Army Educational Outreach Program

High School Apprenticeship Program

2014 Annual Program Evaluation Report

ARMY EDUCATIONAL OUTREACH PROGRAM

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Executive Summary

The High School Apprenticeship Program (HSAP), managed by the U.S. Army Research Office (ARO), is an Army Educational Outreach Program (AEOP) commuter program for high school students who demonstrate an interest in science, technology, engineering, or mathematics (STEM) to work as an apprentice in an Army-funded university or college research laboratory. HSAP is designed so that students (herein called apprentices) can apprentice in fields of their choice with experienced scientists and engineers (S&Es, herein called mentors) full-time during the summer or part-time during the school year.

Students receive an educational stipend equivalent to $10 per hour, and are allowed to work up to 300 hours total. The students contribute to the research of the laboratory while learning research techniques in the process. This "hands-on" experience gives students a broader view of their fields of interest and shows students what kind of work awaits them in their future career. At the end of the program, the students prepare final reports for submission to the US Army Research Office Youth Science programs office.

In 2014, HSAP provided outreach to 10 apprentices and their mentors at seven Army-sponsored university or college laboratory sites (herein called HSAP sites).

This report documents the evaluation of the 2014 HSAP program. The evaluation addressed questions related to program strengths and challenges, benefits to participants, and overall effectiveness in meeting AEOP and program objectives. The assessment strategy for HSAP included post-program questionnaires distributed to all apprentices and mentors, individual interviews with four apprentices, and an online focus group with three mentors.

2014 HSAP Fast Facts	
Description	STEM Apprenticeship Program – Summer, in Army-funded laboratories at colleges/universities nationwide, with college/university S&E mentors
Participant Group	9th-12th grade students
No. of Applicants	84
No. of Students (Apprentices)	10
Placement Rate	12%
No. of Adults (Mentors)	7
No. of College/University S&Es	7
No. of K-12 Schools	10
No. of K-12 Schools – Title I	N/A

No. of Army-Funded College/University Laboratories	7
No. of College/Universities	7
No. of HBCU/MIs	3
Total Cost	$38,239
Admin/Overhead Costs (Host Sites)	$5,132
Stipend Cost (paid by AEOP and ARO)	$33,107
Cost Per Student Participant	$3,824

The response rate for the post-program apprentice survey was 80%. Although some caution is warranted when interpreting these data, it appears that the respondents are generally representative of apprentices as a whole participating in the HSAP program. In contrast, the response rate for the mentor survey was only 29%. Because of the small number of responses to the mentor survey, these data are not included in this report, both because of the extremely large margin of error (63.26% @ 95% confidence[1]) indicating low confidence that the data would be representative of all mentors, and because the data may allow the respondents to be identified (violating assurance of anonymity given when collecting the data).

Summary of Findings

The FY14 evaluation of HSAP collected data about participants; their perceptions of program processes, resources, and activities; and indicators of achievement in outcomes related to AEOP and program objectives. A summary of findings is provided in the following table.

2014 HSAP Evaluation Findings	
Participant Profiles	
HSAP serves students of historically underrepresented and underserved populations.	• HSAP has been somewhat successful in attracting participation of female students; half (5 of 10) of enrolled participants are female—a population that is historically underrepresented in engineering fields.
	• HSAP has moderate success in providing outreach to students from historically underrepresented and underserved race/ethnic and low-income groups. Of enrolled apprentices, 2 of 10 are Black or African American, 3 of 10 qualify for free or reduced-price lunch (FRL), and 5 of 10 attend school in urban areas.

[1] "Margin of error @ 95% confidence" means that 95% of the time, the true percentage of the population who would select an answer lies within the stated margin of error. For example, if 47% of the sample selects a response and the margin of error at 95% confidence is calculated to be 5%, if you had asked the question to the entire population, there is a 95% likelihood that between 42% and 52% would have selected that answer. A 2-5% margin of error is generally acceptable at the 95% confidence level.

Actionable Program Evaluation	
HSAP marketing and recruitment occurs at the site-level.	• When recruiting potential host sites, HSAP's marketing and advertising campaigns target the very specific population of Army-funded university and college researchers.
	• Marketing to recruit student participants targets students in proximity to specific HSAP host sites. Responding apprentices most frequently learned about HSAP from the program or AEOP website (4 of 9) and a teacher/professor (3 of 9).
HSAP apprentices are motivated by opportunities to learn about STEM in ways not possible in school.	• According to information collected at registration, apprentices were motivated to participate in HSAP by the desire to learn something new or interesting, because of their interest in STEM, and to learn in ways not possible in school.
HSAP engages apprentices in meaningful STEM learning, through team-based and authentic STEM experiences.	• Most responding apprentices reported learning about applications of STEM to real-life situations, cutting-edge STEM research, and STEM topics on most days or every day of their HSAP experience.
	• Apprentices had opportunities to engage in a variety of STEM practices during their HSAP experience. For example, 5 of 8 reported practicing laboratory/field techniques, procedures; participating in hands-on STEM activities, drawing conclusions from an investigation, and analyzing or interpreting data/information every day of their HSAP experience.
	• Apprentices reported greater opportunities to learn about STEM and greater engagement in STEM practices in their HSAP experience than they typically have in school.
HSAP can improve its promotion of DoD STEM research and careers and marketing of other AEOP opportunities.	• The majority of responding apprentices have favorable opinions of what DoD researchers do and the value of DoD research more broadly.
	• Only half of responding apprentices (3 of 6) reported learning about one or more DoD STEM careers during their participation in HSAP.
	• A substantial proportion of apprentices reported never hearing about or never participating in AEOP programs beyond HSAP.
Apprentices value the HSAP experience.	• Responding apprentices were largely satisfied with their HSAP experience, including communications from Army Research Office, the application/ registration process, available of interesting program topics/fields, and mentorship during program activities.
Outcomes Evaluation	
HSAP had positive impacts on apprentices' STEM knowledge and competencies.	• A majority of responding apprentices reported large or extreme gains on their knowledge of how professionals work on real problems in STEM, what everyday research work is like in STEM, a STEM topic or field in depth, research conducted in a STEM topic or field, and the research processes, ethics, and rules for conduct in STEM.

	• Apprentices reported impacts on their abilities to do STEM, including such things as communicating information about their design processes and/or solutions in different formats; integrating information from multiple sources to support their explanations of phenomena; and supporting a proposed explanation with relevant scientific, mathematical, and/or engineering knowledge.
HSAP had positive impacts on apprentices' 21st Century Skills.	• The majority of responding apprentices reported large or extreme gains in a number of areas, including their ability to work independently, make changes when things do not go as planned, communicate effectively with others, and work collaboratively with a team.
HSAP positively impacted apprentices' confidence and identity in STEM, as well as their interest in future STEM engagement.	• All 6 responding apprentices reported large or extreme gains in their preparedness for more challenging STEM activities, confidence to do well in future STEM courses, feeling like part of a STEM community, and feeling responsible for a STEM project or activity.
	• Apprentices also reported on the likelihood that they would engage in additional STEM activities outside of school. A majority of apprentices indicated that as a result of HSAP, they were more likely to engage in such activities as solving mathematical or scientific puzzles, looking up STEM information at a library or on the internet, helping with a community service project that relates to STEM, mentoring or teaching other students about STEM, and tinkering with a mechanical or electrical device.
HSAP succeeded in raising students' education aspirations, but did not affect career aspirations.	• After participating in HSAP, some responding apprentices indicated being more likely to go further in their schooling than they would have before HSAP.
	• Apprentices were asked to indicate what kind of work they expected to be doing at age 30, with the majority indicating interest in a STEM-related career, both before and after HSAP.
HSAP apprentices show interest in future AEOP opportunities.	• Although apprentices reported limited exposure to and past participation in AEOP programs beyond HSAP, 5 of 6 apprentices reported interest in participating in other AEOP programs in the future.
HSAP raised apprentice awareness and appreciation of DoD STEM research and careers, as well as their interest in pursuing a STEM career with the DoD.	• Although only half of responding apprentices (3 of 5) reported learning about one or more DoD STEM careers during their participation in HSAP, a majority also reported that they had a greater awareness (5 of 6) and appreciation (5 of 6) of DoD STEM research and careers. In addition, 4 apprentices agreed that HSAP increased their interest in earing a STEM degree in college, and 5 agreed that HSAP made them more interested in pursuing a STEM career with the DoD.

Recommendations

1. The HSAP program was moderately successful in 2014 at attracting students from groups historically underrepresented and underserved in these fields. HSAP recruitment of apprentices occurs at the site-level using connections or mechanisms available to the university or college site and community in which they are situated. Therefore, the ability of HSAP to recruit underrepresented or underserved populations of students depends upon the diversity of the local communities, and especially high schools, in which recruitment takes place. Consistent with the recommendation in FY13, the program should continue to consider practical solutions to the challenge posed by HSAP locations, such as expanding to alternative research sites or offering travel stipends, transportation, and/or temporary accommodations to students. In addition, the program may want to contemplate expanding to additional research sites, particularly in areas with diverse student populations.

2. The program may want to consider doing more to increase the likelihood that the program has a long-term impact on the number of apprentices who pursue STEM. Strategies that have been shown to be effective in this area include providing role models for students, exposing them to different education and career possibilities, providing guidance on how to pursue specific education and career paths (e.g., what courses they need to take in school, how to navigate the college application process), and providing coaching on the "soft skills" (e.g., time management, communication skills) needed to be successful in STEM careers. The program should consider ways to ensure that these areas are addressed systematically. For example, the program may want to work with each site to see how these areas could be built into their schedules, or provide more guidance to mentors for how and when to address these issues.

3. Given the goal of exposing apprentices to other AEOP initiatives and encouraging continued participation (including as a mentor or volunteer), HSAP may want to work with sites to increase apprentices' exposure to AEOP. To this end, HSAP should ensure that mentors: (1) are aware of the intended focus on exposing apprentices to AEOP/DoD programs, (2) have the resources to educate themselves and their apprentices about these programs, and (3) are equipped to help apprentices apply to other AEOP/DoD programs. Given the limited use of the program website, print materials, and social media, the program may want to consider how these resources could be leveraged to provide mentors and apprentices with information about AEOP initiatives and facilitate increased enrollment.

4. Additional efforts should be undertaken to improve participation in evaluation activities. Although the FY14 response rate for the apprentice survey increased, 80% in FY14 compared to 63% in FY13, the 29% response rate for the mentor survey was substantially lower than the 100% response rate for the mentor survey in 2013. The low numbers of mentors in 2014, coupled with the low response rate on the mentor questionnaire, raise major questions about the representativeness of the results. Improved communication with the individual program sites about expectations for the evaluation may help. Specifically, it is recommended that the program administrator ensures that mentors are aware they are expected to participate in surveys/focus groups and encourage their apprentices to do the same. In

addition, as noted in FY13, the evaluation instruments may need to be streamlined as perceived response burden can affect participation. In particular, consideration should be given to whether the parallel nature of the apprentice and mentor questionnaires is necessary, with items being asked only of the most appropriate data source.

Introduction

The Army Educational Outreach Program (AEOP) vision is to offer a collaborative and cohesive portfolio of Army sponsored science, technology, engineering and mathematics (STEM) programs that effectively engage, inspire, and attract the next generation of STEM talent through K-college programs and expose them to Department of Defense (DoD) STEM careers. The consortium, formed by the Army Educational Outreach Program Cooperative Agreement (AEOP CA), supports the AEOP in this mission by engaging non-profit, industry, and academic partners with aligned interests, as well as a management structure that collectively markets the portfolio among members, leverages available resources, and provides expertise to ensure the programs provide the greatest return on investment in achieving the Army's STEM goals and objectives.

AEOP Goals

Goal 1: STEM Literate Citizenry.

- Broaden, deepen, and diversify the pool of STEM talent in support of our defense industry base.

Goal 2: STEM Savvy Educators.

- Support and empower educators with unique Army research and technology resources.

Goal 3: Sustainable Infrastructure.

- Develop and implement a cohesive, coordinated, and sustainable STEM education outreach infrastructure across the Army.

This report documents the evaluation of one of the AEOP elements, the High School Apprenticeship Program (HSAP). HSAP is managed by the U.S. Army Research Office (ARO). The evaluation study was performed by Virginia Tech, the Lead Organization (LO) in the AEOP CA consortium. Data analyses and reports were prepared in collaboration with Horizon Research, Inc.

Program Overview

The High School Apprenticeship Program (HSAP), managed by the U.S. Army Research Office (ARO), is an Army Educational Outreach Program (AEOP) commuter program for high school students who demonstrate an interest in science, technology, engineering, or mathematics (STEM) to work as an apprentice in an Army-funded university or college research laboratory. HSAP is designed so that students (herein called apprentices) can apprentice in fields of their choice with experienced scientists and engineers (S&Es, herein called mentors) during the summer.

Apprentices receive an educational stipend equivalent to $10 per hour, and are allowed to work up to 300 hours total. The apprentices contribute to the research of the laboratory while learning research techniques in the process. This "hands-on" experience gives apprentices a broader view of their fields of interest and shows them what kind of work awaits them in their future career. At the end of the program, the apprentices prepare final reports for submission to the U.S. Army Research Office's Youth Science Programs office.

In 2014, HSAP was guided by the following priorities:

1. Provide hands-on science and engineering research experience to high school students;
2. Educate students about the Army's interest and investment in science and engineering research and the associated educational opportunities available to students through the AEOP;
3. Provide students with experience in developing and presenting scientific research;
4. Benefit students from the expertise of a scientist or engineer as a mentor; and
5. Develop students' skills and background to prepare them for competitive entry to science and engineering undergraduate programs.

HSAP awards were made at seven universities or colleges in seven different U.S. States and funded 10 apprentices (see Table 1). Three of the seven institutions have Historically Black College and University (HBCU) or Minority-serving (MI) status (denoted with an asterisk below.)

Table 1. 2014 HSAP Sites

2014 HSAP Site	City	State
Arizona State University	Phoenix	Arizona
City College of New York*	New York	New York
Clark Atlanta University*	Atlanta	Georgia
North Carolina State University	Raleigh	North Carolina
Northeastern University	Boston	Massachusetts
Princeton University	Princeton	New Jersey
University of California – Irvine*	Irvine	California

The total cost of the 2014 HSAP program was approximately $38,239, including $33,107 in stipends. The average cost per HSAP participant was $3,824. Table 2 summarizes these and other 2014 HSAP program costs. Funding was provided by ARO via Director discretionary funds matching program manager funds.

Table 2. 2014 HSAP Program Costs

2014 HSAP - Cost Per Participant	
Total Participants (Apprentices)	10
Total Cost	$38,239
Total Stipends	$33,107
Cost Per Participant	**$3,824**

Evidence-Based Program Change

AEOP programs are tasked with achieving three broad priorities: (1) STEM Literate Citizenry – Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base; (2) STEM Savvy Educators – Support and empower educators with unique Army research and technology resources; and (3) Sustainable Infrastructure – Develop and implement a cohesive, coordinated, and sustainable STEM education outreach infrastructure across the Army. ARO initiated the following program changes/additions to the FY14 administration of the HSAP program in light of the AEOP priorities, the FY13 HSAP evaluation study, and site visits conducted by ARO:

I. **STEM Literate Citizenry – Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base.**
   a. Student recruiting and selection criteria were more clearly outlined and used in the broad agency announcement and RFP process. An educational merit review criteria, which required proposals to clearly articulate the strategy for mentorship and facilitation of follow-on opportunities, was added to the Broad Agency Announcement (BAA). This change was made in an effort to clearly define learning and research objectives to ensure student success in short term research programs.
   b. The criteria used to select participants included transcripts, resumes and essays. The program administrator provided guidance to the professors by attempting to highlight the target audience upon transferring the student information to the university.

II. **STEM Savvy Educators – Support and empower educators with unique Army research and technology resources.**
   a. The program partnered with national schools and educators with shared interest in STEM fields to expand mentorship capacity of Army-sponsored researchers across the nation.
   b. One HSAP mentor has begun a partnership with a local high school to formalize a relationship where students can become involved in HSAP.

III. **Sustainable Infrastructure – Develop and implement a cohesive, coordinated, and sustainable STEM education outreach infrastructure across the Army.**
   a. The HSAP program administrator performed marketing and recruiting activities by distributing AEOP marketing materials at various events (science fairs, local JSHS events, local site visits, etc.).
   b. The HSAP program administrator also spoke on behalf of the AEOP at those various events to promote awareness.

FY14 Evaluation At-A-Glance

Virginia Tech, in collaboration with ARO, conducted a comprehensive evaluation study of the HSAP program. The HSAP logic model below presents a summary of the expected outputs and outcomes for the HSAP program in relation to the AEOP and HSAP-specific priorities. This logic model provided guidance for the overall HSAP evaluation strategy.

Inputs	Activities	Outputs	Outcomes (Short term)	Impact (Long Term)
• Army sponsorship • ARO providing oversight of programming • Operations conducted by seven Army-funded university/college labs (HSAP sites) • Ten students participating in HSAP apprenticeships • Seven university/college S&Es serve as HSAP mentors • Apprenticeship funds administered to university/college labs to support student participation • Centralized branding and comprehensive marketing • Centralized evaluation	• Students engage in authentic STEM research experiences through hands' on summer apprenticeships at Army-sponsored university/college labs • University/college S&Es supervise and mentor students' research • Program activities that expose students to AEOP programs and/or STEM careers in the Army or DoD	• Number and diversity of student participants engaged in HSAP • Number and diversity of university/college S&Es engaged in HSAP • Number and Title 1 status of high schools served through student engagement • Students, university/college S&Es, and ARO contributing to evaluation	• Increased student STEM competencies (confidence, knowledge, skills, and/or abilities to do STEM) • Increased student interest in future STEM engagement • Increased student awareness of and interest in other AEOP opportunities • Increased student awareness of and interest in STEM research and careers • Increased student awareness of and interest in Army/DoD STEM research and careers • Implementation of evidence-based recommendations to improve HSAP programs	• Increased student participation in other AEOP opportunities and Army/DoD-sponsored scholarship/ fellowship programs • Increased student pursuit of STEM coursework in secondary and post-secondary schooling • Increased student pursuit of STEM degrees • Increased student pursuit of STEM careers • Increased student pursuit of Army/DoD STEM careers • Continuous improvement and sustainability of HSAP

The HSAP evaluation gathered information from apprentice and mentor participants about HSAP processes, resources, activities, and their potential effects in order to address key evaluation questions related to program strengths and challenges, benefits to participants, and overall effectiveness in meeting AEOP and HSAP program objectives.

Key Evaluation Questions

- What aspects of HSAP motivate participation?
- What aspects of HSAP structure and processes are working well?
- What aspects of HSAP could be improved?
- Did participation in HSAP:
  - Increase apprentices' STEM competencies?
  - Increase apprentices' interest in future STEM engagement?
  - Increase apprentices' awareness of and interest in other AEOP opportunities?
  - Increase apprentices' awareness of and interest in Army/DoD STEM research and careers?

The assessment strategy for HSAP included post-program apprentice and mentor questionnaires, individual interviews with four apprentices (1 online and 3 via telephone), and an online focus group with three mentors. Tables 3-6 outline the information collected in apprentice and mentor questionnaires, apprentice interviews, and mentor focus group.

Table 3. 2014 Apprentice Questionnaire

Category	Description
Profile	**Demographics:** Participant gender, age, grade level, race/ethnicity, and socioeconomic status indicators
	Education Intentions: Degree level, confidence to achieve educational goals, field sought
Satisfaction & Suggestions	Benefits to participants, suggestions for improving programs, overall satisfaction
AEOP Goal 1	**Capturing the Apprentice Experience:** In-school vs. in-program experience, mentored research experience and products
	STEM Competencies: Gains in Knowledge of STEM, Science & Engineering Practices; contribution of AEOP
	Transferrable Competencies: Gains in 21st Century Skills
	STEM Identity: Gains in STEM identity, intentions to participate in STEM, STEM-oriented education and career aspirations, contribution of AEOP
	AEOP Opportunities: Past participation, awareness of, and interest in participating in other AEOP programs; contribution of AEOP; impact of AEOP resources
	Army/DoD STEM: Exposure to Army/DoD STEM jobs, attitudes toward Army/DoD STEM research and careers, change in interest for STEM and Army/DoD STEM jobs; contribution of AEOP, impact of AEOP resources
AEOP Goal 2	**Mentor Capacity:** Perceptions of mentor/teaching strategies (apprentices respond to a subset)

and 3	**Comprehensive Marketing Strategy:** How apprentices learn about AEOP, motivating factors for participation, impact of AEOP resources on awareness of AEOPs and Army/DoD STEM research and careers

Table 4. 2014 Mentor Questionnaire	
Category	**Description**
Profile	**Demographics:** Participant gender, race/ethnicity, occupation, past participation
Satisfaction & Suggestions	Awareness of HSAP, motivating factors for participation, satisfaction with and suggestions for improving the HSAP program, benefits to participants
AEOP Goal 1	**Capturing the Apprentice Experience:** In-program experience
	STEM Competencies: Gains in Knowledge of STEM, Science & Engineering Practices; contribution of AEOP
	Transferrable Competencies: Gains in 21st Century Skills
	AEOP Opportunities: Past participation, awareness of other AEOP programs; efforts to expose apprentices to AEOPs, impact of AEOP resources on efforts; contribution of AEOP in changing apprentice AEOP metrics
	Army/DoD STEM: Attitudes toward Army/DoD STEM research and careers, efforts to expose apprentices to Army/DoD STEM research/careers, impact of AEOP resources on efforts; contribution of AEOP in changing apprentice Army/DoD career metrics
AEOP Goal 2 and 3	**Mentor Capacity:** Perceptions of mentor/teaching strategies
	Comprehensive Marketing Strategy: How mentors learn about AEOP, usefulness of AEOP resources on awareness of AEOPs and Army/DoD STEM research and careers

Table 5. 2014 Apprentice Interviews	
Category	**Description**
Profile	Gender, race/ethnicity, grade level, past participation in HSAP, past participation in other AEOP programs
Satisfaction & Suggestions	Awareness of HSAP, motivating factors for participation, involvement in other science programs in addition to HSAP, satisfaction with and suggestions for improving the HSAP program, benefits to participants
AEOP Goal 1 and 2 Program Efforts	**AEOP Opportunities:** Extent to which apprentices were exposed to other AEOP opportunities
	Army/DoD STEM: Extent to which apprentices were exposed to STEM and Army/DoD STEM jobs

Table 6. 2014 Mentor Focus Group	
Category	**Description**
Profile	Gender, race/ethnicity, occupation, organization, role in HSAP, past participation in HSAP, past participation in other AEOP programs

Satisfaction & Suggestions	Perceived value of HSAP, benefits to apprentices, benefits to mentors, suggestions for improving the HSAP program
AEOP Goal 1 and 2 Program Efforts	**AEOP Opportunities:** Efforts to expose apprentices to AEOP opportunities
	Army/DoD STEM Careers: Efforts to expose apprentices to STEM and Army/DoD STEM jobs
	Mentor Capacity: Strategies used to increase diversity/support diversity in HSAP

Detailed information about methods and instrumentation, sampling and data collection, and analysis are described in Appendix A, the evaluation plan. The reader is strongly encouraged to review Appendix A to clarify how data are summarized, analyzed, and reported in this document. Questionnaires and respective data summaries are provided in Appendix B (apprentice) and Appendix C (mentor). The apprentice interview protocol is provided in Appendix D and the mentor focus group protocol is provided in Appendix E. Major trends in data and analyses are reported herein.

Study Sample

Table 7 provides an analysis of apprentice and mentor participation in the HSAP post-program questionnaires, the response rate, and the margin of error at the 95% confidence level (a measure of how representative the sample is of the population). The response rate for the post-program apprentice survey was quite good at 80%, a marked improvement from a 63% response rate in FY13. However, the 29% response rate for the mentor survey was very low, substantially lower than the 100% response rate for the mentor survey last year. Because of the small number of responses to the mentor survey, these data are not included in this report, both because of the extremely large margin of error and because the data may allow the respondents to be identified (violating assurance of anonymity given when collecting the data).

Table 7. 2014 HSAP Questionnaire Participation

Participant Group	Respondents (Sample)	Total Participants (Population)	Participation Rate	Margin of Error @ 95% Confidence[2]
Apprentices	8	10	80%	16.33%
Mentors	2	7	29%	63.26%

Individual interviews were conducted with four apprentices (2 females, 2 males). Participants ranged from rising 10th graders to rising college freshmen. One mentor focus group was also conducted, which included three mentors. The interviews and focus group were not intended to yield generalizable findings; rather they were intended to provide

[2] "Margin of error @ 95% confidence" means that 95% of the time, the true percentage of the population who would select an answer lies within the stated margin of error. For example, if 47% of the sample selects a response and the margin of error at 95% confidence is calculated to be 5%, if you had asked the question to the entire population, there is a 95% likelihood that between 42% and 52% would have selected that answer. A 2-5% margin of error is generally acceptable at the 95% confidence level.

additional evidence of, explanation for, or illustrations of apprentice questionnaire data. They add to the overall narrative of HSAP's efforts and impact, and highlight areas for future exploration in programming and evaluation.

Respondent Profiles

Apprentice Demographics

Demographic information collected from HSAP apprentice questionnaire respondents is summarized in Table 8.[3] Equal numbers of males and females completed the questionnaire. More responding apprentices identified with the race/ethnicity category of Asian (4 of 8) than any other single race/ethnicity category. Respondents ranged from rising 10th graders to rising college freshmen. Three of 8 reported qualifying for FRL—a common indicator of low-income status. As can be seen in Table 9, all respondents attended public schools and most attended schools in suburban areas (5 of 8).

These data indicate HSAP was successful in attracting participation from female students—a population that is historically underrepresented in many STEM fields. HSAP also had moderate success in providing outreach to students from historically underrepresented and underserved race/ethnicity and low-income groups.

[3] In FY15 the AEOP developed and implemented a new application tool through the vendor, Cvent. This centralized tool will facilitate accurate and improved collection of demographic information from participants across the portfolio of AEOP initiatives.

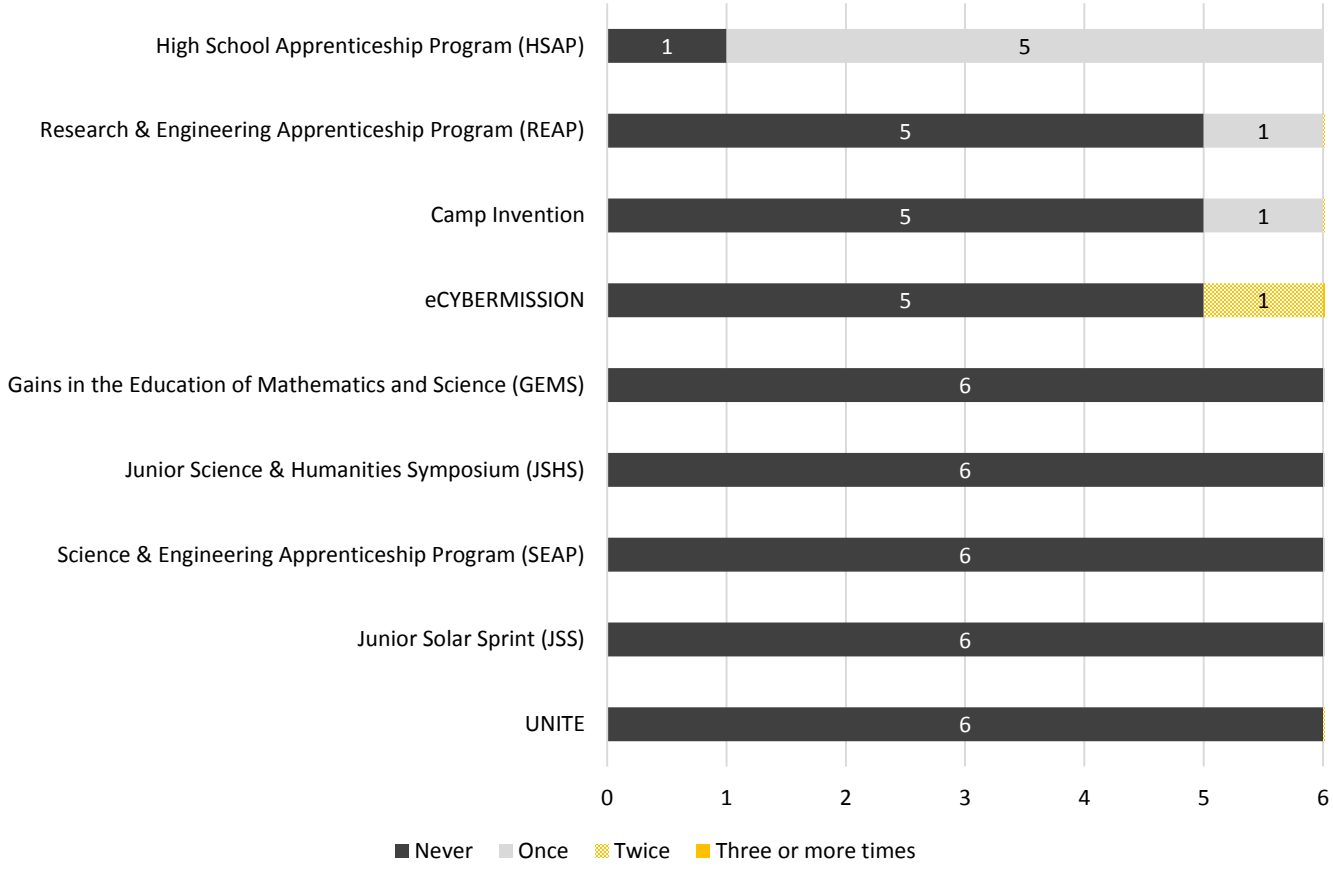
Table 8. 2014 HSAP Apprentice Respondent Profile	
Demographic Category	**Questionnaire Respondents**
Respondent Gender (n = 8)	
Female	4
Male	4
Respondent Race/Ethnicity (n = 8)	
Asian	4
Black or African American	2
Hispanic or Latino	0
Native American or Alaska Native	0
Native Hawaiian or Other Pacific Islander	0
White	0
Other race or ethnicity, (specify):[†]	2
Respondent Grade Level in Fall (n = 8)	
10th	1
11th	1
12th	3
College Freshman	3
Respondent Eligible for FRL (n = 8)	
Yes	3
No	5

[†] Other = "White & Asian" and "Mixed."

Table 9. 2014 HSAP Apprentice Respondent School Information	
Demographic Category	**Questionnaire Respondents**
Respondent School Location (n = 8)	
Suburban	5
Urban (city)	3
Frontier or tribal school	0
Rural (country)	0
Respondent School Type (n = 8)	
Public school	8
Private school	0
Home school	0

Apprentices were asked how many times they participated in each of the AEOP programs. As can be seen in Chart 1, 5 of the 6 respondents to this item reported participating in HSAP once. Few apprentices reported participating in any of the other AEOP programs. These data are similar to 2013, suggesting that HSAP may be serving as an entry point into AEOP programming.

Chart 1: Apprentice Participation in AEOP Programs (n = 5-6)



Actionable Program Evaluation

Actionable Program Evaluation is intended to provide assessment and evaluation of program processes, resources, and activities for the purpose of recommending improvements as the program moves forward. This section highlights information outlined in the Satisfaction & Suggestions sections of Tables 3-6.

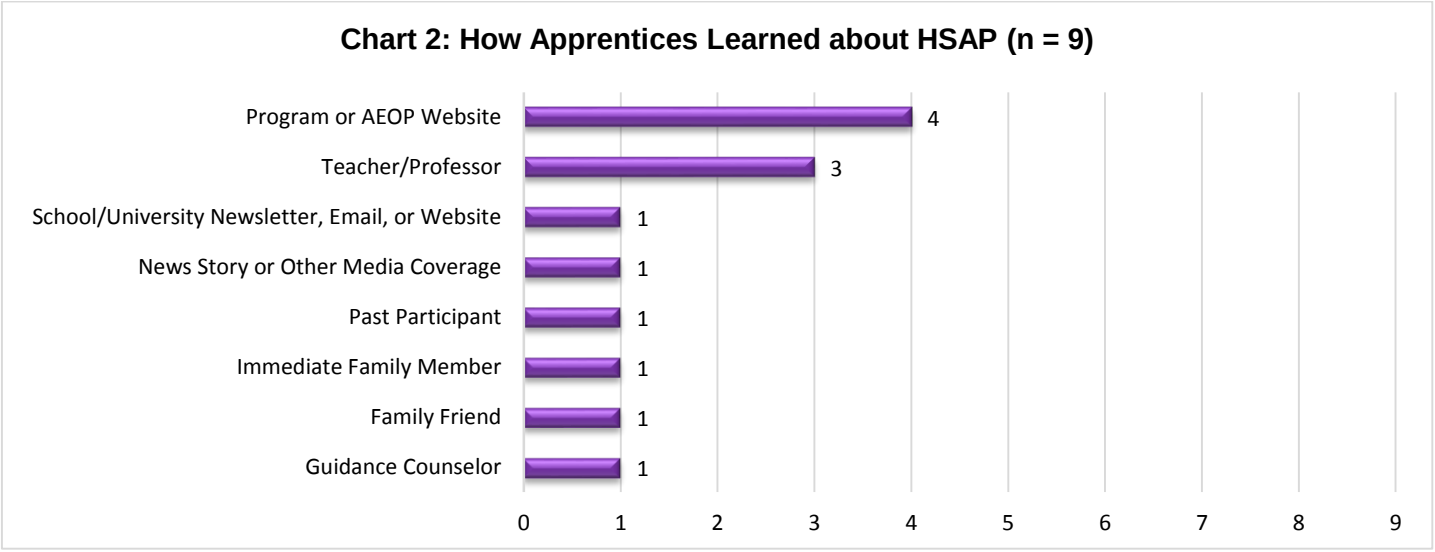
A focus of the Actionable Program Evaluation is efforts toward the long-term goal of HSAP and all of the AEOP to increase and diversify the future pool of talent capable of contributing to the nation's scientific and technology progress. HSAP sites reach out to students of traditionally underrepresented and underserved populations. Thus, it is important to consider how HSAP is marketed and ultimately recruits student participants, the factors that motivate students to participate in HSAP, participants' perceptions of and satisfaction with activities, what value participants place on program activities, and what recommendations participants have for program improvement. The following sections report perceptions of apprentices and mentors that pertain to current programmatic efforts and recommend evidence-based improvements to help HSAP achieve outcomes related to AEOP programs and objectives.

Marketing and Recruiting Underrepresented and Underserved Populations

Marketing and recruitment for HSAP occurred both in the solicitation of host sites and students. ARO, the manager of HSAP as well as the Undergraduate Research Apprenticeship Program (URAP), invited Army-funded university and college laboratories nationwide to apply for the opportunity to host HSAP and/or URAP apprentices. Once the host labs were selected, HSAP apprenticeships were marketed to students in the following ways: together with the AEOP portfolio of opportunities on the AEOP website, print materials, and social media; and through targeted distribution of marketing materials at regional STEM events, including the Junior Science & Humanities Symposium (JSHS). It is unclear how these marketing and recruiting efforts targeted underrepresented and underserved student and mentor populations.

In order to understand which recruitment methods are most effective, the HSAP application asked apprentices to select all of the different ways they heard about HSAP. As can be seen in Chart 2, the program or AEOP website (4 of 9 apprentices) and a teacher or professor (3 of 9) were the most frequently mentioned sources of information about HSAP.

Chart 2: How Apprentices Learned about HSAP (n = 9)



Factors Motivating Apprentice Participation

The HSAP application asked how motivating a number of factors were in apprentices' decisions to participate in the program. As can be seen in Table 10, all nine responding apprentices indicated that the desire to learn something new or interesting, interest in STEM, and learning in ways that are not possible in school were very motivating. Eight respondents also indicated that exploring a unique work environment, having fun, and the opportunity to use advanced laboratory technology were very motivating.

Table 10. Factors That were "Very Motivating" in Apprentices' Decision to Participate in HSAP (n = 9)

Item	Questionnaire Respondents
Desire to learn something new or interesting	9
Interest in science, technology, engineering, or mathematics (STEM)	9
Learning in ways that are not possible in school	9
Exploring a unique work environment	8
Having fun	8
Opportunity to use advanced laboratory technology	8
Desire to expand laboratory or research skills	7
Serving the community or country	7
Networking opportunities	6
Opportunity to do something with friends	6
Program mentor(s)	6
Teacher or professor encouragement	6
An academic requirement or school grade	5
Parent encouragement	5
Building college application or résumé	4
Earning stipend or award while doing STEM	4
Interest in STEM careers with the Army	2

Preparing for college and exploring possible careers in STEM were mentioned in the individual apprentice interviews as reasons for participating in HSAP. In the words of three apprentices:

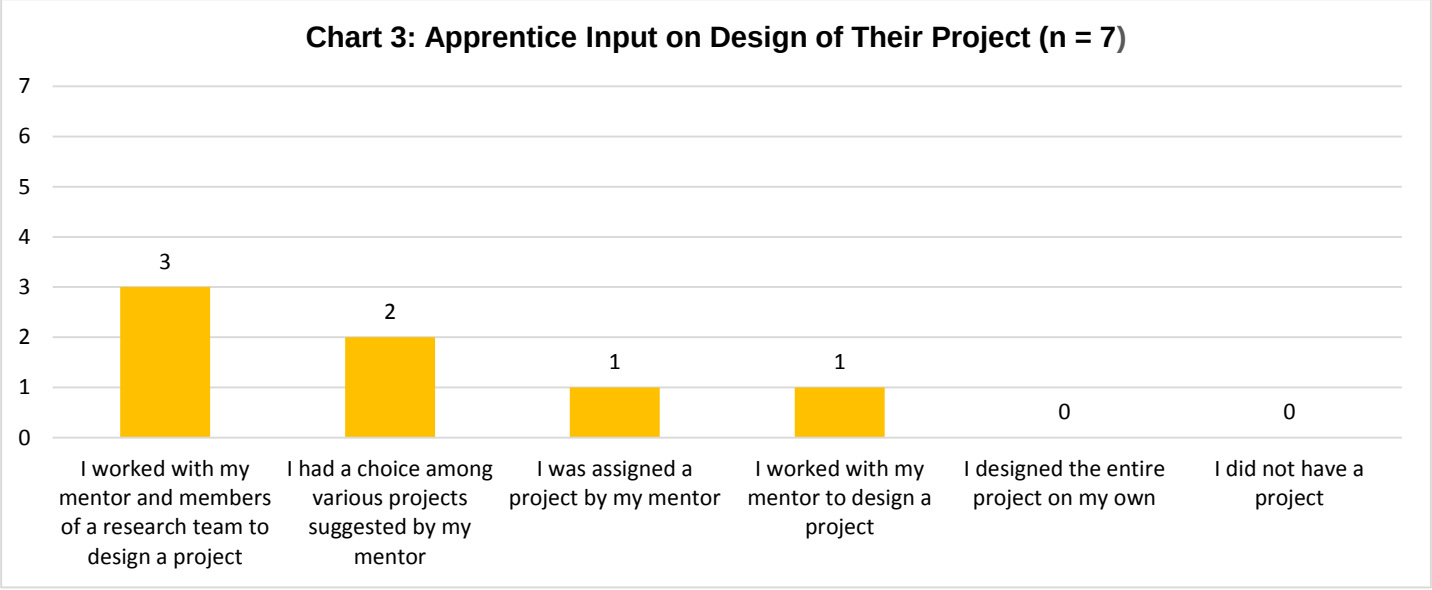
> *I'm going into college and thought it would be good experience for me. I'm planning on majoring in [a STEM field] so I found a professor [in that field] that I could do the apprenticeship with. I thought about getting a head start with what I'll be doing in college in the future. (HSAP Apprentice)*

I guess I needed something to do over the summer and wanted to be exposed to college labs, professors…I wanted to get a chance to get the college thing down pat before I go. (HSAP Apprentice)

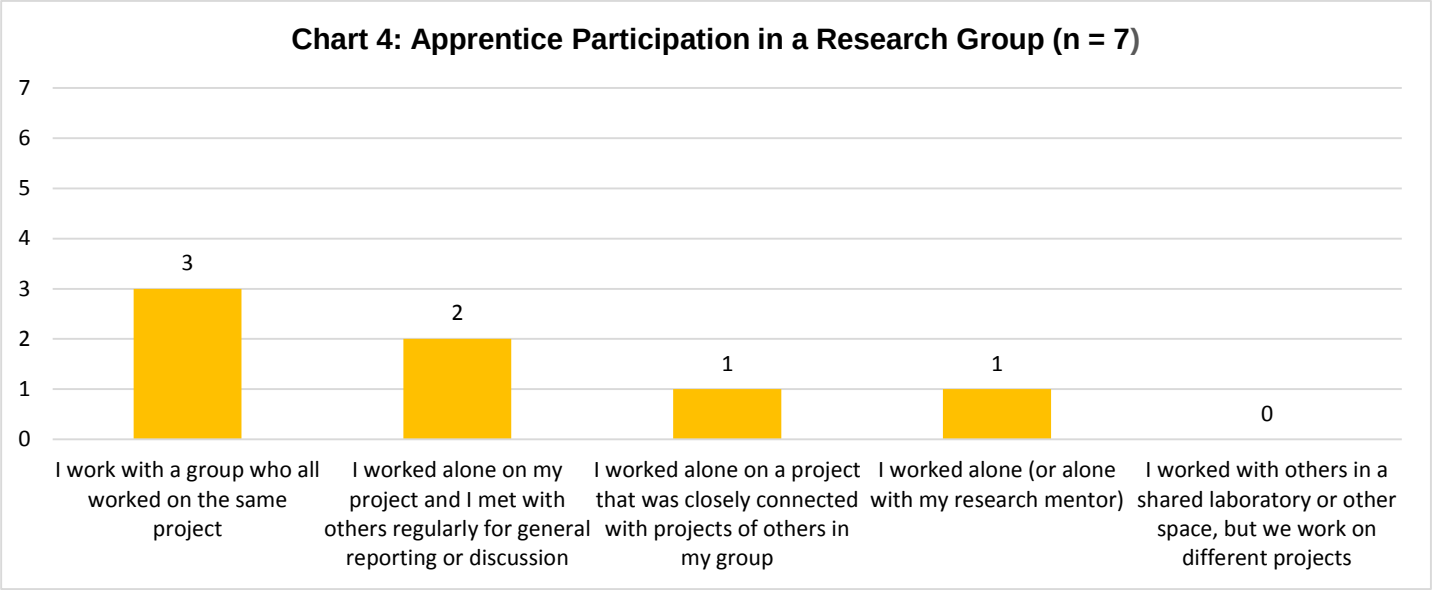
I knew I wanted to go into [a STEM field]. I was looking for a program that was a little bit more advanced. I was looking at a lot of various programs. This one just stood out to me because it's more actual work experience than the other ones. (HSAP Apprentice)

The HSAP Experience

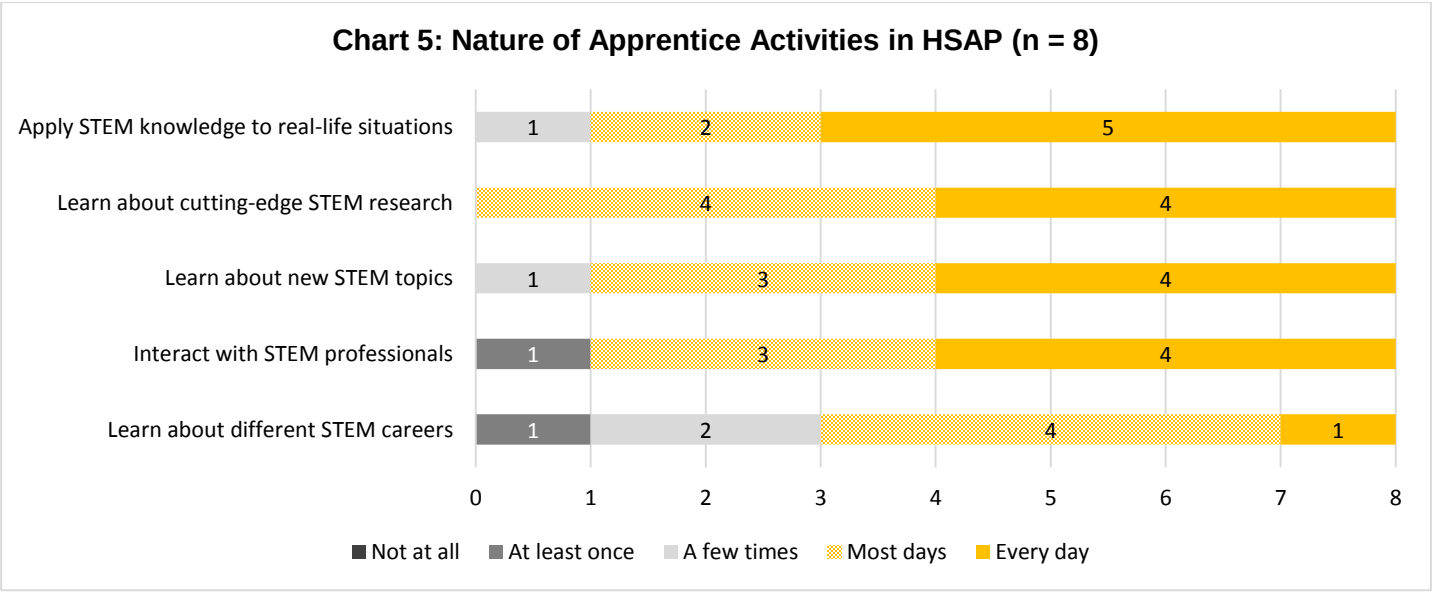
The apprentice questionnaire included several items asking about the nature of apprentices' experience in HSAP, and how that experience compared to their STEM learning opportunities in school. When asked what field their HSAP experience focused on, 3 of 6 responding apprentices selected science, 2 selected engineering, and 1 selected technology. As can be seen in Chart 3, 3 of 7 responding apprentices indicated that they worked with their mentor and members of a research team to design a project. Additionally, 2 apprentices had a choice among various projects suggested by their mentor, 1 was assigned a project by their mentor, and 1 worked with their mentor to design a project.



About half of responding apprentices (3 of 7) reported working with others on the same project during their experience. Conversely, 4 of 7 worked independently on their projects, although 2 of these apprentices met regularly with others to discuss their projects and 1 worked on a project that was closely connected with projects of others in his/her group (see Chart 4).



Apprentices were also asked a series a questions about what their HSAP experience focused on. As can be seen in Chart 5, all responding apprentices indicated that they applied STEM knowledge to real life situations most days or every day. Further, the vast majority of respondents (7 of 8) indicated that they applied STEM knowledge, learned about new STEM topics, or interacted with STEM professionals most days or every day.



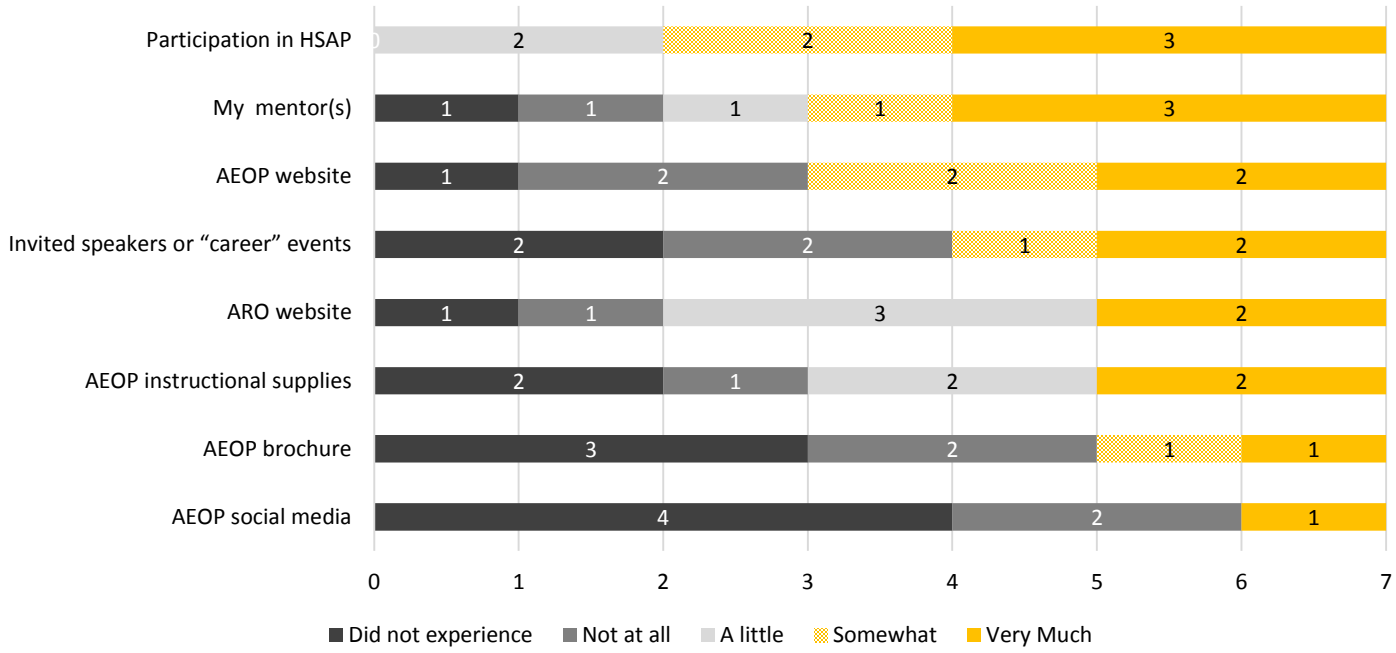
Because increasing the number and diversity of students who purse STEM careers is one goal of the HSAP program, the apprentice questionnaire also asked how many jobs/careers in STEM in general, and STEM jobs/careers in the DoD more specifically, apprentices learned about during their experience. As can be seen in Table 11, 5 of 6 responding apprentices reported learning about at least one STEM job/career, and 3 of 6 reported learning about at least one DoD STEM job/career.

Table 11. Number of STEM Jobs/Careers Apprentices Learned about During HSAP (n = 6)

	STEM Jobs/Careers	DoD STEM Jobs/Careers
None	1	3
1	1	0
2	3	2
3	0	0
4	0	0
5 or more	1	1

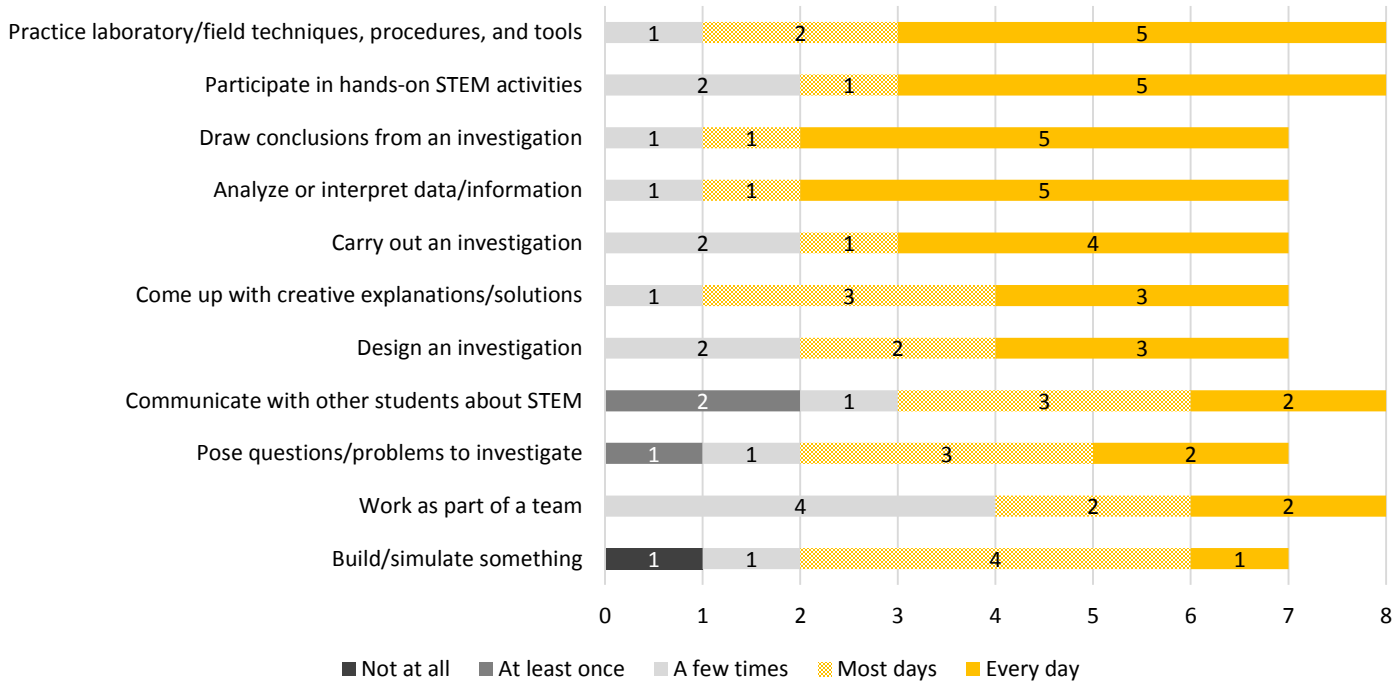
Apprentices were also asked which resources impacted their awareness of DoD STEM careers. Participation in HSAP (5 of 7), apprentices' mentors (4 of 7), and the AEOP website (4 of 7) were most often reported as being somewhat or very much responsible for their awareness of DoD STEM careers (see Chart 6).

Chart 6: Impact of Resources on Apprentice Awareness of DoD STEM Careers (n = 7)



The questionnaire also asked apprentices how often they engaged in various STEM practices during HSAP. Results indicate that apprentices were very actively engaged in doing STEM during the program (see Chart 7). For example, 7 of 8 respondents reported practicing laboratory/field techniques, procedures, and tools and 6 of 8 indicated participating in hands-on STEM activities on most days or every day. Additionally, apprentices indicated being integrally involved in the work of STEM on most days or every day, including drawing conclusions from an investigation (6 of 7), coming up with creative explanations/solutions (6 of 7), analyzing or interpreting data/information (6 of 7), and carrying out investigations (5 of 7).

Chart 7: Apprentice Engagement in STEM Practices in HSAP (n = 7-8)



A composite score[4] was calculated for each of these two sets of items, the first titled "Learning about STEM in HSAP,"[5] and the second "Engaging in STEM Practices in HSAP."[6] Response categories were converted to a scale of 1 = "Not at all" to 5 = "Every day" and the average across all items in the scale was calculated.

To examine how the HSAP experience compares to their typical school experience, apprentices were asked how often they engaged in the same activities in school (individual item responses can be found in Appendix B). These responses were also combined into two composite variables: "Learning about STEM in School,"[7] and "Engaging in STEM Practices in

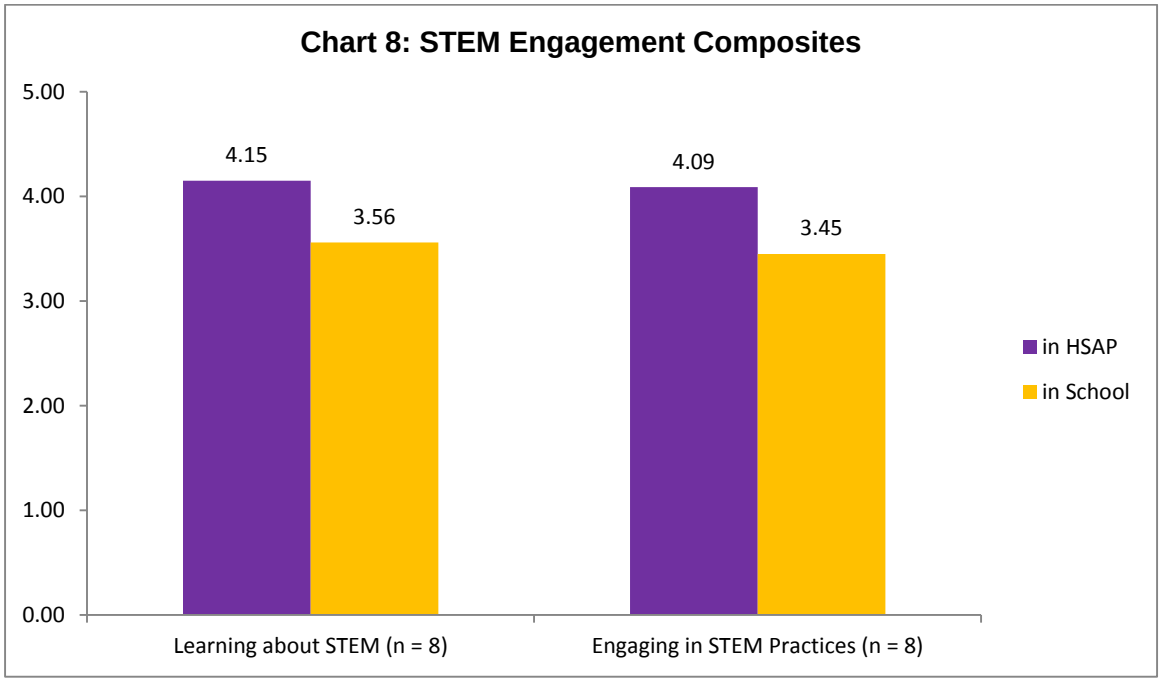
[4] Using multiple statistical tests on related outcomes requires the use of a Type I error rate adjustment to reduce the likelihood of false positives (i.e., detecting a difference when one does not truly exist). However, Type I error rate adjustments lead to a reduction in statistical power (i.e., the ability to detect a difference if it does exist). The use of a composite score helps avoid both of these problems by reducing the total number of statistical tests used. In addition, composite scores are typically more reliable than individual questionnaire items.

[5] The Cronbach's alpha reliability for these 6 items was 0.623.

[6] The Cronbach's alpha reliability for these 10 items was 0.832.

[7] Cronbach's alpha reliability of 0.921.

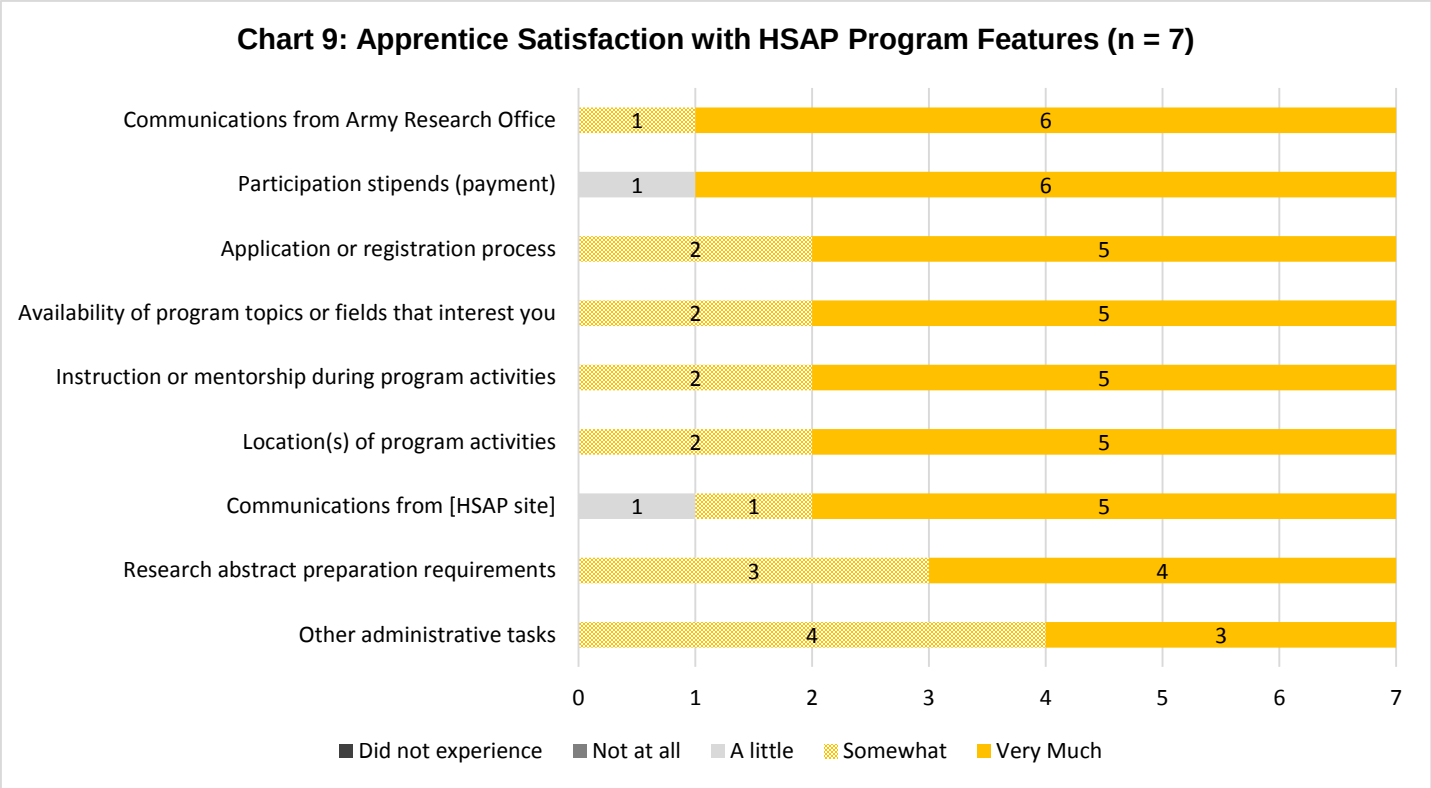
School"[8] that are parallel to the ones asking about HSAP. As can be seen in Chart 8, scores appear to be higher on the "in HSAP" versions of both composites than on the in school versions. However, given the low number of survey respondents, it was not appropriate to test for statistical difference between composite scores.



Satisfaction with HSAP

Apprentices were asked how satisfied they were with a number of features of the HSAP program. As can be seen in Chart 9, all or nearly all respondents were somewhat or very much satisfied with each of the listed program features. For example, 6 of 7 apprentices indicated that they were "very much" satisfied with communications from the Army Research Office and participant stipends.

[8] Cronbach's alpha reliability 0.850.



Apprentices were also asked about access to their mentor. As can be seen in Table 12, 4 of 7 responding apprentices indicated their mentor was always available, and 2 that their mentor was available more than half of the time. Only 1 apprentice indicated that their mentor was available half of the time or less.

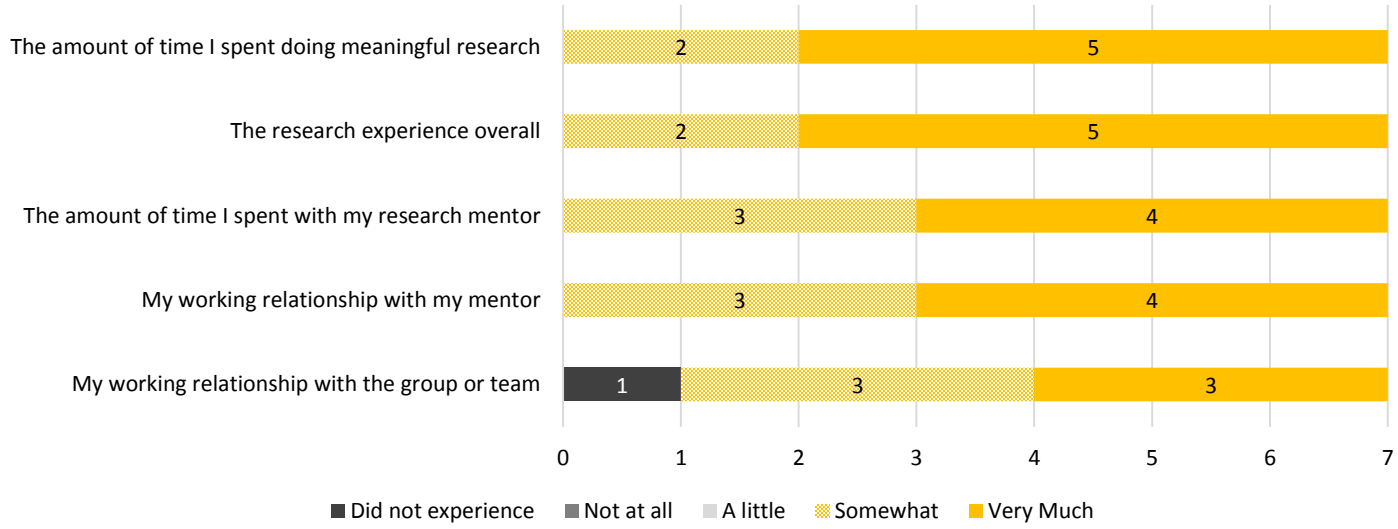
Table 12. Apprentice Reports of Availability of Mentors (n = 7)

Item	Questionnaire Respondents
The mentor was always available	4
The mentor was available more than half of the time	2
The mentor was available about half of the time of my project	1
The mentor was available less than half of the time	0
The mentor was never available	0
I did not have a mentor	0

In addition, apprentices were asked about their satisfaction with their mentors and the research experience (see Chart 10). All or almost all apprentices indicated being "very much" or "somewhat" satisfied with each of the features. Notably,

5 of 7 responding apprentices were “very much” satisfied with the amount of time they spent doing meaningful research and the research experience overall.

Chart 10: Apprentice Satisfaction with Their Experience (n = 7)



An open-ended item on the apprentice questionnaire asked apprentices about their overall satisfaction with their HSAP experience. Five apprentices provided an answer to this question, and their responses were quite positive. In the words of three:

> *With my mentor and my partner, we shared joy and pain together during our experiments. I came to learn and appreciate the camaraderie and patience that goes into slow research projects. Above all, I am really enthusiastic knowing that the work I'm doing could contribute to real life situations. It feels great knowing that the research that I'm working on could help people in the world. While I continue to have a never ending passion for STEM learning, HSAP has made me grow more interest in STEM learning. (HSAP apprentice)*

> *Great experience. I gained so much valuable knowledge and experience related to stem fields and laboratory research. (HSAP Apprentice)*

> *Very satisfied. Learned so much about being a STEM professional especially about working as a researcher. Would do it again. (HSAP Apprentice)*

An open-ended item on the apprentice questionnaire also asked how the program could be improved. Four apprentices offered suggestions, though no suggestion was mentioned by more than two individuals. For example, 2 apprentices indicated the need for better communication from the university and 2 recommended more orientation to the research projects they would be working on. These sentiments were echoed in the apprentice interviews. As two apprentices said:

> *Miscommunication is an issue. I think it's with the university--they got the information, but then we got things late. I think the university got us the information late. (HSAP Apprentice)*

> *Instead of diving into the lab work, have training to ease us into the lab work. I didn't have any idea about the work or the experiments. The professor gave me articles but maybe more could be done to learn more about the specific work I'd be doing. (HSAP Apprentice)*

The mentor focus group explored mentors' perspective of the benefits of the program for apprentices. Mentors described how HSAP allows students to experience research and the environments in which research occurs. In their words:

> *I think it's a really good program because it allows the students, well before the students head to college and choose a major, to see what research environments are like. I think that's really important, because a lot of times you get to college and you're an undergrad and you don't really get that experience, or at least you don't understand that experience unless you happen upon a research apprenticeship. This allows them to see that early on, and I think it really would influence what they decide to do later, what they decide to study. I think that's one of the biggest values. I think, in addition, it gives them a way to use their creativity. It kind of throws them in there, you give them a project but you allow them the freedom to think about what they want to do next, so they're not in this box of a certain procedure or something like that. They can actually put their creativity in, and I think it allows them to develop in a way that boxed learning just doesn't allow.* (HSAP Mentor)

> *[T]he students in the high school, they're doing work that's different from the research program we're doing in the university. We give them more freedom and more independent thinking. That allows them to put more of their*

"Above all, I am really enthusiastic knowing that the work I'm doing could contribute to real life situations. It feels great knowing that the research that I'm working on could help people in the world. While I continue to have a never ending passion for STEM learning, HSAP has made me grow more interested in STEM learning. -- HSAP Apprentice

own thoughts into the research problem. This is quite challenging for them, and quite different from their experience in high school. (HSAP Mentor)

In summary, findings from the Actionable Program Evaluation indicate that the program is having success in actively engaging apprentices in authentic STEM experiences. Once in the HSAP program, students are working both independently and collaboratively on research projects. The vast majority of apprentices are consistently interacting with STEM professionals, learning about new STEM topics, applying STEM to real life situations, and learning about cutting-edge STEM research. Apprentices are also learning about DoD or STEM jobs/careers with apprentices most often crediting participation in HSAP, their mentors, and the AEOP website with impacting their awareness of DoD STEM jobs/careers. The HSAP program actively engages apprentices in learning about STEM and in STEM practices. Apprentices were actively involved in doing STEM during the program, including practicing laboratory/field techniques, procedures, and tools; participating in hands-on activities; and carrying out investigations. Overall, apprentices were somewhat or very much satisfied with the HSAP program.

Outcomes Evaluation

The evaluation of HSAP included measurement of several outcomes relating to AEOP and program objectives, including impacts on apprentices' STEM competencies (e.g., knowledge and skills), STEM identity and confidence, interest in and intent for future STEM engagement (e.g., further education, careers), attitudes towards research, and knowledge of and interest in participating in additional AEOP opportunities.[9] STEM competencies are necessary for a STEM-literate citizenry. STEM competencies include foundational knowledge, skills, and abilities in STEM, as well as the confidence to apply them appropriately. STEM competencies are important for those engaging in STEM enterprises, but also for all members of society as critical consumers of information and effective decision makers in a world that is heavily reliant on STEM. The

[9] The outcomes measured in the evaluation study were informed by the following documents:

Committee on STEM Education. (2013*). Federal Science, Technology, Engineering, and Mathematics (STEM) education 5-year strategic plan: A report from the Committee on STEM Education, National Science and Technology Council.* Washington, DC: The White House, Office of Science and Technology Policy.

National Research Council. (2009). Learning Science in Informal Environments: People, Places, and Pursuits. Committee on Learning Science in Informal Environments. Philip Bell, Bruce Lewenstein, Andrew W. Shouse, and Michael A. Feder, Editors. Board on Science Education, Center for Education. Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

President's Council of Advisors on Science and Technology (P-CAST). (February 2012). *Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics.* Executive Office of the President.

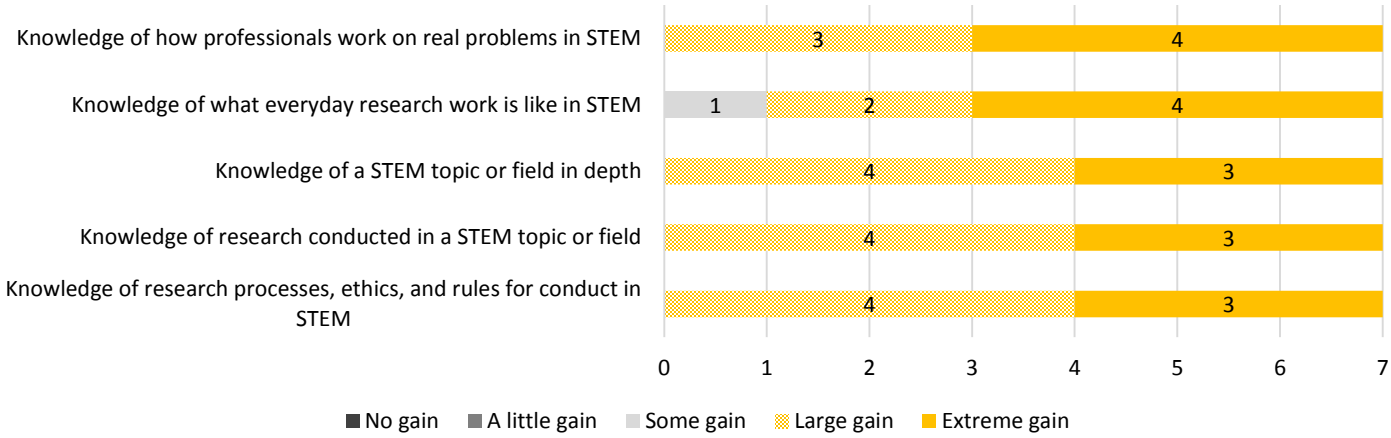
Report of the Academic Competitiveness Council (ACC). (2007). U.S. Department of Education. Available on the Department's Web site at: http://www.ed.gov/about/inits/ed/competitiveness/acc-mathscience/index.html.

evaluation of HSAP measured apprentices' self-reported gains in STEM competencies and engagement in opportunities intended to develop what is considered to be a critical STEM skill in the 21st century—collaboration and teamwork.

STEM Knowledge and Skills

As can be seen in Chart 11, all or almost all responding apprentices reported large or extreme gains in their STEM knowledge as a result of the HSAP program. For example, 4 of 7 responding apprentices indicated extreme gains in their knowledge of how professionals work on real problems in STEM, and what everyday research work is like in STEM.

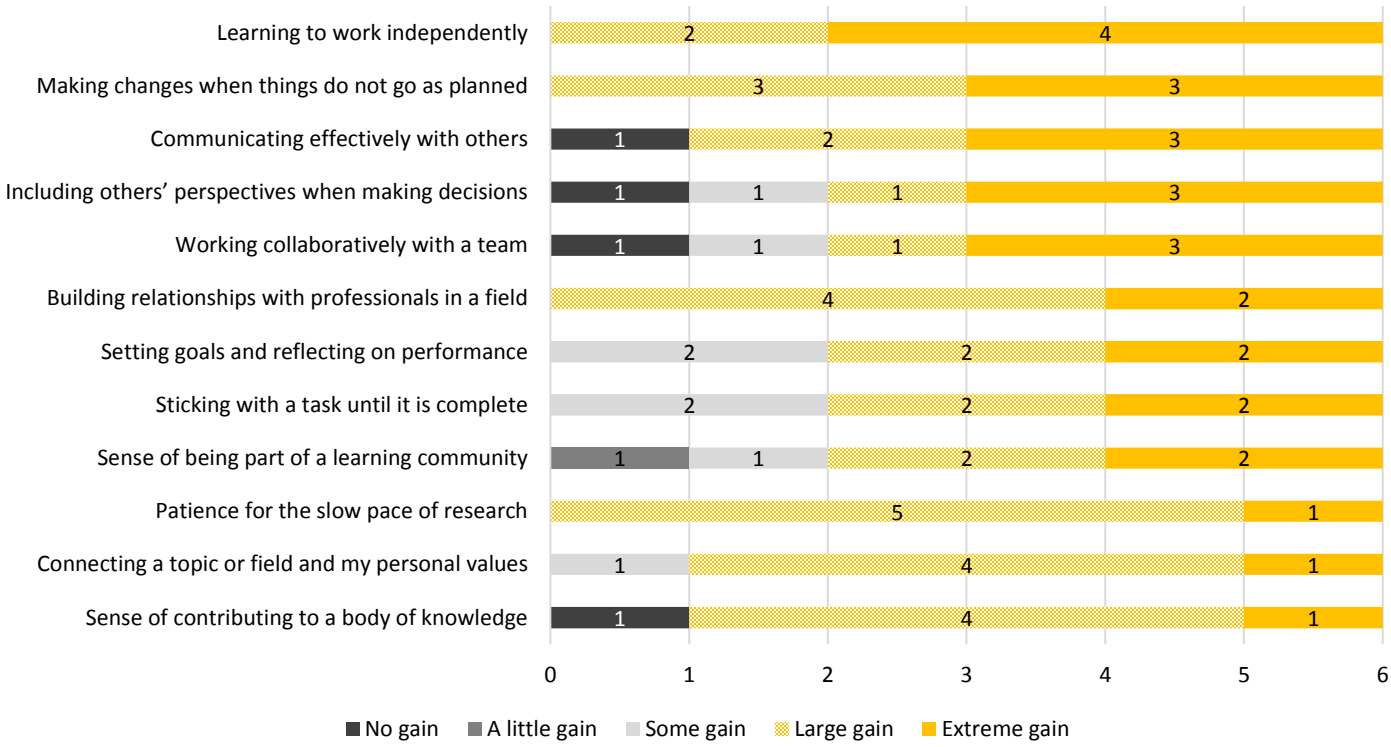
Chart 11: Apprentice Report of Impacts on STEM Knoweldge (n = 7)



The apprentice questionnaire also asked about perceived impacts on STEM skills, i.e., apprentices' abilities to use STEM practices. Apprentices were presented with different sets of items depending on the focus of their HSAP experience (science vs. technology, engineering, or mathematics). In general, responding apprentices indicated large or extreme gains across all science-related or engineering practices. For example, responding apprentices reported extreme gains in communicating information about their investigations and explanations in different formats; integrating information from multiple sources to support their explanations of phenomena; identifying real-world problems based on social, technological, or environmental issues; and testing how changing one variable affects another variable, in order to understand relationships between variables.

The apprentice questionnaire also asked apprentices about the impact of HSAP on their "21st Century Skills" that are necessary across a wide variety of fields. As can be seen in Chart 12, most responding apprentices reported large or extreme gains on each of these skills, including learning to work independently and making change when things do not go as planned.

Chart 12: Apprentice Report of Impacts on 21st Century Skills (n = 6)

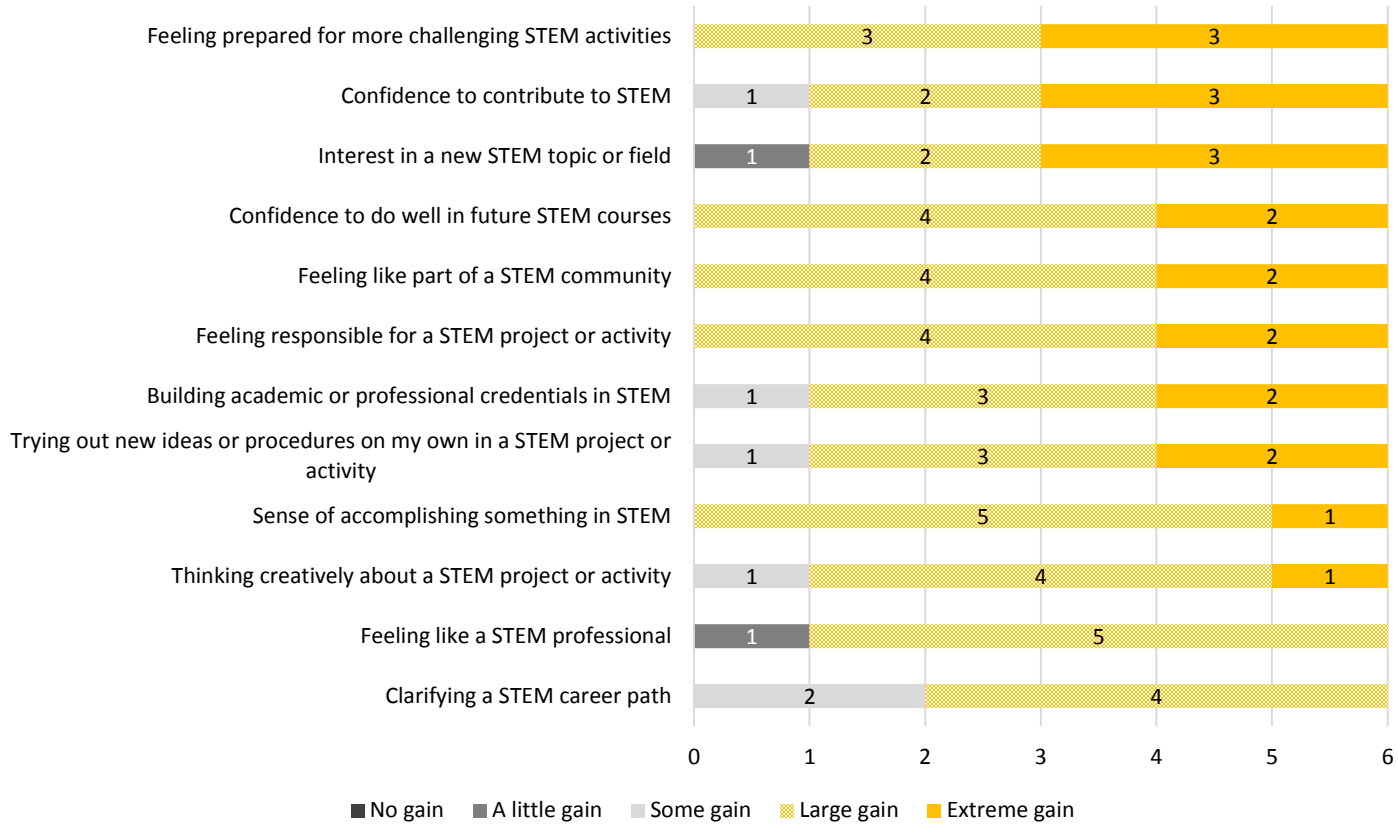


STEM Identity and Confidence

Deepening students' STEM knowledge and skills are important for increasing the likelihood that they will pursue STEM further in their education and/or careers. However, they are unlikely to do so if they do not see themselves as capable of succeeding in STEM.[10] Consequently, the apprentice questionnaire included a series of items intended to measure the impact of HSAP on apprentices' STEM identity. These data are shown in Chart 13 and strongly suggest that the program has had a positive impact in this area. For example, all six responding apprentices reported a large or extreme gain in feeling prepared for more challenging STEM activities, confidence to do well in future STEM courses, feeling like part of a STEM community, feeling responsible for a STEM project or activity, and sense of accomplishing something in STEM.

[10] Chang, M. J., Sharkness, J., Hurtado, S. and Newman, C. B. (2014), What matters in college for retaining aspiring scientists and engineers from underrepresented racial groups. J. Res. Sci. Teach., 51: 555–580.

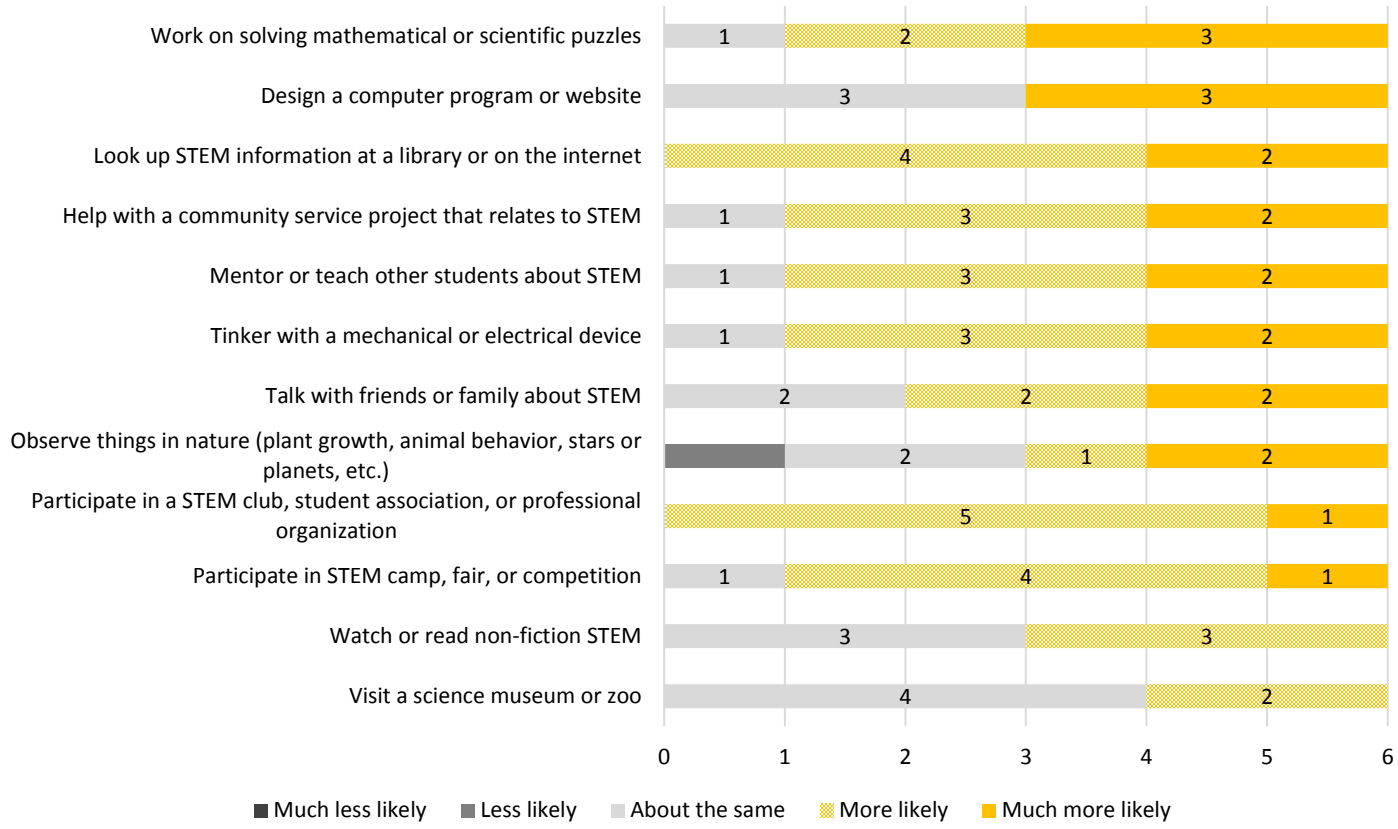
Chart 13: Apprentice Report of Impacts on STEM Identity (n = 6)



Interest and Future Engagement in STEM

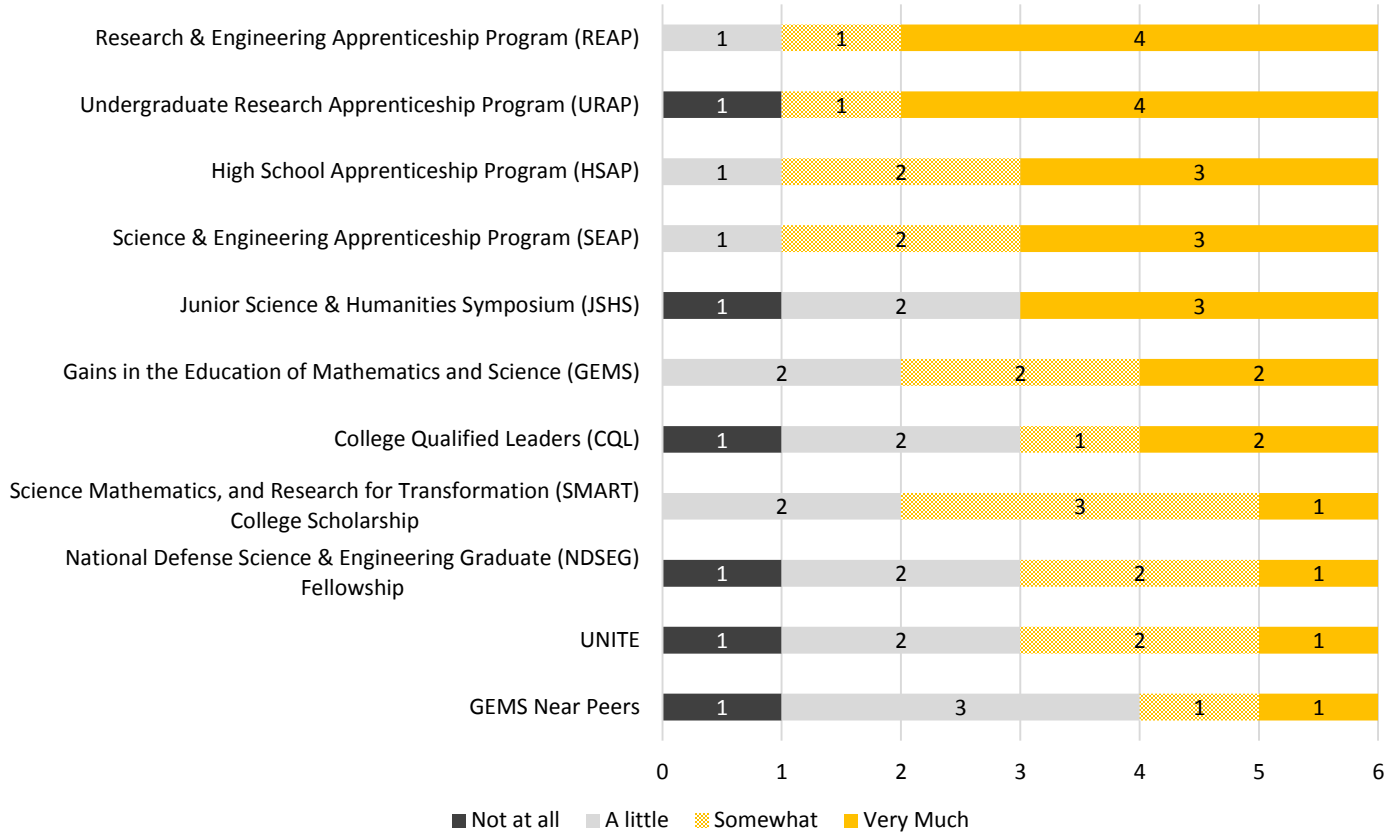
A key goal of the AEOP program is to develop a STEM-literate citizenry. To do so, students need to be engaged in and out of school with high quality STEM activities. In order to examine the impact of HSAP on apprentices' interest in future engagement in STEM, the questionnaire asked them to reflect on whether the likelihood of their engaging in STEM activities outside of school changed as a result of their experience, as well as their interest level in participating in future AEOP programs. As can be seen in Chart 14, the majority of apprentices indicated they were more likely or much more likely to engage in many of these activities as a result of HSAP, such as working on solving mathematical or scientific puzzles, looking up STEM information at a library or on the internet, helping with a community service project that relates to STEM and mentoring or teaching other students about STEM.

Chart 14: Change in Likelihood Apprentices Will Engage in STEM Activities Outside of School (n = 6)



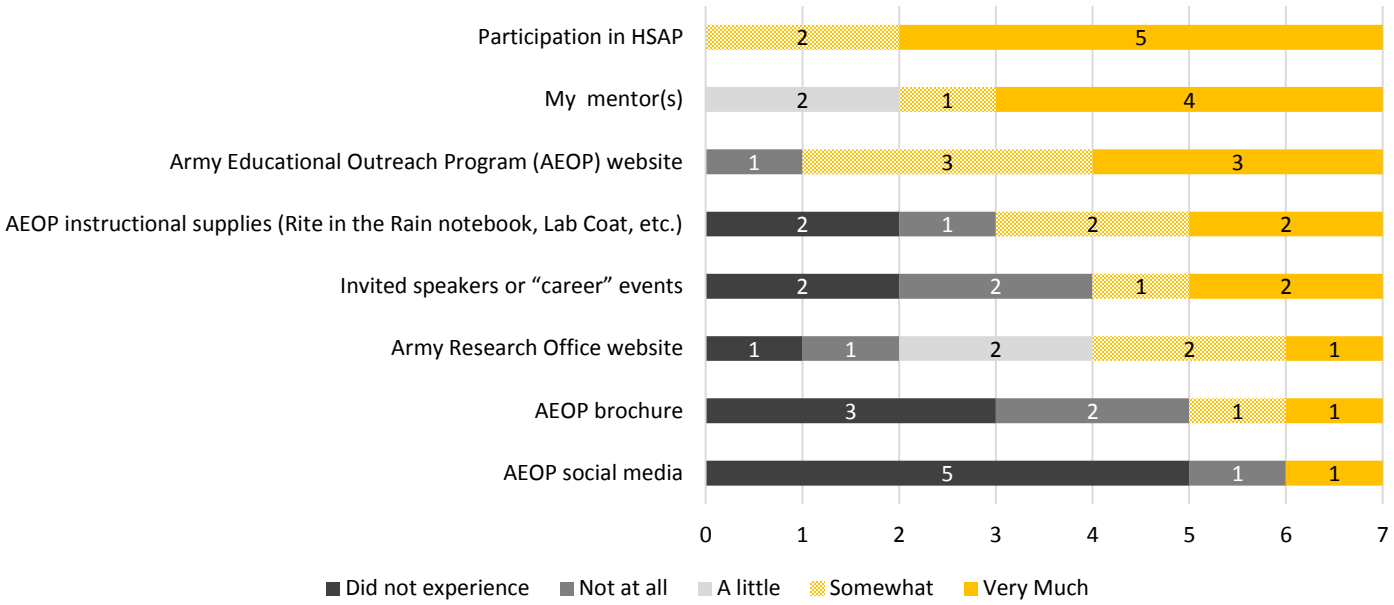
When asked how interested they are in participating in future AEOP programs, 5 of 6 responding apprentices indicated being somewhat or very much interested in participating in REAP, URAP, SEAP, and HSAP (see Chart 15).

Chart 15: Apprentice Interest in Future AEOP Programs (n = 6)



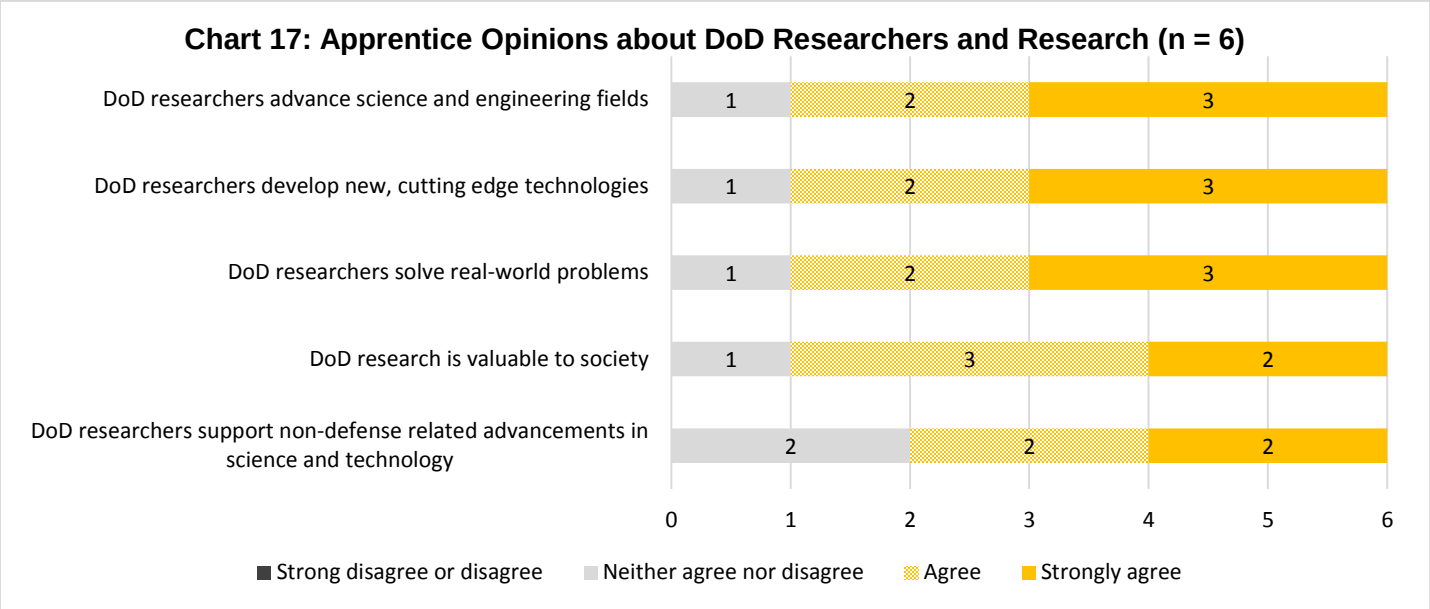
Apprentices were asked which resources impacted their awareness of the various AEOPs. As can be seen in Chart 16, all 7 responding apprentices reported that simply participating in HSAP impacted their awareness "somewhat" or "very much." Many apprentices also rated the AEOP website (6 of 7), their mentor (5 of 7), and AEOP instructional supplies (4 of 7) as having at least some impact on their awareness of AEOP programs.

Chart 16: Impact of Resources on Apprentice Awareness of AEOPs (n = 7)



Attitudes toward Research

Students' attitudes about the importance of DoD research is an important prerequisite to their continued interest in the field and potential involvement in the future. In order to gauge apprentices' attitudes in this area, the apprentice questionnaire asked about their opinions of what DoD researchers do and the value of DoD research more broadly. The data indicate that most responding apprentices have favorable opinions (see Chart 17). For example, almost all responding apprentices agreed or strongly agreed that DoD researchers advance science and engineering fields, DoD researchers develop cutting-edge technologies, and DoD researchers solve real-world problems.



Education and Career Aspirations

The evaluation also examined the program's impact on apprentices' education and career aspirations. In terms of education, the questionnaire asked apprentices how far they wanted to go in school before and after participating in HSAP. As can be seen in Table 13, more of the responding apprentices indicated wanting to obtain advanced degrees after participating in HSAP than before HSAP. However, due to the small sample size, it was not appropriate to test whether this difference was statistically significant.

Table 13. Apprentice Education Aspirations (n = 6)		
	Before HSAP	**After HSAP**
Graduate from high school	1	0
Go to a trade or vocational school	0	0
Go to college for a little while	0	0
Finish college (get a Bachelor's degree)	2	1
Get more education after college	0	0
Get a master's degree	1	2
Get a Ph.D.	0	1
Get a medical-related degree (M.D.), veterinary degree (D.V.M.), or dental degree (D.D.S.)	0	0
Get a combined M.D. / Ph.D.	2	2
Get another professional degree (law, business, etc.)	0	0

In terms of career aspirations, apprentices were asked what kind of work they expect to be doing at age 30, both reflecting on what their aspiration was before participating in HSAP and after HSAP (see Table 14). Most responding apprentices expressed interest in STEM-related careers both before and after participating in HSAP.

Table 14. Apprentice Career Aspirations (n = 6)		
	Before HSAP	**After HSAP**
Engineering	2	2
Computer science	1	1
Medicine (e.g., doctor, dentist, veterinarian, etc.)	1	1
Science (no specific subject)	0	1
Technology	1	1
Agricultural science	0	0
Art (e.g., writing, dancing, painting, etc.)	0	0
Biological science	0	0
Business	0	0
Earth, atmospheric or oceanic science	0	0
English/language arts	0	0
Environmental science	0	0
Farming	0	0
Health (e.g., nursing, pharmacy, technician, etc.)	0	0
Law	0	0
Mathematics or statistics	0	0
Military, police, or security	0	0
Physical science (e.g., physics, chemistry, astronomy, materials science)	0	0
Skilled trade (carpenter, electrician, plumber, etc.)	0	0
Social science (e.g., psychologist, sociologist)	0	0
Teaching, non-STEM	0	0
Teaching, STEM	0	0
Undecided	1	0

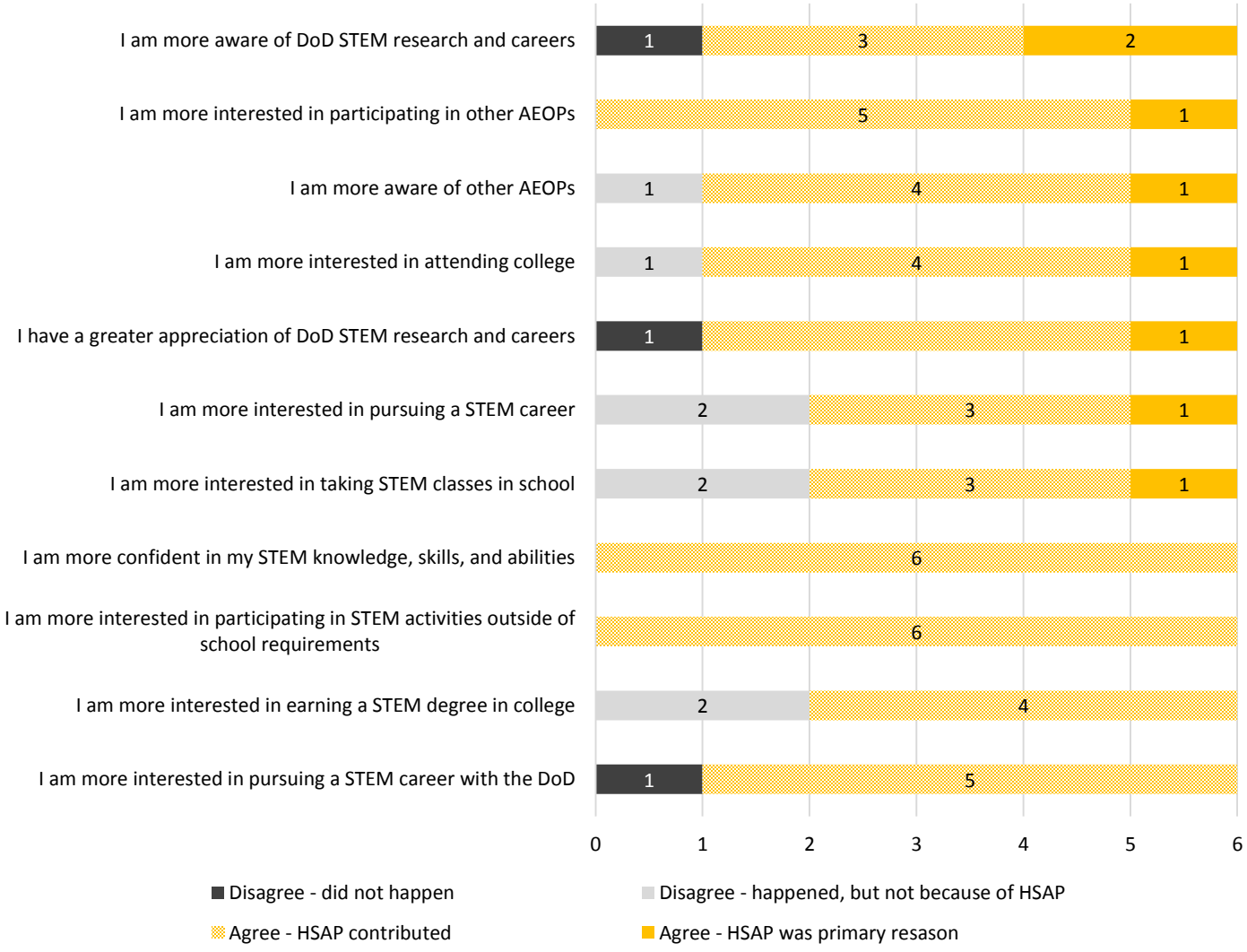
Apprentices were also asked the extent to which they expect to use their STEM knowledge, skills, and/or abilities in their work when they are age 30. As can be seen in Table 15, nearly all responding apprentices expect to use STEM 76-100% of the time in their work.

Table 15. Apprentices Expecting to use STEM in Their Work at Age 30 (n = 6)	
	Questionnaire Respondents
Not at all	0
Less than 25% of the time	0
26% to 50% of the time	0
51% to 75% of the time	1
76% to 100% of the time	5

Overall Impact

Lastly, apprentices were asked about impacts of participating in HSAP more broadly. From these data, it is clear that apprentices thought the program had substantial impacts on their STEM interests, knowledge and future pursuits (see Chart 18). For example, responding apprentices agreed that HSAP contributed or was the primary reason for their increased awareness of DoD STEM research and careers (5 of 6), interest in participating in other AEOPs (6 of 6), and awareness of other AEOPs (5 of 6). Apprentices also cited the influence of HSAP on their increased interest in attending college, increased interest in pursuing a STEM career, and increased interest in taking STEM classes in school.

Chart 18: Apprentice Opinions of HSAP Impacts (n = 6)



An open-ended item on the apprentice questionnaire asked apprentices to list the three most important ways they benefited from the program; 5 of 8 responding apprentices provided at least one answer to the question. Apprentice responses addressed a variety of themes, including working with STEM professionals (3 of 5), learning about/participating in lab work (2 of 5), and increasing STEM content knowledge (2 of 5).

Comments from the apprentice interviews expand on some of these impacts. As one said:

I've learned so much about all the research out there, research going on…I've also gotten opportunities to do lab work, so I'm very happy…I learned about real life projects and how they apply to the world. I didn't know the applications to the project, but after reading articles and the apprenticeship I know more. Also, I realized that the things I'm learning and doing in school can apply to real life research and these experiments. (HSAP apprentice)

"I've learned so much about all the research out there, research going on…I've also gotten opportunities to do lab work, so I'm very happy…I learned about real life projects and how they apply to the world. -- HSAP Apprentice

Summary of Findings

The FY14 evaluation of HSAP collected data about participants; their perceptions of program processes, resources, and activities; and indicators of achievement in outcomes related to AEOP and program objectives. A summary of findings is provided in Table 16.

Table 16. 2014 HSAP Evaluation Findings	
Participant Profiles	
HSAP serves students of historically underrepresented and underserved populations.	• HSAP has been somewhat successful in attracting participation of female students; half (5 of 10) of enrolled participants are female—a population that is historically underrepresented in engineering fields.
	• HSAP has moderate success in providing outreach to students from historically underrepresented and underserved race/ethnic and low-income groups. Of enrolled apprentices, 2 of 10 are Black or African American, 3 of 10 qualify for FRL, and 5 of 10 attend school in urban areas.
Actionable Program Evaluation	
HSAP marketing and recruitment occurs at the site-level.	• When recruiting potential host sites, HSAP's marketing and advertising campaigns target the very specific population of Army-funded university and college researchers.
	• Marketing to recruit student participants targets students in proximity to specific HSAP host sites. Responding apprentices most frequently learned about HSAP from the program or AEOP website (4 of 9) and a teacher/professor (3 of 9).

HSAP apprentices are motivated by opportunities to learn about STEM in ways not possible in school.	• According to information collected at registration, apprentices were motivated to participate in HSAP by the desire to learn something new or interesting, because of their interest in STEM, and to learn in ways not possible in school.
HSAP engages apprentices in meaningful STEM learning, through team-based and authentic STEM experiences.	• Most responding apprentices reported learning about applications of STEM to real-life situations, cutting-edge STEM research, and STEM topics on most days or every day of their HSAP experience.
	• Apprentices had opportunities to engage in a variety of STEM practices during their HSAP experience. For example, 5 of 8 reported practicing laboratory/field techniques, procedures; participating in hands-on STEM activities, drawing conclusions from an investigation, and analyzing or interpreting data/information every day of their HSAP experience.
	• Apprentices reported greater opportunities to learn about STEM and greater engagement in STEM practices in their HSAP experience than they typically have in school.
HSAP can improve its promotion of DoD STEM research and careers and marketing of other AEOP opportunities.	• The majority of responding apprentices have favorable opinions of what DoD researchers do and the value of DoD research more broadly.
	• Only half of responding apprentices (3 of 6) reported learning about one or more DoD STEM careers during their participation in HSAP.
	• A substantial proportion of apprentices reported never hearing about or never participating in AEOP programs beyond HSAP.
Apprentices value the HSAP experience.	• Responding apprentices were largely satisfied with their HSAP experience, including communications from Army Research Office, the application/ registration process, available of interesting program topics/fields, and mentorship during program activities.
Outcomes Evaluation	
HSAP had positive impacts on apprentices' STEM knowledge and competencies.	• A majority of responding apprentices reported large or extreme gains on their knowledge of how professionals work on real problems in STEM, what everyday research work is like in STEM, a STEM topic or field in depth, research conducted in a STEM topic or field, and the research processes, ethics, and rules for conduct in STEM.
	• Apprentices reported impacts on their abilities to do STEM, including such things as communicating information about their design processes and/or solutions in different formats; integrating information from multiple sources to support their explanations of phenomena; and supporting a proposed explanation with relevant scientific, mathematical, and/or engineering knowledge.

HSAP had positive impacts on apprentices' 21st Century Skills.	• The majority of responding apprentices reported large or extreme gains in a number of areas, including their ability to work independently, make changes when things do not go as planned, communicate effectively with others, and work collaboratively with a team.
HSAP positively impacted apprentices' confidence and identity in STEM, as well as their interest in future STEM engagement.	• All 6 responding apprentices reported large or extreme gains in their preparedness for more challenging STEM activities, confidence to do well in future STEM courses, feeling like part of a STEM community, and feeling responsible for a STEM project or activity.
	• Apprentices also reported on the likelihood that they would engage in additional STEM activities outside of school. A majority of apprentices indicated that as a result of HSAP, they were more likely to engage in such activities as solving mathematical or scientific puzzles, looking up STEM information at a library or on the internet, helping with a community service project that relates to STEM, mentoring or teaching other students about STEM, and tinkering with a mechanical or electrical device.
HSAP succeeded in raising students' education aspirations, but did not affect career aspirations.	• After participating in HSAP, some responding apprentices indicated being more likely to go further in their schooling than they would have before HSAP.
	• Apprentices were asked to indicate what kind of work they expected to be doing at age 30, with the majority indicating interest in a STEM-related career, both before and after HSAP.
HSAP apprentices show interest in future AEOP opportunities.	• Although apprentices reported limited exposure to and past participation in AEOP programs beyond HSAP, 5 of 6 apprentices reported interest in participating in other AEOP programs in the future.
HSAP raised apprentice awareness and appreciation of DoD STEM research and careers, as well as their interest in pursuing a STEM career with the DoD.	• Although only half of responding apprentices (3 of 5) reported learning about one or more DoD STEM careers during their participation in HSAP, a majority also reported that they had a greater awareness (5 of 6) and appreciation (5 of 6) of DoD STEM research and careers. In addition, 4 apprentices agreed that HSAP increased their interest in earing a STEM degree in college, and 5 agreed that HSAP made them more interested in pursuing a STEM career with the DoD.

Recommendations

1. The HSAP program was moderately successful in 2014 at attracting students from groups historically underrepresented and underserved in these fields. HSAP recruitment of apprentices occurs at the site-level using connections or mechanisms available to the university or college site and community in which they are situated. Therefore, the ability of HSAP to recruit underrepresented or underserved populations of students depends upon the diversity of the local communities, and especially high schools, in which recruitment takes place. Consistent with the recommendation in FY13, the program should continue to consider practical solutions to the challenge posed by HSAP locations, such as expanding to alternative research sites or offering travel stipends, transportation, and/or temporary accommodations to students. In addition, the program may want to contemplate expanding to additional research sites, particularly in areas with diverse student populations.

2. The program may want to consider doing more to increase the likelihood that the program has a long-term impact on the number of apprentices who pursue STEM. Strategies that have been shown to be effective in this area include providing role models for students, exposing them to different education and career possibilities, providing guidance on how to pursue specific education and career paths (e.g., what courses they need to take in school, how to navigate the college application process), and providing coaching on the "soft skills" (e.g., time management, communication skills) needed to be successful in STEM careers. The program should consider ways to ensure that these areas are addressed systematically. For example, the program may want to work with each site to see how these areas could be built into their schedules, or provide more guidance to mentors for how and when to address these issues.

3. Given the goal of exposing apprentices to other AEOP initiatives and encouraging continued participation (including as a mentor or volunteer), HSAP may want to work with sites to increase apprentices' exposure to AEOP. To this end, HSAP should ensure that mentors: (1) are aware of the intended focus on exposing apprentices to AEOP/DoD programs, (2) have the resources to educate themselves and their apprentices about these programs, and (3) are equipped to help apprentices apply to other AEOP/DoD programs. Given the limited use of the program website, print materials, and social media, the program may want to consider how these resources could be leveraged to provide mentors and apprentices with information about AEOP initiatives and facilitate increased enrollment.

4. Additional efforts should be undertaken to improve participation in evaluation activities. Although the FY14 response rate for the apprentice survey increased, 80% in FY14 compared to 63% in FY13, the 29% response rate for the mentor survey was substantially lower than the 100% response rate for the mentor survey in 2013. The low numbers of mentors in 2014, coupled with the low response rate on the mentor questionnaire, raise major questions about the representativeness of the results. Improved communication with the individual program sites about expectations for the evaluation may help. Specifically, it is recommended that the program administrator ensures that mentors are aware they are expected to participate in surveys/focus groups and encourage their apprentices to do the same. In

addition, as noted in FY13, the evaluation instruments may need to be streamlined as perceived response burden can affect participation. In particular, consideration should be given to whether the parallel nature of the apprentice and mentor questionnaires is necessary, with items being asked only of the most appropriate data source.

Appendices

Appendix A

FY14 HSAP Evaluation Plan

Questionnaires

Purpose:

As per the approved FY14 AEOP APP, the external evaluation of HSAP conducted by VT includes two post-program questionnaires:

1. AEOP Youth Questionnaire to be completed by students (apprentices); and
2. AEOP Mentor Questionnaire to be completed by University S&Es and/or other laboratory personnel that supervise, guide, or support apprentices during their HSAP research activities.

Questionnaires are the primary method of data collection for AEOP evaluation and collect information about participants' experiences with and perceptions of program resources, structures, and activities; potential benefits to participants; and strengths and areas of improvement for programs.

The questionnaires have been revised for FY14 to align with:

- Army's strategic plan and AEOP Priorities 1 (STEM Literate Citizenry), 2 (STEM Savvy Educators) *and* 3 (Sustainable Infrastructure);
- Federal guidance for evaluation of Federal STEM investments (e.g., inclusive of implementation and outcomes evaluation, and outcomes of STEM-specific competencies, transferrable competencies, attitudes about/identifying with STEM, future engagement in STEM-related activities, and educational/career pathways);
- Best practices and published assessment tools in STEM education, STEM informal/outreach, and the evaluation/ research communities; and
- AEOP's vision to improve the quality of the data collected, focusing on changes in intended student outcomes and contributions of AEOPs like CQL effecting those changes.

The use of common questionnaires and sets of items that are appropriate across programs will allow for comparisons across AEOP programs and, if administered in successive years, longitudinal studies of students as they advance through pipelines within the AEOP. Because the questionnaires incorporate batteries of items from existing tools that have been validated in published research, external comparisons may also be possible.

All AEOPs are expected to administer the Youth and Mentor questionnaires provided for their program. Both the Youth and Mentor questionnaires have two versions, an "advanced" version (JSHS and apprenticeship programs) or a "basic" version (all other programs). The same basic set of items is used in both, with slightly modified items and/or additional items used in the advanced version. Additionally, the surveys are customized to gather information specific structures, resources, and activities of programs.

Focus Groups

Purpose:

As per the approved FY14 AEOP APP, the external evaluation of HSAP conducted by VT includes two or three online focus groups across all sites:

- One or two 45-minute focus group with 6-8 apprentices each; and
- One 45-minute focus group with 6-8 mentors.

Focus groups provide the Virginia Tech (VT) evaluation team with first-hand opportunities to speak with apprentices and their mentors. The information gleaned from these focus groups help us in illustrating and more deeply understanding the findings of other data collected (from questionnaires). In total, VT's findings are used to highlight program successes and inform program changes so that the AEOPs can be even better in the future. *Although VT will coordinate the online focus groups, we encourage ARO to alert ALL participants to the possibility that they may be invited by VT evaluators to join an online focus group and to encourage their participation.*

Site and Participant Selection:

VT will purposefully sample from HSAP participants using site-based enrollment data provided by ARO (site name, apprentice and mentor participant names, basic demographic data). VT will "invite" a sample to participate via email, and will require that each RSVP by a designated date (prior to the scheduled focus group), so that an alternate may be identified in the event an invited participant declines to participate.

Through our purposeful sampling, we are attempting to assemble a diverse group of focus group participants who can provide information about a range of experiences possible in HSAP. Ideally, each apprentice focus group will be inclusive of:

- Male and female students (equal representation if possible);
- A range of grade levels of students;
- A range of race/ethnicities of students served by the program; and
- A range of STEM content studied/researched.

Data Analyses

Quantitative and qualitative data were compiled and analyzed after all data collection concluded. Evaluators summarized quantitative data with descriptive statistics such as numbers of respondents, frequencies and proportions of responses, average response when responses categories are assigned to a 6-point scale (e.g., 1 = "Strongly Disagree" to 6 = "Strongly

Agree"), and standard deviations. Emergent coding was used for the qualitative data to identify the most common themes in responses.

Appendix B

FY14 HSAP Apprentice Questionnaire and Data Summaries

2014 High School Apprenticeship Program (HSAP): HSAP Youth Survey

Virginia Tech conducts program evaluation on behalf of the Army Research Office and U.S. Army to determine how well the Army Educational outreach Program (AEOP) is achieving its goals of promoting student interest and engagement in science, technology, engineering, and mathematics (STEM). As part of this study Virginia Tech is surveying students (like you) who have participated in the High School Apprenticeship Program (HSAP). The survey will collect information about you, your experiences in school, and your experiences in HSAP.

About this survey:

- While this survey is not anonymous, your responses are CONFIDENTIAL. When analyzing data and reporting results, your name will not be linked to any item responses or any comments you make.
- Responding to this survey is VOLUNTARY. You are not required to participate, although we hope you do because your responses will provide valuable information for meaningful and continuous improvement.
- If you provide your email address, the AEOP may contact you in the future to ask about your academic and career success.
- The survey takes about 25-30 minutes to complete on average, but it could take less time. In the online survey you can scroll over purple print in the survey to see definitions of words or phrases.

If you have any additional questions or concerns, please contact one of the following people:

Tanner Bateman, Virginia Tech
Senior Project Associate, AEOPCA
(540) 231-4540, tbateman@vt.edu

Rebecca Kruse, Virginia Tech
Evaluation Director, AEOPCA
(703) 336-7922, rkruse75@vt.edu

If you are 17 and under, your parent/guardian provided permission for you to participate in the evaluation study when they authorized your participation in the AEOP program you just completed or will soon complete.

Q1. Do you agree to participate in this survey? (required)

❍ Yes, I agree to participate in this survey
❍ No, I do not wish to participate in this survey **If selected, respondent will be directed to the end of the survey**

Q2. Please provide your personal information below:

First Name: _____
Last Name: _____

Q3. What is your email address? (optional)

Email: _____

Q4. So that we can determine how diverse students respond to participation in AEOP programs please tell us about yourself and your school. What grade will you start in the fall? (select one)

- ❍ 4th
- ❍ 5th
- ❍ 6th
- ❍ 7th
- ❍ 8th
- ❍ 9th
- ❍ 10th
- ❍ 11th
- ❍ 12th
- ❍ College freshman
- ❍ Other (specify): _____
- ❍ Choose not to report

Q5. What is your gender?

- ❍ Male
- ❍ Female
- ❍ Choose not to report

Q6. What is your race or ethnicity?

- ❍ Hispanic or Latino
- ❍ Asian
- ❍ Black or African American
- ❍ Native American or Alaska Native
- ❍ Native Hawaiian or Other Pacific Islander
- ❍ White
- ❍ Other race or ethnicity (specify): _____
- ❍ Choose not to report

Q7. Do you qualify for free or reduced lunches at school? **Only presented to those who responded with grades 4 – college freshman on Q4**

- ❍ Yes
- ❍ No
- ❍ Choose not to report

Q8. Which best describes the location of your school? **Only presented to those who responded with grades 4 – college freshman on Q4**

- ❍ Frontier or tribal school
- ❍ Rural (country)
- ❍ Suburban
- ❍ Urban (city)

Q9. What kind of school do you attend? **Only presented to those who responded with grades 4 – college freshman on Q4**

- ❍ Public school
- ❍ Private school
- ❍ Home school
- ❍ Online school
- ❍ Department of Defense school (DoDDS or DoDEA)

Q10. Where was the HSAP program located?

- ❍ Arizona State University
- ❍ University of California - Irvine
- ❍ Clark Atlanta University
- ❍ Northeastern University
- ❍ Princeton University
- ❍ City University of New York
- ❍ North Carolina State University
- ❍ Other, (specify): _____

Q11. How often do you do each of the following in STEM classes at school this year?

	Not at all	At least once	A few times	Most days	Every day
Learn about new science, technology, engineering, or mathematics (STEM) topics	❍	❍	❍	❍	❍
Apply STEM knowledge to real life situations	❍	❍	❍	❍	❍
Learn about cutting-edge STEM research	❍	❍	❍	❍	❍
Learn about different STEM careers	❍	❍	❍	❍	❍
Interact with STEM professionals	❍	❍	❍	❍	❍

Q12. How often did you do each of the following in HSAP this year?

	Not at all	At least once	A few times	Most days	Every day
Learn about new science, technology, engineering, or mathematics (STEM) topics	❍	❍	❍	❍	❍
Apply STEM knowledge to real life situations	❍	❍	❍	❍	❍
Learn about cutting-edge STEM research	❍	❍	❍	❍	❍
Learn about different STEM careers	❍	❍	❍	❍	❍
Interact with STEM professionals	❍	❍	❍	❍	❍

Q13. How often do you do each of the following in STEM classes at school this year?

	Not at all	At least once	A few times	Most days	Every day
Practice using laboratory or field techniques, procedures, and tools	❍	❍	❍	❍	❍
Participate in hands-on STEM activities	❍	❍	❍	❍	❍
Work as part of a team	❍	❍	❍	❍	❍
Communicate with other students about STEM	❍	❍	❍	❍	❍

Q14. How often did you do each of the following in HSAP this year?

	Not at all	At least once	A few times	Most days	Every day
Practice using laboratory or field techniques, procedures, and tools	❍	❍	❍	❍	❍
Participate in hands-on STEM activities	❍	❍	❍	❍	❍
Work as part of a team	❍	❍	❍	❍	❍
Communicate with other students about STEM	❍	❍	❍	❍	❍

Q15. How often do you do each of the following in STEM classes at school this year?

	Not at all	At least once	A few times	Most days	Every day
Pose questions or problems to investigate	❍	❍	❍	❍	❍
Design an investigation	❍	❍	❍	❍	❍
Carry out an investigation	❍	❍	❍	❍	❍
Analyze and interpret data or information	❍	❍	❍	❍	❍
Draw conclusions from an investigation	❍	❍	❍	❍	❍
Come up with creative explanations or solutions	❍	❍	❍	❍	❍
Build (or simulate) something	❍	❍	❍	❍	❍

Q16. How often did you do each of the following in HSAP this year?

	Not at all	At least once	A few times	Most days	Every day
Pose questions or problems to investigate	❍	❍	❍	❍	❍
Design an investigation	❍	❍	❍	❍	❍
Carry out an investigation	❍	❍	❍	❍	❍
Analyze and interpret data or information	❍	❍	❍	❍	❍

Draw conclusions from an investigation	❍	❍	❍	❍	❍
Come up with creative explanations or solutions	❍	❍	❍	❍	❍
Build (or simulate) something	❍	❍	❍	❍	❍

Q17. Rate how the following items impacted your awareness of Army Educational Outreach Programs (AEOPs) during HSAP:

	Did not experience	Not at all	A little	Somewhat	Very much
Army Research Office website	❍	❍	❍	❍	❍
Army Educational Outreach Program (AEOP) website	❍	❍	❍	❍	❍
AEOP social media	❍	❍	❍	❍	❍
AEOP brochure	❍	❍	❍	❍	❍
AEOP instructional supplies (Rite in the Rain notebook, Lab Coat, etc.)	❍	❍	❍	❍	❍
My mentor(s)	❍	❍	❍	❍	❍
Invited speakers or "career" events	❍	❍	❍	❍	❍
Participation in HSAP	❍	❍	❍	❍	❍

Q18. Rate how the following items impacted your awareness of Department of Defense (DoD) STEM careers during HSAP:

	Did not experience	Not at all	A little	Somewhat	Very much
Army Research Office website	❍	❍	❍	❍	❍
Army Educational Outreach Program (AEOP) website	❍	❍	❍	❍	❍
AEOP social media	❍	❍	❍	❍	❍
AEOP brochure	❍	❍	❍	❍	❍
AEOP instructional supplies (Rite in the Rain notebook, Lab Coat, etc.)	❍	❍	❍	❍	❍
My mentor(s)	❍	❍	❍	❍	❍
Invited speakers or "career" events	❍	❍	❍	❍	❍
Participation in HSAP	❍	❍	❍	❍	❍

Q19. How SATISFIED were you with each of the following HSAP program features?

	Did not experience	Not at all	A little	Somewhat	Very much
Application or registration process	❍	❍	❍	❍	❍

Other administrative tasks	❍	❍	❍	❍	❍
Communications from Army Research Office	❍	❍	❍	❍	❍
Communications from [HSAP site]	❍	❍	❍	❍	❍
Location(s) of program activities	❍	❍	❍	❍	❍
Availability of program topics or fields that interest you	❍	❍	❍	❍	❍
Instruction or mentorship during program activities	❍	❍	❍	❍	❍
Participation stipends (payment)	❍	❍	❍	❍	❍
Research abstract preparation requirements	❍	❍	❍	❍	❍

Q20. Which of the following best describes your primary research mentor?

❍ I did not have a research mentor
❍ Teacher
❍ Coach
❍ Parent
❍ Club or activity leader (School club, Boy/Girls Scouts, etc.)
❍ STEM researcher (private industry, university, or DoD/government employee, etc.)
❍ Other (specify) _____

Q21. Which of the following statements best reflects the input you had into your project initially?

❍ I did not have a project
❍ I was assigned a project by my mentor
❍ I worked with my mentor to design a project
❍ I had a choice among various projects suggested by my mentor
❍ I worked with my mentor and members of a research team to design a project
❍ I designed the entire project on my own

Q22. Which of the following statements best reflects the availability of your mentor?

❍ I did not have a mentor
❍ The mentor was never available
❍ The mentor was available less than half of the time
❍ The mentor was available about half of the time of my project
❍ The mentor was available more than half of the time
❍ The mentor was always available

Q23. Which of the following statements best reflects your working as part of a group or team?

❍ I worked alone (or alone with my research mentor)
❍ I worked with others in a shared laboratory or other space, but we work on different projects
❍ I worked alone on my project and I met with others regularly for general reporting or discussion
❍ I worked alone on a project that was closely connected with projects of others in my group
❍ I work with a group who all worked on the same project

Q24. How SATISFIED were you with each of the following:

	Did Not Experience	Not at all	A little	Somewhat	Very much
My working relationship with my mentor	❍	❍	❍	❍	❍
My working relationship with the group or team	❍	❍	❍	❍	❍
The amount of time I spent doing meaningful research	❍	❍	❍	❍	❍
The amount of time I spent with my research mentor	❍	❍	❍	❍	❍
The research experience overall	❍	❍	❍	❍	❍

Q25. Which of the following statements apply to your research experience? (Choose all that apply)

- ❑ I presented a talk or poster to other students or faculty
- ❑ I presented a talk or poster at a professional symposium or conference
- ❑ I attended a symposium or conference
- ❑ I wrote or co-wrote a paper that was/will be published in a research journal
- ❑ I wrote or co-wrote a technical paper or patent
- ❑ I will present a talk or poster to other students or faculty
- ❑ I will present a talk or poster at a professional symposium or conference
- ❑ I will attend a symposium or conference
- ❑ I will write or co-write a paper that was/will be published in a research journal
- ❑ I will write or co-write a technical paper or patent
- ❑ I won an award or scholarship based on my research

Q26. The list below describes mentoring strategies that are effective ways to support STEM learners. From the list below, please indicate which strategies that your mentor(s) used when working directly with you in HSAP:

	Yes - my mentor used this strategy with me	No - my mentor did not use this strategy with me
Helped me become aware of the roles STEM play in my everyday life	❍	❍
Helped me understand how STEM can help me improve my community	❍	❍
Used teaching/mentoring activities that addressed my learning style	❍	❍
Provided me with extra support when I needed it	❍	❍
Encouraged me to exchange ideas with others whose backgrounds or viewpoints are different from mine	❍	❍
Allowed me to work on a collaborative project as a member of a team	❍	❍
Helped me practice a variety of STEM skills with supervision	❍	❍
Gave me constructive feedback to improve my STEM knowledge, skills, or abilities	❍	❍
Gave me guidance about educational pathways that would prepare me for a STEM career	❍	❍
Recommended Army Educational Outreach Programs that match my interests	❍	❍

Discussed STEM career opportunities with DoD or other government agencies	❍	❍

Q27. Which category best describes the focus of your HSAP experience?

❍ Science
❍ Technology
❍ Engineering
❍ Mathematics

Q28. AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas?

	No gain	A little gain	Some gain	Large gain	Extreme gain
Knowledge of a STEM topic or field in depth	❍	❍	❍	❍	❍
Knowledge of research conducted in a STEM topic or field	❍	❍	❍	❍	❍
Knowledge of research processes, ethics, and rules for conduct in STEM	❍	❍	❍	❍	❍
Knowledge of how professionals work on real problems in STEM	❍	❍	❍	❍	❍
Knowledge of what everyday research work is like in STEM	❍	❍	❍	❍	❍

Q29. AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas? **Only presented to respondents who selected "science" in Q27**

NOTE: Results of Q29 are not presented in this appendix to protect anonymity of respondents.

	No gain	A little gain	Some gain	Large gain	Extreme gain
Asking questions based on observations of real-world phenomena	❍	❍	❍	❍	❍
Asking a question (about a phenomenon) that can be answered with one or more investigations	❍	❍	❍	❍	❍
Applying knowledge, logic, and creativity to propose explanations that can be tested with investigations	❍	❍	❍	❍	❍
Making a model to represent the key features and functions of an observed phenomenon	❍	❍	❍	❍	❍
Deciding what type of data to collect in order to answer a question	❍	❍	❍	❍	❍
Designing procedures for investigations, including selecting methods and tools that are appropriate for the data to be collected	❍	❍	❍	❍	❍
Identifying the limitations of data collected in an investigation	❍	❍	❍	❍	❍
Carrying out procedures for an investigation and recording data accurately	❍	❍	❍	❍	❍
Testing how changing one variable affects another variable, in order to understand relationships between variables	❍	❍	❍	❍	❍
Using computer-based models to investigate cause and effect relationships of a simulated phenomenon	❍	❍	❍	❍	❍

Considering alternative interpretations of data when deciding on the best explanation for a phenomenon	❍	❍	❍	❍	❍
Displaying numeric data from an investigation in charts or graphs to identify patterns and relationships	❍	❍	❍	❍	❍
Using mathematics or computers to analyze numeric data	❍	❍	❍	❍	❍
Supporting a proposed explanation (for a phenomenon) with data from investigations	❍	❍	❍	❍	❍
Supporting a proposed explanation with relevant scientific, mathematical, and/or engineering knowledge	❍	❍	❍	❍	❍
Identifying the strengths and limitations of explanations in terms of how well they describe or predict observations	❍	❍	❍	❍	❍
Using data or interpretations from other researchers or investigations to improve an explanation	❍	❍	❍	❍	❍
Asking questions to understand the data and interpretations others use to support their explanations	❍	❍	❍	❍	❍
Using data from investigations to defend an argument that conveys how an explanation describes an observed phenomenon	❍	❍	❍	❍	❍
Deciding what additional data or information may be needed to find the best explanation for a phenomenon	❍	❍	❍	❍	❍
Reading technical or scientific texts, or using other media, to learn about the natural or designed worlds	❍	❍	❍	❍	❍

Q29 CONTINUED. AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas? **Only presented to respondents who selected "science" in Q27****

NOTE: Results of Q29 continued are not presented in this appendix to protect anonymity of respondents.

	No gain	A little gain	Some gain	Large gain	Extreme gain
Identifying the strengths and limitation of data, interpretations, or arguments presented in technical or scientific texts	❍	❍	❍	❍	❍
Integrating information from multiple sources to support your explanations of phenomena	❍	❍	❍	❍	❍
Communicating information about your investigations and explanations in different formats (orally, written, graphically, mathematically, etc.)	❍	❍	❍	❍	❍

Q30. AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas? **Only presented to respondents who selected "technology," "engineering," or "mathematics" in Q27****

NOTE: Results of Q30 are not presented in this appendix to protect anonymity of respondents.

	No gain	A little gain	Some gain	Large gain	Extreme gain

Identifying real-world problems based on social, technological, or environmental issues	❍	❍	❍	❍	❍
Defining a problem that can be solved by developing a new or improved object, process, or system	❍	❍	❍	❍	❍
Applying knowledge, logic, and creativity to propose solutions that can be tested with investigations	❍	❍	❍	❍	❍
Making a model that represents the key features or functions of a solution to a problem	❍	❍	❍	❍	❍
Deciding what type of data to collect in order to test if a solution functions as intended	❍	❍	❍	❍	❍
Designing procedures for investigations, including selecting methods and tools that are appropriate for the data to be collected	❍	❍	❍	❍	❍
Identifying the limitations of the data collected in an investigation	❍	❍	❍	❍	❍
Carrying out procedures for an investigation and recording data accurately	❍	❍	❍	❍	❍
Testing how changing one variable affects another variable in order to determine a solution's failure points or to improve its performance	❍	❍	❍	❍	❍
Using computer-based models to investigate cause and effect relationships of a simulated solution	❍	❍	❍	❍	❍
Considering alternative interpretations of data when deciding if a solution functions as intended	❍	❍	❍	❍	❍
Displaying numeric data in charts or graphs to identify patterns and relationships	❍	❍	❍	❍	❍
Using mathematics to analyze numeric data	❍	❍	❍	❍	❍
Supporting a proposed solution with relevant scientific, mathematical, and/or engineering knowledge	❍	❍	❍	❍	❍
Identifying the strengths and limitations of solutions in terms of how well they meet design criteria	❍	❍	❍	❍	❍

Q30 CONTINUED. AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas? **Only presented to respondents who selected "technology," "engineering," or "mathematics" in Q27**

NOTE: Results of Q30 continued are not presented in this appendix to protect anonymity of respondents.

	No gain	A little gain	Some gain	Large gain	Extreme gain
Using data or interpretations from other researchers or investigations to improve a solution	❍	❍	❍	❍	❍
Asking questions to understand the data and interpretations others use to support their solutions	❍	❍	❍	❍	❍

Using data from investigations to defend an argument that conveys how a solution meets design criteria	❍	❍	❍	❍	❍
Deciding what additional data or information may be needed to find the best solution to a problem	❍	❍	❍	❍	❍
Reading technical or scientific texts, or using other media, to learn about the natural or designed worlds	❍	❍	❍	❍	❍
Identifying the strengths and limitations of data, interpretations, or arguments presented in technical or scientific texts	❍	❍	❍	❍	❍
Integrating information from multiple sources to support your solution to a problem	❍	❍	❍	❍	❍
Communicating information about your design processes and/or solutions in different formats (e.g., orally, written, graphically, mathematically)	❍	❍	❍	❍	❍
Supporting a proposed solution (for a problem) with data from investigations	❍	❍	❍	❍	❍

Q31. AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas?

	No gain	A little gain	Some gain	Large gain	Extreme gain
Learning to work independently	❍	❍	❍	❍	❍
Setting goals and reflecting on performance	❍	❍	❍	❍	❍
Persevering with a task	❍	❍	❍	❍	❍
Making changes when things do not go as planned	❍	❍	❍	❍	❍
Patience for the slow pace of research	❍	❍	❍	❍	❍
Working collaboratively with a team	❍	❍	❍	❍	❍
Communicating effectively with others	❍	❍	❍	❍	❍
Including others' perspectives when making decisions	❍	❍	❍	❍	❍
Sense of being part of a learning community	❍	❍	❍	❍	❍
Sense of contributing to a body of knowledge	❍	❍	❍	❍	❍
Building relationships with professionals in a field	❍	❍	❍	❍	❍
Connecting a topic or field and your personal values	❍	❍	❍	❍	❍

Q32. AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas?

	No gains	A little gain	Some gain	Large gain	Extremely large gains
Interest in a new STEM topic or field	❍	❍	❍	❍	❍
Clarifying a STEM career path	❍	❍	❍	❍	❍
Sense of accomplishing something in STEM	❍	❍	❍	❍	❍

Building academic or professional credentials in STEM	❍	❍	❍	❍	❍
Readiness for more challenging STEM activities	❍	❍	❍	❍	❍
Confidence to do well in future STEM courses	❍	❍	❍	❍	❍
Confidence to contribute to STEM	❍	❍	❍	❍	❍
Thinking creatively about a STEM project or activity	❍	❍	❍	❍	❍
Trying out new ideas or procedures on your own in a STEM project or activity	❍	❍	❍	❍	❍
Feeling responsible for a STEM project or activity	❍	❍	❍	❍	❍
Feeling like a STEM professional	❍	❍	❍	❍	❍
Feeling like part of a STEM community	❍	❍	❍	❍	❍

Q33. AS A RESULT OF YOUR HSAP experience, how much MORE or LESS likely are you to engage in the following activities in science, technology, engineering, or mathematics (STEM) outside of school requirements or activities?

	Much less likely	Less likely	About the same before and after	More likely	Much more likely
Visit a science museum or zoo	❍	❍	❍	❍	❍
Watch or read non-fiction STEM	❍	❍	❍	❍	❍
Look up STEM information at a library or on the internet	❍	❍	❍	❍	❍
Tinker with a mechanical or electrical device	❍	❍	❍	❍	❍
Work on solving mathematical or scientific puzzles	❍	❍	❍	❍	❍
Design a computer program or website	❍	❍	❍	❍	❍
Observe things in nature (plant growth, animal behavior, stars or planets, etc.)	❍	❍	❍	❍	❍
Talk with friends or family about STEM	❍	❍	❍	❍	❍
Mentor or teach other students about STEM	❍	❍	❍	❍	❍
Help with a community service project that relates to STEM	❍	❍	❍	❍	❍
Participate in a STEM club, student association, or professional organization	❍	❍	❍	❍	❍
Participate in STEM camp, fair, or competition	❍	❍	❍	❍	❍
Take an elective (not required) STEM class	❍	❍	❍	❍	❍
Work on a STEM project or experiment in a university or professional setting	❍	❍	❍	❍	❍
Receive an award or special recognition for STEM accomplishments	❍	❍	❍	❍	❍

Q34. How far did you want to go in school BEFORE participating in HSAP?

- ❍ Graduate from high school
- ❍ Go to a trade or vocational school
- ❍ Go to college for a little while
- ❍ Finish college (get a Bachelor's degree)
- ❍ Get more education after college
- ❍ Get a master's degree
- ❍ Get a Ph.D.
- ❍ Get a medical-related degree (M.D.), veterinary degree (D.V.M), or dental degree (D.D.S)
- ❍ Get a combined M.D. / Ph.D.
- ❍ Get another professional degree (law, business, etc.)

Q35. How far do you want to go in school AFTER participating in HSAP?

- ❍ Graduate from high school
- ❍ Go to a trade or vocational school
- ❍ Go to college for a little while
- ❍ Finish college (get a Bachelor's degree)
- ❍ Get more education after college
- ❍ Get a master's degree
- ❍ Get a Ph.D.
- ❍ Get a medical-related degree (M.D.), veterinary degree (D.V.M), or dental degree (D.D.S)
- ❍ Get a combined M.D. / Ph.D.
- ❍ Get another professional degree (law, business, etc.)

Q36. BEFORE HSAP, what kind of work did you expect to be doing when you are 30 years old? (select the ONE answer that best describes your career goals BEFORE HSAP)

- ❍ Undecided
- ❍ Science (no specific subject)
- ❍ Physical science (e.g., physics, chemistry, astronomy, materials science)
- ❍ Biological science
- ❍ Earth, atmospheric or oceanic science
- ❍ Agricultural science
- ❍ Environmental science
- ❍ Computer science
- ❍ Technology
- ❍ Engineering
- ❍ Mathematics or statistics
- ❍ Teaching, STEM
- ❍ Teaching, non-STEM
- ❍ Medicine (e.g., doctor, dentist, veterinarian, etc.)
- ❍ Health (e.g., nursing, pharmacy, technician, etc.)
- ❍ Social science (e.g., psychologist, sociologist)
- ❍ Business
- ❍ Law
- ❍ English/language arts
- ❍ Farming
- ❍ Military, police, or security
- ❍ Art (e.g., writing, dancing, painting, etc.)
- ❍ Skilled trade (carpenter, electrician, plumber, etc.)

Other _____

Q37. AFTER HSAP, what kind of work do you expect to be doing when you are 30 years old? (select the ONE answer that best describes your career AFTER HSAP)

- ❍ Undecided
- ❍ Science (no specific subject)
- ❍ Teaching, non-STEM
- ❍ Medicine (e.g., doctor, dentist, veterinarian, etc.)

- ❍ Physical science (e.g., physics, chemistry, astronomy, materials science)
- ❍ Biological science
- ❍ Earth, atmospheric or oceanic science
- ❍ Agricultural science
- ❍ Environmental science
- ❍ Computer science
- ❍ Technology
- ❍ Engineering
- ❍ Mathematics or statistics
- ❍ Teaching, STEM
- ❍ Health (e.g., nursing, pharmacy, technician, etc.)
- ❍ Social science (e.g., psychologist, sociologist)
- ❍ Business
- ❍ Law
- ❍ English/language arts
- ❍ Farming
- ❍ Military, police, or security
- ❍ Art (e.g., writing, dancing, painting, etc.)
- ❍ Skilled trade (carpenter, electrician, plumber, etc.)

Other _____

Q38. When you are 30, to what extent do you expect to use your STEM knowledge, skills, and/or abilities in your work?

- ❍ not at all
- ❍ up to 25% of the time
- ❍ up to 50% of the time
- ❍ up to 75% of the time
- ❍ up to 100% of the time

Q39. How many times have you participated in any of the following Army Educational Outreach Programs (AEOPs)?
If you have heard of an AEOP but never participated select "Never". If you have not heard of an AEOP select "Never heard of it".

	Never	Once	Twice	Three or more times	Never heard of it
Camp Invention	❍	❍	❍	❍	❍
eCYBERMISSION	❍	❍	❍	❍	❍
Junior Solar Sprint (JSS)	❍	❍	❍	❍	❍
West Point Bridge Design Contest (WPBDC)	❍	❍	❍	❍	❍
Junior Science & Humanities Symposium (JSHS)	❍	❍	❍	❍	❍
Gains in the Education of Mathematics and Science (GEMS)	❍	❍	❍	❍	❍
GEMS Near Peers	❍	❍	❍	❍	❍
UNITE	❍	❍	❍	❍	❍
Science & Engineering Apprenticeship Program (SEAP)	❍	❍	❍	❍	❍
Research & Engineering Apprenticeship Program (REAP)	❍	❍	❍	❍	❍
High School Apprenticeship Program (HSAP)	❍	❍	❍	❍	❍
College Qualified Leaders (CQL)	❍	❍	❍	❍	❍
Undergraduate Research Apprenticeship Program (URAP)	❍	❍	❍	❍	❍
Science Mathematics, and Research for Transformation (SMART) College Scholarship	❍	❍	❍	❍	❍

National Defense Science & Engineering Graduate (NDSEG) Fellowship	❍	❍	❍	❍	❍

Q40. How interested are you in participating in the following programs in the future?

	Not at all	A little	Somewhat	Very much
Camp Invention	❍	❍	❍	❍
eCYBERMISSION	❍	❍	❍	❍
Junior Solar Sprint (JSS)	❍	❍	❍	❍
West Point Bridge Design Contest (WPBDC)	❍	❍	❍	❍
Junior Science & Humanities Symposium (JSHS)	❍	❍	❍	❍
Gains in the Education of Mathematics and Science (GEMS)	❍	❍	❍	❍
GEMS Near Peers	❍	❍	❍	❍
UNITE	❍	❍	❍	❍
Science & Engineering Apprenticeship Program (SEAP)	❍	❍	❍	❍
Research & Engineering Apprenticeship Program (REAP)	❍	❍	❍	❍
High School Apprenticeship Program (HSAP)	❍	❍	❍	❍
College Qualified Leaders (CQL)	❍	❍	❍	❍
Undergraduate Research Apprenticeship Program (URAP)	❍	❍	❍	❍
Science Mathematics, and Research for Transformation (SMART) College Scholarship	❍	❍	❍	❍
National Defense Science & Engineering Graduate (NDSEG) Fellowship	❍	❍	❍	❍

Q41. How many jobs/careers in science, technology, engineering, or math (STEM) did you learn about during HSAP?

❍ None
❍ 1
❍ 2
❍ 3
❍ 4
❍ 5 or more

Q42. How many Department of Defense (DoD) STEM jobs/careers did you learn about during HSAP?

❍ None
❍ 1
❍ 2
❍ 3
❍ 4
❍ 5 or more

Q43. Rate how much you agree or disagree with each of the following statements about Department of Defense (DoD) researchers and research:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
DoD researchers advance science and engineering fields	❍	❍	❍	❍	❍
DoD researchers develop new, cutting edge technologies	❍	❍	❍	❍	❍
DoD researchers support non-defense related advancements in science and technology	❍	❍	❍	❍	❍
DoD researchers solve real-world problems	❍	❍	❍	❍	❍
DoD research is valuable to society	❍	❍	❍	❍	❍

Q44. Which of the following statements describe you after participating in HSAP?

	Disagree - This did not happen	Disagree - This happened but not because of the program	Agree - The program contributed	Agree - The program was primary reason
I am more confident in my STEM knowledge, skills, and abilities	❍	❍	❍	❍
I am more interested in participating in STEM activities outside of school requirements	❍	❍	❍	❍
I am more aware of other AEOPs	❍	❍	❍	❍
I am more interested in participating in other AEOPs	❍	❍	❍	❍
I am more interested in taking STEM classes in school	❍	❍	❍	❍
I am more interested in attending college	❍	❍	❍	❍
I am more interested in earning a STEM degree in college	❍	❍	❍	❍
I am more interested in pursuing a STEM career	❍	❍	❍	❍
I am more aware of DoD STEM research and careers	❍	❍	❍	❍
I have a greater appreciation of DoD STEM research and careers	❍	❍	❍	❍
I am more interested in pursuing a STEM career with the DoD	❍	❍	❍	❍

Q45. What are the three most important ways that you have benefited from HSAP?

Benefit #1:

Benefit #2:

Benefit #3:

Q46. What are the three ways that HSAP should be improved for future participants?

Improvement #1:

Improvement #2:

Improvement #3:

Q47. Tell us about your overall satisfaction with your HSAP experience.

HSAP Youth Data Summary

So that we can determine how diverse students respond to participation in AEOP programs, please tell us about yourself and your school. What grade will you start in the fall? (select one) (Avg. = 12.00, SD = 1.07)		
	Freq.	**%**
9th	0	0%
10th	1	13%
11th	1	13%
12th	3	38%
College freshman	3	38%
Other, (specify)	0	0%
Choose not to report	0	0%
Total	**8**	**100%**

What is your gender?		
	Freq.	**%**
Male	4	50%
Female	4	50%
Choose not to report	0	0%
Total	**8**	**100%**

What is your race or ethnicity?		
	Freq.	**%**
Hispanic or Latino	0	0%
Asian	4	50%
Black or African American	2	25%
Native American or Alaska Native	0	0%
Native Hawaiian or Other Pacific Islander	0	0%
White	0	0%
Other race or ethnicity, (specify):	2	25%
Choose not to report	0	0%
Total	**8**	**100%**
Note. Other = "White and Asian", and "Mixed".		

Do you qualify for free or reduced lunches at school?		
	Freq.	%
Yes	3	38%
No	5	63%
Choose not to report	0	0%
Total	8	100%

Which best describes the location of your school?		
	Freq.	%
Frontier or tribal school	0	0%
Rural (country)	0	0%
Suburban	5	63%
Urban (city)	3	38%
Total	8	100%

What kind of school do you attend?		
	Freq.	%
Public school	8	100%
Private school	0	0%
Home school	0	0%
Online school	0	0%
Department of Defense school (DoDDS or DoDEA)	0	0%
Total	8	100%

Where was the HSAP program located?		
	Freq.	%
Arizona State University	1	13%
University of California - Irvine	1	13%
Clark Atlanta University	2	25%
Northeastern University	1	13%

Princeton University	0	0%
City University of New York	1	13%
North Carolina State University	2	25%
Other, (specify):	0	0%
Total	**8**	**100%**

How often do you do each of the following in STEM classes at school this year?

	1	2	3	4	5	n	Avg.	SD
Learn about new science, technology, engineering, or mathematics (STEM) topics	0 (0%)	0 (0%)	3 (38%)	1 (13%)	4 (50%)	8	**4.13**	0.99
Apply STEM knowledge to real life situations	1 (13%)	0 (0%)	2 (25%)	2 (25%)	3 (38%)	8	**3.75**	1.39
Learn about cutting-edge STEM research	0 (0%)	1 (13%)	4 (50%)	1 (13%)	2 (25%)	8	**3.50**	1.07
Learn about different STEM careers	0 (0%)	1 (13%)	3 (38%)	2 (25%)	2 (25%)	8	**3.63**	1.06
Interact with STEM professionals	2 (25%)	1 (13%)	2 (25%)	2 (25%)	1 (13%)	8	**2.88**	1.46

Note. Response scale: **1** = "Not at all," **2** = "At least once," **3** = "A few times," **4** = "Most days," **5** = "Every day".

How often do you do each of the following in HSAP this year?

	1	2	3	4	5	n	Avg.	SD
Learn about new science, technology, engineering, or mathematics (STEM) topics	0 (0%)	0 (0%)	1 (13%)	3 (38%)	4 (50%)	8	**4.38**	0.74
Apply STEM knowledge to real life situations	0 (0%)	0 (0%)	1 (13%)	2 (25%)	5 (63%)	8	**4.50**	0.76
Learn about cutting-edge STEM research	0 (0%)	0 (0%)	0 (0%)	4 (50%)	4 (50%)	8	**4.50**	0.53
Learn about different STEM careers	0 (0%)	1 (13%)	2 (25%)	4 (50%)	1 (13%)	8	**3.63**	0.92
Interact with STEM professionals	0 (0%)	1 (13%)	0 (0%)	3 (38%)	4 (50%)	8	**4.25**	1.04

Note. Response scale: **1** = "Not at all," **2** = "At least once," **3** = "A few times," **4** = "Most days," **5** = "Every day".

How often do you do each of the following in STEM classes at school this year?

	1	2	3	4	5	n	Avg.	SD
Practice using laboratory or field techniques, procedures, and tools	0 (0%)	1 (13%)	1 (13%)	6 (75%)	0 (0%)	8	**3.63**	0.74
Participate in hands-on STEM activities	0 (0%)	0 (0%)	3 (38%)	5 (63%)	0 (0%)	8	**3.63**	0.52
Work as part of a team	0 (0%)	0 (0%)	3 (38%)	5 (63%)	0 (0%)	8	**3.63**	0.52
Communicate with other students about STEM	1 (13%)	0 (0%)	3 (38%)	2 (25%)	2 (25%)	8	**3.50**	1.31

Note. Response scale: **1** = "Not at all," **2** = "At least once," **3** = "A few times," **4** = "Most days," **5** = "Every day".

How often do you do each of the following in HSAP this year?								
	1	**2**	**3**	**4**	**5**	**n**	**Avg.**	**SD**
Practice using laboratory or field techniques, procedures, and tools	0 (0%)	0 (0%)	1 (13%)	2 (25%)	5 (63%)	8	**4.50**	0.76
Participate in hands-on STEM activities	0 (0%)	0 (0%)	2 (25%)	1 (13%)	5 (63%)	8	**4.38**	0.92
Work as part of a team	0 (0%)	0 (0%)	4 (50%)	2 (25%)	2 (25%)	8	**3.75**	0.89
Communicate with other students about STEM	0 (0%)	2 (25%)	1 (13%)	3 (38%)	2 (25%)	8	**3.63**	1.19

Note. Response scale: **1** = "Not at all," **2** = "At least once," **3** = "A few times," **4** = "Most days," **5** = "Every day".

How often do you do each of the following in STEM classes at school this year?								
	1	**2**	**3**	**4**	**5**	**n**	**Avg.**	**SD**
Pose questions or problems to investigate	0 (0%)	1 (14%)	2 (29%)	3 (43%)	1 (14%)	7	**3.57**	0.98
Design an investigation	2 (29%)	1 (14%)	1 (14%)	3 (43%)	0 (0%)	7	**2.71**	1.38
Carry out an investigation	1 (14%)	0 (0%)	3 (43%)	3 (43%)	0 (0%)	7	**3.14**	1.07
Analyze and interpret data or information	0 (0%)	0 (0%)	1 (14%)	5 (71%)	1 (14%)	7	**4.00**	0.58
Draw conclusions from an investigation	1 (14%)	0 (0%)	1 (14%)	4 (57%)	1 (14%)	7	**3.57**	1.27
Come up with creative explanations or solutions	0 (0%)	0 (0%)	3 (43%)	2 (29%)	2 (29%)	7	**3.86**	0.90
Build (or simulate) something	1 (14%)	1 (14%)	3 (43%)	2 (29%)	0 (0%)	7	**2.86**	1.07

Note. Response scale: **1** = "Not at all," **2** = "At least once," **3** = "A few times," **4** = "Most days," **5** = "Every day".

How often do you do each of the following in HSAP this year?								
	1	**2**	**3**	**4**	**5**	**n**	**Avg.**	**SD**
Pose questions or problems to investigate	0 (0%)	1 (14%)	1 (14%)	3 (43%)	2 (29%)	7	**3.86**	1.07
Design an investigation	0 (0%)	0 (0%)	2 (29%)	2 (29%)	3 (43%)	7	**4.14**	0.90
Carry out an investigation	0 (0%)	0 (0%)	2 (29%)	1 (14%)	4 (57%)	7	**4.29**	0.95
Analyze and interpret data or information	0 (0%)	0 (0%)	1 (14%)	1 (14%)	5 (71%)	7	**4.57**	0.79
Draw conclusions from an investigation	0 (0%)	0 (0%)	1 (14%)	1 (14%)	5 (71%)	7	**4.57**	0.79
Come up with creative explanations or solutions	0 (0%)	0 (0%)	1 (14%)	3 (43%)	3 (43%)	7	**4.29**	0.76
Build (or simulate) something	1 (14%)	0 (0%)	1 (14%)	4 (57%)	1 (14%)	7	**3.57**	1.27

Note. Response scale: **1** = "Not at all," **2** = "At least once," **3** = "A few times," **4** = "Most days," **5** = "Every day".

Rate how the following items impacted your awareness of Army Educational Outreach Programs (AEOPs) during HSAP:								
	0	**1**	**2**	**3**	**4**	**n**	**Avg.**	**SD**
Army Research Office website	1 (14%)	1 (14%)	2 (29%)	2 (29%)	1 (14%)	7	**2.50**	1.05
Army Educational Outreach Program (AEOP) website	0 (0%)	1 (14%)	0 (0%)	3 (43%)	3 (43%)	7	**3.14**	1.07
AEOP social media	5 (71%)	1 (14%)	0 (0%)	0 (0%)	1 (14%)	7	**2.50**	2.12
AEOP brochure	3 (43%)	2 (29%)	0 (0%)	1 (14%)	1 (14%)	7	**2.25**	1.50
AEOP instructional supplies (Rite in the Rain notebook, Lab Coat)	2 (29%)	1 (14%)	0 (0%)	2 (29%)	2 (29%)	7	**3.00**	1.22
My mentor(s)	0 (0%)	0 (0%)	2 (29%)	1 (14%)	4 (57%)	7	**3.29**	0.95
Invited speakers or "career" events	2 (29%)	2 (29%)	0 (0%)	1 (14%)	2 (29%)	7	**2.60**	1.52
Participation in HSAP	0 (0%)	0 (0%)	0 (0%)	2 (29%)	5 (71%)	7	**3.71**	0.49

Note. Response scale: **0** = "Did Not Experience," **1** = "Not at all," **2** = "A little," **3** = "Somewhat," **4** = "Very much".

Rate how the following items impacted your awareness of Department of Defense (DoD) STEM careers during HSAP:								
	0	**1**	**2**	**3**	**4**	**n**	**Avg.**	**SD**
Army Research Office website	1 (14%)	1 (14%)	3 (43%)	0 (0%)	2 (29%)	7	**2.50**	1.22
Army Educational Outreach Program (AEOP) website	1 (14%)	2 (29%)	0 (0%)	2 (29%)	2 (29%)	7	**2.67**	1.37
AEOP social media	4 (57%)	2 (29%)	0 (0%)	0 (0%)	1 (14%)	7	**2.00**	1.73
AEOP brochure	3 (43%)	2 (29%)	0 (0%)	1 (14%)	1 (14%)	7	**2.25**	1.50
AEOP instructional supplies (Rite in the Rain notebook, Lab Coat)	2 (29%)	1 (14%)	2 (29%)	0 (0%)	2 (29%)	7	**2.60**	1.34
My mentor(s)	1 (14%)	1 (14%)	1 (14%)	1 (14%)	3 (43%)	7	**3.00**	1.26
Invited speakers or "career" events	2 (29%)	2 (29%)	0 (0%)	1 (14%)	2 (29%)	7	**2.60**	1.52
Participation in HSAP	0 (0%)	0 (0%)	2 (29%)	2 (29%)	3 (43%)	7	**3.14**	0.90

Note. Response scale: **0** = "Did Not Experience," **1** = "Not at all," **2** = "A little," **3** = "Somewhat," **4** = "Very much".

How SATISFIED were you with each of the following HSAP program features?								
	0	**1**	**2**	**3**	**4**	**n**	**Avg.**	**SD**
Application or registration process	0 (0%)	0 (0%)	0 (0%)	2 (29%)	5 (71%)	7	**3.71**	0.49
Other administrative tasks	0 (0%)	0 (0%)	0 (0%)	4 (57%)	3 (43%)	7	**3.43**	0.53

Communications from Army Research Office	0 (0%)	0 (0%)	0 (0%)	1 (14%)	6 (86%)	7	**3.86**	0.38
Communications from [HSAP site]	0 (0%)	0 (0%)	1 (14%)	1 (14%)	5 (71%)	7	**3.57**	0.79
Location(s) of program activities	0 (0%)	0 (0%)	0 (0%)	2 (29%)	5 (71%)	7	**3.71**	0.49
Availability of program topics or fields that interest you	0 (0%)	0 (0%)	0 (0%)	2 (29%)	5 (71%)	7	**3.71**	0.49
Instruction or mentorship during program activities	0 (0%)	0 (0%)	0 (0%)	2 (29%)	5 (71%)	7	**3.71**	0.49
Participation stipends (payment)	0 (0%)	0 (0%)	1 (14%)	0 (0%)	6 (86%)	7	**3.71**	0.76
Research abstract preparation requirements	0 (0%)	0 (0%)	0 (0%)	3 (43%)	4 (57%)	7	**3.57**	0.53
Application or registration process	0 (0%)	0 (0%)	0 (0%)	2 (29%)	5 (71%)	7	**3.71**	0.49

Note. Response scale: **0** = "Did Not Experience," **1** = "Not at all," **2** = "A little," **3** = "Somewhat," **4** = "Very much".

Which of the following best describes your primary research mentor?

	Freq.	%
I did not have a research mentor	0	0%
Teacher	0	0%
Coach	0	0%
Parent	0	0%
Club or activity leader (School club, Boy/Girls Scouts)	0	0%
STEM researcher (university, industry, or DoD/government employee)	7	100%
Other (specify)	0	0%
Total	**7**	**100%**

Which of the following statements best reflects the input you had into your project initially?

	Freq.	%
I did not have a project	0	0%
I was assigned a project by my mentor	1	14%
I worked with my mentor to design a project	1	14%
I had a choice among various projects suggested by my mentor	2	29%
I worked with my mentor and members of a research team to design a project	3	43%
I designed the entire project on my own	0	0%
Total	**7**	**100%**

Which of the following statements best reflects the availability of your mentor?		
	Freq.	**%**
I did not have a mentor	0	0%
The mentor was never available	0	0%
The mentor was available less than half of the time	0	0%
The mentor was available about half of the time of my project	1	14%
The mentor was available more than half of the time	2	29%
The mentor was always available	4	57%
Total	**7**	**100%**

Which of the following statements best reflects your working as part of a group or team?		
	Freq.	**%**
I worked alone (or alone with my research mentor)	1	14%
I worked with others in a shared laboratory or other space, but we work on different projects	0	0%
I worked alone on my project and I met with others regularly for general reporting or discussion	2	29%
I worked alone on a project that was closely connected with projects of others in my group	1	14%
I work with a group who all worked on the same project	3	43%
Total	**7**	**100%**

How SATISFIED were you with each of the following?								
	0	**1**	**2**	**3**	**4**	**n**	**Avg.**	**SD**
My working relationship with my mentor	0 (0%)	0 (0%)	0 (0%)	3 (43%)	4 (57%)	7	**3.57**	0.53
My working relationship with the group or team	1 (14%)	0 (0%)	0 (0%)	3 (43%)	3 (43%)	7	**3.50**	0.55
The amount of time I spent doing meaningful research	0 (0%)	0 (0%)	0 (0%)	2 (29%)	5 (71%)	7	**3.71**	0.49
The amount of time I spent with my research mentor	0 (0%)	0 (0%)	0 (0%)	3 (43%)	4 (57%)	7	**3.57**	0.53
The research experience overall	0 (0%)	0 (0%)	0 (0%)	2 (29%)	5 (71%)	7	**3.71**	0.49

Note. Response scale: **0** = "Did Not Experience," **1** = "Not at all," **2** = "A little," **3** = "Somewhat," **4** = "Very much".

Which of the following statements apply to your research experience? (choose all that apply) (n = 6)						
	Freq.	%			Freq.	%
I presented a talk or poster to other students or faculty	1	17%		I will present a talk or poster to other students or faculty	3	50%
I presented a talk or poster at a professional symposium or conference	0	0%		I will present a talk or poster at a professional symposium or conference	0	0%
I attended a symposium or conference	2	33%		I will attend a symposium or conference	1	17%
I wrote or co-wrote a paper that was/will be published in a research journal	1	17%		I will write or co-write a paper that was/will be published in a research journal	2	33%
I wrote or co-wrote a technical paper or patent	1	17%		I will write or co-write a technical paper or patent	1	17%
				I won an award or scholarship based on my research	0	0%

The list below describes mentoring strategies that are effective ways to support STEM learners. From the list below, please indicate which strategies that your mentor(s) used when working directly with you for HSAP:					
		Yes - my mentor used this strategy with me		No - my mentor did not use this strategy with me	
	n	Freq.	%	Freq.	%
Helped me become aware of the roles STEM play in my everyday life	7	5	71%	2	29%
Helped me understand how STEM can help me improve my community	7	5	71%	2	29%
Used teaching/mentoring activities that addressed my learning style	7	7	100%	0	0%
Provided me with extra support when I needed it	7	7	100%	0	0%
Encouraged me to exchange ideas with others whose backgrounds or viewpoints are different from mine	7	6	86%	1	14%
Allowed me to work on a collaborative project as a member of a team	7	6	86%	1	14%
Helped me practice a variety of STEM skills with supervision	7	6	86%	1	14%
Gave me constructive feedback to improve my STEM knowledge, skills, or abilities	7	6	86%	1	14%
Gave me guidance about educational pathways that would prepare me for a STEM career	7	5	71%	2	29%
Recommended Army Educational Outreach Programs that match my interests	7	4	57%	3	43%

Discussed STEM career opportunities with DoD or other government agencies	7	3	43%	4	57%

Which category best describes the focus of your HSAP experience?		
	Freq.	**%**
Science	3	50%
Technology	1	17%
Engineering	2	33%
Mathematics	0	0%
Total	**6**	**100%**

AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas?								
	1	**2**	**3**	**4**	**5**	**n**	**Avg.**	**SD**
Knowledge of a STEM topic or field in depth	0 (0%)	0 (0%)	0 (0%)	4 (57%)	3 (43%)	7	**4.43**	0.53
Knowledge of research conducted in a STEM topic or field	0 (0%)	0 (0%)	0 (0%)	4 (57%)	3 (43%)	7	**4.43**	0.53
Knowledge of research processes, ethics, and rules for conduct in STEM	0 (0%)	0 (0%)	0 (0%)	4 (57%)	3 (43%)	7	**4.43**	0.53
Knowledge of how professionals work on real problems in STEM	0 (0%)	0 (0%)	1 (14%)	2 (29%)	4 (57%)	7	**4.43**	0.79
Knowledge of what everyday research work is like in STEM	0 (0%)	0 (0%)	0 (0%)	3 (43%)	4 (57%)	7	**4.57**	0.53

Note. Response scale: **1** = "No gain," **2** = "A little gain," **3** = "Some gain," **4** = "Large gain," **5** = "Extreme gain".

AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas?								
	1	**2**	**3**	**4**	**5**	**n**	**Avg.**	**SD**
Learning to work independently	0 (0%)	0 (0%)	0 (0%)	2 (33%)	4 (67%)	6	**4.67**	0.52
Setting goals and reflecting on performance	0 (0%)	0 (0%)	2 (33%)	2 (33%)	2 (33%)	6	**4.00**	0.89
Sticking with a task until it is complete	0 (0%)	0 (0%)	2 (33%)	2 (33%)	2 (33%)	6	**4.00**	0.89
Making changes when things do not go as planned	0 (0%)	0 (0%)	0 (0%)	3 (50%)	3 (50%)	6	**4.50**	0.55
Patience for the slow pace of research	0 (0%)	0 (0%)	0 (0%)	5 (83%)	1 (17%)	6	**4.17**	0.41
Working collaboratively with a team	1 (17%)	0 (0%)	1 (17%)	1 (17%)	3 (50%)	6	**3.83**	1.60
Communicating effectively with others	1 (17%)	0 (0%)	0 (0%)	2 (33%)	3 (50%)	6	**4.00**	1.55

Including others' perspectives when making decisions	1 (17%)	0 (0%)	1 (17%)	1 (17%)	3 (50%)	6	**3.83**	1.60
Sense of being part of a learning community	0 (0%)	1 (17%)	1 (17%)	2 (33%)	2 (33%)	6	**3.83**	1.17
Sense of contributing to a body of knowledge	1 (17%)	0 (0%)	0 (0%)	4 (67%)	1 (17%)	6	**3.67**	1.37
Building relationships with professionals in a field	0 (0%)	0 (0%)	0 (0%)	4 (67%)	2 (33%)	6	**4.33**	0.52
Connecting a topic or field and my personal values	0 (0%)	0 (0%)	1 (17%)	4 (67%)	1 (17%)	6	**4.00**	0.63

Note. Response scale: **1** = "No gain," **2** = "A little gain," **3** = "Some gain," **4** = "Large gain," **5** = "Extreme gain".

AS A RESULT OF YOUR HSAP EXPERIENCE, how much did you GAIN in the following areas?

	1	2	3	4	5	n	Avg.	SD
Interest in a new STEM topic or field	0 (0%)	1 (17%)	0 (0%)	2 (33%)	3 (50%)	6	**4.17**	1.17
Clarifying a STEM career path	0 (0%)	0 (0%)	2 (33%)	4 (67%)	0 (0%)	6	**3.67**	0.52
Sense of accomplishing something in STEM	0 (0%)	0 (0%)	0 (0%)	5 (83%)	1 (17%)	6	**4.17**	0.41
Building academic or professional credentials in STEM	0 (0%)	0 (0%)	1 (17%)	3 (50%)	2 (33%)	6	**4.17**	0.75
Feeling prepared for more challenging STEM activities	0 (0%)	0 (0%)	0 (0%)	3 (50%)	3 (50%)	6	**4.50**	0.55
Confidence to do well in future STEM courses	0 (0%)	0 (0%)	0 (0%)	4 (67%)	2 (33%)	6	**4.33**	0.52
Confidence to contribute to STEM	0 (0%)	0 (0%)	1 (17%)	2 (33%)	3 (50%)	6	**4.33**	0.82
Thinking creatively about a STEM project or activity	0 (0%)	0 (0%)	1 (17%)	4 (67%)	1 (17%)	6	**4.00**	0.63
Trying out new ideas or procedures on my own in a STEM project or activity	0 (0%)	0 (0%)	1 (17%)	3 (50%)	2 (33%)	6	**4.17**	0.75
Feeling responsible for a STEM project or activity	0 (0%)	0 (0%)	0 (0%)	4 (67%)	2 (33%)	6	**4.33**	0.52
Feeling like a STEM professional	0 (0%)	1 (17%)	0 (0%)	5 (83%)	0 (0%)	6	**3.67**	0.82
Feeling like part of a STEM community	0 (0%)	0 (0%)	0 (0%)	4 (67%)	2 (33%)	6	**4.33**	0.52

Note. Response scale: **1** = "No gain," **2** = "A little gain," **3** = "Some gain," **4** = "Large gain," **5** = "Extreme gain".

AS A RESULT OF YOUR HSAP experience, how much MORE or LESS likely are you to engage in the following activities in science, technology, engineering, or mathematics (STEM) outside of school requirements or activities?

	1	2	3	4	5	n	Avg.	SD
Visit a science museum or zoo	0 (0%)	0 (0%)	4 (67%)	2 (33%)	0 (0%)	6	**3.33**	0.52
Watch or read non-fiction STEM	0 (0%)	0 (0%)	3 (50%)	3 (50%)	0 (0%)	6	**3.50**	0.55

Look up STEM information at a library or on the internet	0 (0%)	0 (0%)	0 (0%)	4 (67%)	2 (33%)	6	**4.33**	0.52
Tinker with a mechanical or electrical device	0 (0%)	0 (0%)	1 (17%)	3 (50%)	2 (33%)	6	**4.17**	0.75
Work on solving mathematical or scientific puzzles	0 (0%)	0 (0%)	1 (17%)	2 (33%)	3 (50%)	6	**4.33**	0.82
Design a computer program or website	0 (0%)	0 (0%)	3 (50%)	0 (0%)	3 (50%)	6	**4.00**	1.10
Observe things in nature (plant growth, animal behavior, stars or planets, etc.)	0 (0%)	1 (17%)	2 (33%)	1 (17%)	2 (33%)	6	**3.67**	1.21
Talk with friends or family about STEM	0 (0%)	0 (0%)	2 (33%)	2 (33%)	2 (33%)	6	**4.00**	0.89
Mentor or teach other students about STEM	0 (0%)	0 (0%)	1 (17%)	3 (50%)	2 (33%)	6	**4.17**	0.75
Help with a community service project that relates to STEM	0 (0%)	0 (0%)	1 (17%)	3 (50%)	2 (33%)	6	**4.17**	0.75
Participate in a STEM club, student association, or professional organization	0 (0%)	0 (0%)	0 (0%)	5 (83%)	1 (17%)	6	**4.17**	0.41
Participate in STEM camp, fair, or competition	0 (0%)	0 (0%)	1 (17%)	4 (67%)	1 (17%)	6	**4.00**	0.63
Take an elective (not required) STEM class	0 (0%)	0 (0%)	1 (17%)	2 (33%)	3 (50%)	6	**4.33**	0.82
Work on a STEM project or experiment in a university or professional setting	0 (0%)	0 (0%)	0 (0%)	3 (50%)	3 (50%)	6	**4.50**	0.55
Receive an award or special recognition for STEM accomplishments	0 (0%)	0 (0%)	0 (0%)	5 (83%)	1 (17%)	6	**4.17**	0.41

Note. Response scale: **1** = "Much less likely," **2** = "Less likely," **3** = "About the same before and after," **4** = "More likely," **5** = "Much more likely".

How far did you want to go in school BEFORE participating in HSAP?		
	Freq.	**%**
Graduate from high school	1	17%
Go to a trade or vocational school	0	0%
Go to college for a little while	0	0%
Finish college (get a Bachelor's degree)	2	33%
Get more education after college	0	0%
Get a master's degree	1	17%
Get a Ph.D.	0	0%
Get a medical-related degree (M.D.), veterinary degree (D.V.M), or dental degree (D.D.S)	0	0%
Get a combined M.D. / Ph.D.	2	33%
Get another professional degree (law, business, etc.)	0	0%
Total	**6**	**100%**

How far did you want to go in school AFTER participating in HSAP?		
	Freq.	%
Graduate from high school	0	0%
Go to a trade or vocational school	0	0%
Go to college for a little while	0	0%
Finish college (get a Bachelor's degree)	1	17%
Get more education after college	0	0%
Get a master's degree	2	33%
Get a Ph.D.	1	17%
Get a medical-related degree (M.D.), veterinary degree (D.V.M), or dental degree (D.D.S)	0	0%
Get a combined M.D. / Ph.D.	2	33%
Get another professional degree (law, business, etc.)	0	0%
Total	6	100%

BEFORE HSAP, what kind of work did you expect to be doing when you are 30 years old (select the ONE answer that best describes your career goals BEFORE HSAP)						
	Freq.	%			Freq.	%
Undecided	1	17%		Teaching, non-STEM	0	0%
Science (no specific subject)	0	0%		Medicine (doctor, dentist, veterinarian, etc.)	1	17%
Physical science (physics, chemistry, astronomy, materials science, etc.)	0	0%		Health (nursing, pharmacy, technician, etc.)	0	0%
Biological science	0	0%		Social science (psychologist, sociologist, etc.)	0	0%
Earth, atmospheric or oceanic science	0	0%		Business	0	0%
Agricultural science	0	0%		Law	0	0%
Environmental science	0	0%		English/language arts	0	0%
Computer science	1	17%		Farming	0	0%
Technology	1	17%		Military, police, or security	0	0%
Engineering	2	33%		Art (writing, dancing, painting, etc.)	0	0%
Mathematics or statistics	0	0%		Skilled trade (carpenter, electrician, plumber, etc.)	0	0%
Teaching, STEM	0	0%		Other, (specify):	0	0%
				Total	6	100%

AFTER HSAP, what kind of work do you expect to be doing when you are 30 years old? (select the ONE answer that best describes your career goals AFTER HSAP)

	Freq.	%			Freq.	%
Undecided	0	0%		Teaching, non-STEM	0	0%
Science (no specific subject)	1	17%		Medicine (doctor, dentist, veterinarian, etc.)	1	17%
Physical science (physics, chemistry, astronomy, materials science, etc.)	0	0%		Health (nursing, pharmacy, technician, etc.)	0	0%
Biological science	0	0%		Social science (psychologist, sociologist, etc.)	0	0%
Earth, atmospheric or oceanic science	0	0%		Business	0	0%
Agricultural science	0	0%		Law	0	0%
Environmental science	0	0%		English/language arts	0	0%
Computer science	1	17%		Farming	0	0%
Technology	1	17%		Military, police, or security	0	0%
Engineering	2	33%		Art (writing, dancing, painting, etc.)	0	0%
Mathematics or statistics	0	0%		Skilled trade (carpenter, electrician, plumber, etc.)	0	0%
Teaching, STEM	0	0%		Other, (specify):	0	0%
				Total	6	100%

When you are 30, to what extent do you expect to use your STEM knowledge, skills, and/or abilities in your work?

	Freq.	%
not at all	0	0%
less than 25% of the time	0	0%
26% to 50% of the time	0	0%
51% to 75% of the time	1	17%
76% to 100% of the time	5	83%
Total	6	100%

How many times have you participated in any of the following Army Educational Outreach Programs? If you have not heard of an AEOP, select "Never heard of it." If you have heard of an AEOP but never participated, select "Never."

	0	1	2	3	4	n	Avg.	SD

Camp Invention	3 (50%)	2 (33%)	1 (17%)	0 (0%)	0 (0%)	6	**1.33**	0.58
eCYBERMISSION	2 (33%)	3 (50%)	0 (0%)	1 (17%)	0 (0%)	6	**1.50**	1.00
Junior Solar Sprint (JSS)	4 (67%)	2 (33%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00
West Point Bridge Design Contest (WPBDC)	2 (40%)	2 (40%)	1 (20%)	0 (0%)	0 (0%)	5	**1.33**	0.58
Junior Science & Humanities Symposium (JSHS)	4 (67%)	2 (33%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00
Gains in the Education of Mathematics and Science (GEMS)	4 (67%)	2 (33%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00
GEMS Near Peers	4 (67%)	2 (33%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00
UNITE	4 (67%)	2 (33%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00
Science & Engineering Apprenticeship Program (SEAP)	2 (33%)	4 (67%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00
Research & Engineering Apprenticeship Program (REAP)	1 (17%)	4 (67%)	1 (17%)	0 (0%)	0 (0%)	6	**1.20**	0.45
High School Apprenticeship Program (HSAP)	0 (0%)	1 (17%)	5 (83%)	0 (0%)	0 (0%)	6	**1.83**	0.41
College Qualified Leaders (CQL)	4 (67%)	2 (33%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00
Undergraduate Research Apprenticeship Program (URAP)	3 (50%)	3 (50%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00
Science Mathematics, and Research for Transformation (SMART) College Scholarship	4 (67%)	2 (33%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00
National Defense Science & Engineering Graduate (NDSEG) Fellowship	4 (67%)	2 (33%)	0 (0%)	0 (0%)	0 (0%)	6	**1.00**	0.00

Note. Response scale: **0** = "Never heard of it," **1** = "Never," **2** = "Once," **3**= "Twice," **4** = "Three or more times".

How interested are you in participating in the following programs in the future?

	1	**2**	**3**	**4**	**n**	**Avg.**	**SD**
Camp Invention	1 (17%)	4 (67%)	0 (0%)	1 (17%)	6	**2.17**	0.98
eCybermission	1 (17%)	2 (33%)	2 (33%)	1 (17%)	6	**2.50**	1.05
Junior Solar Sprint (JSS)	1 (17%)	2 (33%)	2 (33%)	1 (17%)	6	**2.50**	1.05
West Point Bridge Design Contest (WPBDC)	1 (20%)	2 (40%)	0 (0%)	2 (40%)	5	**2.60**	1.34
Junior Science & Humanities Symposium (JSHS)	1 (17%)	2 (33%)	0 (0%)	3 (50%)	6	**2.83**	1.33
Gains in the Education of Mathematics and Science (GEMS)	0 (0%)	2 (33%)	2 (33%)	2 (33%)	6	**3.00**	0.89
GEMS Near Peers	1 (17%)	3 (50%)	1 (17%)	1 (17%)	6	**2.33**	1.03
UNITE	1 (17%)	2 (33%)	2 (33%)	1 (17%)	6	**2.50**	1.05
Science & Engineering Apprenticeship Program (SEAP)	0 (0%)	1 (17%)	2 (33%)	3 (50%)	6	**3.33**	0.82
Research & Engineering Apprenticeship Program (REAP)	0 (0%)	1 (17%)	1 (17%)	4 (67%)	6	**3.50**	0.84

High School Apprenticeship Program (HSAP)	0 (0%)	1 (17%)	2 (33%)	3 (50%)	6	**3.33**	0.82
College Qualified Leaders (CQL)	1 (17%)	2 (33%)	1 (17%)	2 (33%)	6	**2.67**	1.21
Undergraduate Research Apprenticeship Program (URAP)	1 (17%)	0 (0%)	1 (17%)	4 (67%)	6	**3.33**	1.21
Science Mathematics, and Research for Transformation (SMART) College Scholarship	0 (0%)	2 (33%)	3 (50%)	1 (17%)	6	**2.83**	0.75
National Defense Science & Engineering Graduate (NDSEG) Fellowship	1 (17%)	2 (33%)	2 (33%)	1 (17%)	6	**2.50**	1.05

Note. Response scale: **1** = "Not at all," **2** = "A little," **3** = "Somewhat," **4** = "Very much".

How many jobs/careers in science, technology, engineering, or math (STEM) did you learn about during HSAP?

	Freq.	%
None	1	17%
1	1	17%
2	3	50%
3	0	0%
4	0	0%
5 or more	1	17%
Total	**6**	**100%**

How many Department of Defense (DoD) STEM jobs/careers did you learn about during HSAP?

	Freq.	%
None	3	50%
1	0	0%
2	2	33%
3	0	0%
4	0	0%
5 or more	1	17%
Total	**6**	**100%**

Rate how much you agree or disagree with each of the following statements about Department of Defense (DoD) researchers and research:

	1	2	3	4	5	n	Avg.	SD

DoD researchers advance science and engineering fields	0 (0%)	0 (0%)	1 (17%)	2 (33%)	3 (50%)	6	**4.33**	0.82
DoD researchers develop new, cutting edge technologies	0 (0%)	0 (0%)	1 (17%)	2 (33%)	3 (50%)	6	**4.33**	0.82
DoD researchers support non-defense related advancements in science and technology	0 (0%)	0 (0%)	2 (33%)	2 (33%)	2 (33%)	6	**4.00**	0.89
DoD researchers solve real-world problems	0 (0%)	0 (0%)	1 (17%)	2 (33%)	3 (50%)	6	**4.33**	0.82
DoD research is valuable to society	0 (0%)	0 (0%)	1 (17%)	3 (50%)	2 (33%)	6	**4.17**	0.75

Note. Response scale: **1** = "Strongly Disagree," **2** = "Disagree," **3** = "Neither Agree nor Disagree," **4** = "Agree," **5** = "Strongly Agree".

Which of the following statements describe you after participating in HSAP?

	1	**2**	**3**	**4**	**n**	**Avg.**	**SD**
I am more confident in my STEM knowledge, skills, and abilities	0 (0%)	0 (0%)	6 (100%)	0 (0%)	6	**3.00**	0.00
I am more interested in participating in STEM activities outside of school requirements	0 (0%)	0 (0%)	6 (100%)	0 (0%)	6	**3.00**	0.00
I am more aware of other AEOPs	0 (0%)	1 (17%)	4 (67%)	1 (17%)	6	**3.00**	0.63
I am more interested in participating in other AEOPs	0 (0%)	0 (0%)	5 (83%)	1 (17%)	6	**3.17**	0.41
I am more interested in taking STEM classes in school	0 (0%)	2 (33%)	3 (50%)	1 (17%)	6	**2.83**	0.75
I am more interested in attending college	0 (0%)	1 (17%)	4 (67%)	1 (17%)	6	**3.00**	0.63
I am more interested in earning a STEM degree in college	0 (0%)	2 (33%)	4 (67%)	0 (0%)	6	**2.67**	0.52
I am more interested in pursuing a STEM career	0 (0%)	2 (33%)	3 (50%)	1 (17%)	6	**2.83**	0.75
I am more aware of DoD STEM research and careers	1 (17%)	0 (0%)	3 (50%)	2 (33%)	6	**3.00**	1.10
I have a greater appreciation of DoD STEM research and careers	1 (17%)	0 (0%)	4 (67%)	1 (17%)	6	**2.83**	0.98
I am more interested in pursuing a STEM career with the DoD	1 (17%)	0 (0%)	5 (83%)	0 (0%)	6	**2.67**	0.82

Note. Response scale: **1** = "Disagree – This did not happen," **2** = "Disagree – This happened but not because of HSAP," **3** = "Agree – HSAP contributed," **4** = "Agree – HSAP was the primary reason".

*****Data from HSAP registration/application records*****

How did you learn about HSAP? (n = 9)

	Freq.	**%**			**Freq.**	**%**
ARL website	0	0%		**Extended family member (grandparents, aunts, uncles, cousins)**	0	0%
Program or AEOP website	4	44%		**Friend of the family**	1	11%

Facebook, Twitter, Pinterest, or other social media	0	0%		**Teacher or professor**	3	33%
School or university newsletter, email, or website	1	11%		**Guidance counselor**	1	11%
News story or other media coverage	1	11%		**Mentor from HSAP**	0	0%
Past participant of HSAP	1	11%		**Someone who works at an Army laboratory**	0	0%
Friend	0	0%		**Someone who works with the Department of Defense**	0	0%
Immediate family member (mother, father, siblings)	1	11%		**Choose not to report**	0	0%
				Other, (specify):	0	0%

Data from HSAP registration/application records

How motivating were the following factors in your decision to participate in HSAP?

	1	2	3	4	n	Avg.	SD
Teacher or professor encouragement	1 (11%)	0 (0%)	2 (22%)	6 (67%)	9	**3.44**	0.97
An academic requirement of school or grade	1 (11%)	2 (22%)	1 (11%)	5 (56%)	9	**3.11**	1.15
Learning something new or interesting	0 (0%)	0 (0%)	0 (0%)	9 (100%)	9	**4.00**	0.00
The program mentor	1 (11%)	0 (0%)	2 (22%)	6 (67%)	9	**3.44**	0.97
Building college application or résumé	0 (0%)	3 (33%)	2 (22%)	4 (44%)	9	**3.11**	0.88
Networking opportunities	0 (0%)	1 (11%)	2 (22%)	6 (67%)	9	**3.56**	0.70
Interest in science, technology, engineering, or mathematics (STEM)	0 (0%)	0 (0%)	0 (0%)	9 (100%)	9	**4.00**	0.00
Interest in STEM careers with the Army	0 (0%)	4 (44%)	3 (33%)	2 (22%)	9	**2.78**	0.88
Having fun	0 (0%)	0 (0%)	1 (11%)	8 (89%)	9	**3.89**	0.32
Earning stipend or award during summer	0 (0%)	1 (11%)	4 (44%)	4 (44%)	9	**3.33**	0.67
Opportunity to do something with friends	1 (11%)	1 (11%)	1 (11%)	6 (67%)	9	**3.33**	1.06
Opportunity to use advanced laboratory technology	0 (0%)	0 (0%)	1 (11%)	8 (89%)	9	**3.89**	0.32
Desire to expand laboratory or research skills	0 (0%)	0 (0%)	2 (22%)	7 (78%)	9	**3.78**	0.42
Learning in ways that are not possible in school	0 (0%)	0 (0%)	0 (0%)	9 (100%)	9	**4.00**	0.00
Serving the community or country	0 (0%)	0 (0%)	2 (22%)	7 (78%)	9	**3.78**	0.42
Parent encouragement	1 (11%)	1 (11%)	2 (22%)	5 (56%)	9	**3.22**	1.03
Exploring a unique work environment	0 (0%)	0 (0%)	1 (11%)	8 (89%)	9	**3.89**	0.32
Other, (specify)	1 (11%)	0 (0%)	2 (22%)	6 (67%)	9	**3.44**	0.97

Note. Response scale: **1** = “Not motivating at all”, **2** = “Not too motivating,” **3** = “Somewhat motivating”, **4** = “Very motivating”. Other = “Ability to make a difference and showcase my skills.”, “Technology Experience”, “Prepares me for college and future job opportunities.”, and “Finding new ways to express myself”.

Appendix C

FY14 HSAP Mentor Questionnaire and Data Summaries

2014 High School Apprenticeship Program (HSAP): HSAP Mentor Survey

Virginia Tech is conducting an evaluation study on behalf of the Army Research Office and the U.S. Army to determine how well HSAP is achieving its goals of promoting student interest and engagement in science, technology, engineering, and mathematics (STEM). As part of this study Virginia Tech is surveying adults who participate in HSAP in the capacity of STEM mentors (e.g., instructors, research mentors, or competition advisors). The questionnaire will collect information about you, your experiences in school, and your experiences in HSAP. The results of this survey will be used to help us improve HSAP and to report to the organizations that support HSAP.

About this survey:

- This research protocol has been approved for use with human subjects by the Virginia Tech IRB office.
- Although this questionnaire is not anonymous, it is CONFIDENTIAL. Prior to analysis and reporting responses will be de-identified and no one will be able to connect your responses to you or your apprentice's name.
- Only AEOP evaluation personnel will have access to completed questionnaires and personal information will be stored securely.
- Responding to this survey is VOLUNTARY. You are not required to participate, although we hope you do because your responses will provide valuable information for meaningful and continuous improvement.
- If you provide your email address, the AEOP may contact you in the future to ask about you or your students.

If you have any additional questions or concerns, please contact one of the following people:

Tanner Bateman, Virginia Tech
Senior Project Associate, AEOPCA
(540) 231-4540, tbateman@vt.edu

Rebecca Kruse, Virginia Tech
Evaluation Director, AEOPCA
(540) 315-5807, rkruse75@vt.edu

Q1 Do you agree to participate in this survey? (required)

❍ Yes, I agree to participate in this survey
❍ No, I do not wish to participate in this survey **If selected, respondent will be directed to the end of the survey**

Q2 Please provide your personal information below: (required)

First Name _____
Last Name _____

Q3 Please provide your email address: (optional)

Email _____

Q4 What is your gender?

NOTE: Results of Q4 are not presented in this appendix to protect anonymity of respondents.

- ❍ Male
- ❍ Female
- ❍ Choose not to report

Q5 What is your race or ethnicity?

NOTE: Results of Q5 are not presented in this appendix to protect anonymity of respondents.

- ❍ Hispanic or Latino
- ❍ Asian
- ❍ Black or African American
- ❍ Native American or Alaska Native
- ❍ Native Hawaiian or Other Pacific Islander
- ❍ White
- ❍ Other race or ethnicity, (specify): _____
- ❍ Choose not to report

Q6 Which of the following BEST describes your current occupation (select ONE)

NOTE: Results of Q6 are not presented in this appendix to protect anonymity of respondents.

- ❍ Teacher
- ❍ Other school staff
- ❍ University educator
- ❍ Scientist, Engineer, or Mathematician in training (undergraduate or graduate student, etc.)
- ❍ Scientist, Engineer, or Mathematics professional
- ❍ Other, (specify): _____

Q7 Which of the following BEST describes your organization? (select ONE)

NOTE: Results of Q7 are not presented in this appendix to protect anonymity of respondents.

- ❍ No organization
- ❍ School or district (K-12)
- ❍ State educational agency
- ❍ Institution of higher education (vocational school, junior college, college, or university)
- ❍ Industry
- ❍ Department of Defense or other government agency
- ❍ Non-profit
- ❍ Other, (specify): _____

Q8 Which of the following best describes your primary area of research?

NOTE: Results of Q8 are not presented in this appendix to protect anonymity of respondents.

- ❍ Physical science (physics, chemistry, astronomy, materials science)

- ❍ Biological science
- ❍ Earth, atmospheric, or oceanic science
- ❍ Agricultural science
- ❍ Environmental science
- ❍ Computer science
- ❍ Technology
- ❍ Engineering
- ❍ Mathematics or statistics
- ❍ Medical, health, or behavioral science
- ❍ Social science (psychology, sociology, anthropology, etc.)
- ❍ Other, (specify) _____

Q9 Where was the HSAP program located?

NOTE: Results of Q9 are not presented in this appendix to protect anonymity of respondents.

- ❍ Arizona State University
- ❍ University of California - Irvine
- ❍ Clark Atlanta University
- ❍ Northeastern University
- ❍ Princeton University
- ❍ City University of New York
- ❍ North Carolina State University
- ❍ Other, (specify): _____

Q10 Which of the following BEST describes your role during HSAP?

NOTE: Results of Q10 are not presented in this appendix to protect anonymity of respondents.

- ❍ Research Mentor
- ❍ Research Team Member but not a Principal Investigator (PI)
- ❍ Other, (specify) _____

Q11 How many HSAP students did you work with this year?

NOTE: Results of Q11 are not presented in this appendix to protect anonymity of respondents.

Q12 How did you learn about HSAP? (Check all that apply)

- ❑ Army Research Office website
- ❑ Army Educational Outreach Program (AEOP) website
- ❑ Facebook, Twitter, Pinterest, or other social media
- ❑ State or national educator conference

- ❑ STEM conference
- ❑ School, university, or professional organization newsletter, email or website
- ❑ A news story or other media coverage
- ❑ Past HSAP participant
- ❑ A student
- ❑ A colleague
- ❑ A supervisor or superior
- ❑ HSAP event or site host/director
- ❑ Workplace communications
- ❑ Someone who works at an Army laboratory
- ❑ Someone who works with the Department of Defense
- ❑ Other, (specify): _____

Q13 How many times have YOU PARTICIPATED in any of the following Army Educational Outreach Programs (AEOPs) in any capacity? If you have heard of an AEOP but never participated select "Never." If you have not heard of an AEOP select "Never heard of it."

NOTE: Results of Q13 are not presented in this appendix to protect anonymity of respondents.

	Never	Once	Twice	Three or more times	Never heard of it
Camp Invention	❍	❍	❍	❍	❍
eCYBERMISSION	❍	❍	❍	❍	❍
Junior Solar Sprint (JSS)	❍	❍	❍	❍	❍
West Point Bridge Design Contest (WPBDC)	❍	❍	❍	❍	❍
Junior Science & Humanities Symposium (JSHS)	❍	❍	❍	❍	❍
Gains in the Education of Mathematics and Science (GEMS)	❍	❍	❍	❍	❍
GEMS Near Peers	❍	❍	❍	❍	❍
UNITE	❍	❍	❍	❍	❍
Science & Engineering Apprenticeship Program (SEAP)	❍	❍	❍	❍	❍
Research & Engineering Apprenticeship Program (REAP)	❍	❍	❍	❍	❍
High School Apprenticeship Program (HSAP)	❍	❍	❍	❍	❍
College Qualified Leaders (CQL)	❍	❍	❍	❍	❍
Undergraduate Research Apprenticeship Program (URAP)	❍	❍	❍	❍	❍
Science Mathematics, and Research for Transformation (SMART) College Scholarship	❍	❍	❍	❍	❍
National Defense Science & Engineering Graduate (NDSEG) Fellowship	❍	❍	❍	❍	❍

Q14 Which of the following were used for the purpose of recruiting your student(s) for apprenticeships? (select ALL that apply)

- ❑ Applications from Army Research Office or the AEOP
- ❑ Personal acquaintance(s) (friend, family, neighbor, etc.)
- ❑ Colleague(s) in my workplace
- ❑ K-12 school teacher(s) outside of my workplace
- ❑ University faculty outside of my workplace
- ❑ Informational materials sent to K-12 schools or Universities outside of my workplace
- ❑ Communication(s) generated by a K-12 school or teacher (newsletter, email blast, website)
- ❑ Communication(s) generated by a university or faculty (newsletter, email blast, website)
- ❑ Career fair(s)
- ❑ Education conference(s) or event(s)
- ❑ STEM conference(s) or event(s)
- ❑ Organization(s) serving underserved or underrepresented populations
- ❑ Student contacted mentor
- ❑ I do not know how student(s) was recruited for apprenticeship
- ❑ Other, Specify: _____

Q15 How SATISFIED were you with each of the following HSAP features?

	Did not experience	Not at all	A little	Somewhat	Very much
Application or registration process	❍	❍	❍	❍	❍
Other administrative tasks	❍	❍	❍	❍	❍
Communications from the Army Research Office	❍	❍	❍	❍	❍
Communications from ${q://QID13/ChoiceGroup/SelectedChoices}	❍	❍	❍	❍	❍
Support for instruction or mentorship during program activities	❍	❍	❍	❍	❍
Participation stipends (payment)	❍	❍	❍	❍	❍
Research abstract preparation requirements	❍	❍	❍	❍	❍

Q16 The list below describes instructional and mentoring strategies that are effective ways to establish the relevance of learning activities for students. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.

	Yes - I used this strategy	No - I did not use this strategy
Finding out about students' backgrounds and interests at the beginning of the program	❍	❍
Giving students real-life problems to investigate or solve	❍	❍

Asking students to relate outside events or activities to topics covered in the program	❍	❍
Selecting readings or activities that relate to students' backgrounds	❍	❍
Encouraging students to suggest new readings, activities, or projects	❍	❍
Making explicit provisions for students who wish to carry out independent studies	❍	❍
Helping students become aware of the roles STEM plays in their everyday lives	❍	❍
Helping students understand how STEM can help them improve their communities	❍	❍
Other, (specify):	❍	❍

Q17 The list below describes instructional and mentoring strategies that are effective ways to support the diverse needs of students as learners. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.

	Yes - I used this strategy	No - I did not use this strategy
Finding out about students' learning styles at the beginning of the program	❍	❍
Interacting with all students in the same way regardless of their gender or race and ethnicity	❍	❍
Using gender neutral language	❍	❍
Using diverse teaching/mentoring activities to address a broad spectrum of students	❍	❍
Integrating ideas from the literature on pedagogical activities for women and underrepresented students	❍	❍
Providing extra readings, activities, or other support for students who lack essential background knowledge or skills	❍	❍
Directing students to other individuals or programs if I can only provide limited support	❍	❍
Other, (specify):	❍	❍

Q18 The list below describes instructional and mentoring strategies that are effective ways to support students development of collaboration and interpersonal skills. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.

	Yes - I used this strategy	No - I did not use this strategy
Having students tell others about their backgrounds and interests	❍	❍

Having students explain difficult ideas to others	❍	❍
Having students exchange ideas with others whose backgrounds or viewpoints are different from their own	❍	❍
Having students participate in giving and receiving feedback	❍	❍
Having students work on collaborative activities or projects as a member of a team	❍	❍
Having students listen to the ideas of others with an open mind	❍	❍
Having students pay attention to the feelings of all team members	❍	❍
Having students develop ways to resolve conflict and reach agreement among the team	❍	❍
Other, (specify):	❍	❍

Q19 The list below describes instructional and mentoring strategies that are effective ways to support students' engagement in "authentic" STEM activities. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.

	Yes - I used this strategy	No - I did not use this strategy
Teaching (or assigning readings) about specific STEM subject matter	❍	❍
Having students access and critically review technical texts or media to support their work	❍	❍
Demonstrating the use of laboratory or field techniques, procedures, and tools students are expected to use	❍	❍
Helping students practice STEM skills with supervision	❍	❍
Giving constructive feedback to improve students' STEM competencies	❍	❍
Allowing students to work independently as appropriate for their self-management abilities and STEM competencies	❍	❍
Encouraging students to seek support from other team members	❍	❍
Encouraging opportunities in which students could learn from others (team projects, team meetings, journal clubs)	❍	❍
Other, (specify):	❍	❍

Q20 The list below describes instructional and mentoring strategies that are effective ways to support students' STEM educational and career pathways. The list also includes items that reflect AEOP and Army priorities. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.

	Yes - I used this strategy	No - I did not use this strategy

Asking about students' educational and career interests	❍	❍
Recommending extracurricular programs that align with students' educational goals	❍	❍
Recommending Army Educational Outreach Programs that align with students' educational goals	❍	❍
Providing guidance about educational pathways that would prepare students for a STEM career	❍	❍
Sharing personal experiences, attitudes, and values pertaining to STEM	❍	❍
Discussing STEM career opportunities with the DoD or other government agencies	❍	❍
Discussing STEM career opportunities outside of the DoD or other government agencies (private industry, academia)	❍	❍
Discussing non-technical aspects of a STEM career (economic, political, ethical, and/or social issues)	❍	❍
Highlighting under-representation of women and racial and ethnic minority populations in STEM and/or their contributions in STEM	❍	❍
Recommending student and professional organizations in STEM	❍	❍
Helping students build effective STEM networks	❍	❍
Critically reviewing students' résumé, application, or interview preparations	❍	❍
Other, (specify):	❍	❍

Q21 How USEFUL were each of the following in your efforts to expose student(s) to Army Educational Outreach Programs (AEOPs) during HSAP?

	Did not experience	Not at all	A little	Somewhat	Very much
Army Research Office website	❍	❍	❍	❍	❍
Army Educational Outreach Program (AEOP) website	❍	❍	❍	❍	❍
AEOP social media	❍	❍	❍	❍	❍
AEOP brochure	❍	❍	❍	❍	❍
AEOP instructional supplies (Rite in the Rain notebook, Lab coats, etc.)	❍	❍	❍	❍	❍
Program administrator or site coordinators	❍	❍	❍	❍	❍
Invited speakers or "career" events	❍	❍	❍	❍	❍
Participation in HSAP	❍	❍	❍	❍	❍

Q22 Which of the following AEOPs did YOU EXPLICITLY DISCUSS with your student(s) during HSAP? (check ALL that apply)

	Yes - I discussed this program with my student(s)	No - I did not discuss this program with my student(s)
Camp Invention	❍	❍
eCYBERMISSION	❍	❍
Junior Solar Sprint (JSS)	❍	❍
West Point Bridge Design Contest (WPBDC)	❍	❍
Junior Science & Humanities Symposium (JSHS)	❍	❍
Gains in the Education of Mathematics and Science (GEMS)	❍	❍
GEMS Near Peers	❍	❍
UNITE	❍	❍
Science & Engineering Apprenticeship Program (SEAP)	❍	❍
Research & Engineering Apprenticeship Program (REAP)	❍	❍
High School Apprenticeship Program (HSAP)	❍	❍
College Qualified Leaders (CQL)	❍	❍
Undergraduate Research Apprenticeship Program (URAP)	❍	❍
Science Mathematics, and Research for Transformation (SMART) College Scholarship	❍	❍
National Defense Science & Engineering Graduate (NDSEG) Fellowship	❍	❍
I discussed AEOP with my student(s) but did not discuss any specific program	❍	❍

Q23 How USEFUL were each of the following in your efforts to expose your student(s) to Department of Defense (DoD) STEM careers during HSAP?

	Did not experience	Not at all	A little	Somewhat	Very much
Army Research Office website	❍	❍	❍	❍	❍
Army Educational Outreach Program (AEOP) website	❍	❍	❍	❍	❍
AEOP social media	❍	❍	❍	❍	❍
AEOP brochure and/or presentation	❍	❍	❍	❍	❍
AEOP instructional supplies (Rite in the Rain notebook, Lab coats, etc.)	❍	❍	❍	❍	❍

Program administrator or site coordinator	❍	❍	❍	❍	❍
Invited speakers or "career" events	❍	❍	❍	❍	❍
Participation in HSAP	❍	❍	❍	❍	❍

Q24 Rate how much you agree or disagree with each of the following statements about Department of Defense (DoD) researchers and research:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
DoD researchers advance science and engineering fields	❍	❍	❍	❍	❍
DoD researchers develop new, cutting edge technologies	❍	❍	❍	❍	❍
DoD researchers support non-defense related advancements in science and technology	❍	❍	❍	❍	❍
DoD researchers solve real-world problems	❍	❍	❍	❍	❍
DoD research is valuable to society	❍	❍	❍	❍	❍

Q25 How often did YOUR STUDENT(S) have opportunities do each of the following in HSAP?

	Not at all	At least once	A few times	Most days	Every day
Learn new science, technology, engineering, or mathematics (STEM) topics	❍	❍	❍	❍	❍
Apply STEM knowledge to real life situations	❍	❍	❍	❍	❍
Learn about cutting-edge STEM research	❍	❍	❍	❍	❍
Learn about different STEM careers	❍	❍	❍	❍	❍
Interact with STEM professionals	❍	❍	❍	❍	❍
Practice using laboratory or field techniques, procedures, and tools	❍	❍	❍	❍	❍
Participate in hands-on STEM activities	❍	❍	❍	❍	❍
Work as part of a team	❍	❍	❍	❍	❍
Communicate with other students about STEM	❍	❍	❍	❍	❍
Pose questions or problems to investigate	❍	❍	❍	❍	❍
Design an investigation	❍	❍	❍	❍	❍
Carry out an investigation	❍	❍	❍	❍	❍
Analyze and interpret data or information	❍	❍	❍	❍	❍
Draw conclusions from an investigation	❍	❍	❍	❍	❍

Come up with creative explanations or solutions	❍	❍	❍	❍	❍

Q26 Which category best describes the focus of your student(s)' HSAP experience?

- ❍ Science
- ❍ Technology
- ❍ Engineering
- ❍ Mathematics

Q27 AS A RESULT OF THE HSAP EXPERIENCE, how much did your student(s) GAIN in the following areas?

	No gain	A little gain	Some gain	Large gain	Extreme gain
Knowledge of a STEM topic or field in depth	❍	❍	❍	❍	❍
Knowledge of research conducted in a STEM topic or field	❍	❍	❍	❍	❍
Knowledge of research processes, ethics, and rules for conduct in STEM	❍	❍	❍	❍	❍
Knowledge of how professionals work on real problems in STEM	❍	❍	❍	❍	❍
Knowledge of what everyday research work is like in STEM	❍	❍	❍	❍	❍

Q28 AS A RESULT OF THE HSAP EXPERIENCE, how much did your student(s) GAIN in the following areas? **Only presented to respondents who selected "science" in Q26**

	No gain	A little gain	Some gain	Large gain	Extreme gain
Asking questions based on observations of real-world phenomena	❍	❍	❍	❍	❍
Asking a question (about a phenomenon) that can be answered with one or more investigations	❍	❍	❍	❍	❍
Applying knowledge, logic, and creativity to propose explanations that can be tested with investigations	❍	❍	❍	❍	❍
Making a model to represent the key features and functions of an observed phenomenon	❍	❍	❍	❍	❍
Deciding what type of data to collect in order to answer a question	❍	❍	❍	❍	❍
Designing procedures for investigations, including selecting methods and tools that are appropriate for the data to be collected	❍	❍	❍	❍	❍
Identifying the limitations of data collected in an investigation	❍	❍	❍	❍	❍
Carrying out procedures for an investigation and recording data accurately	❍	❍	❍	❍	❍
Testing how changing one variable affects another variable, in order to understand relationships between variables	❍	❍	❍	❍	❍
Using computer-based models to investigate cause and effect relationships of a simulated phenomenon	❍	❍	❍	❍	❍

Considering alternative interpretations of data when deciding on the best explanation for a phenomenon	❍	❍	❍	❍	❍
Displaying numeric data from an investigation in charts or graphs to identify patterns and relationships	❍	❍	❍	❍	❍
Using mathematics or computers to analyze numeric data	❍	❍	❍	❍	❍
Supporting a proposed explanation (for a phenomenon) with data from investigations	❍	❍	❍	❍	❍
Supporting a proposed explanation with relevant scientific, mathematical, and/or engineering knowledge	❍	❍	❍	❍	❍
Identifying the strengths and limitations of explanations in terms of how well they describe or predict observations	❍	❍	❍	❍	❍
Using data or interpretations from other researchers or investigations to improve an explanation	❍	❍	❍	❍	❍
Asking questions to understand the data and interpretations others use to support their explanations	❍	❍	❍	❍	❍
Using data from investigations to defend an argument that conveys how an explanation describes an observed phenomenon	❍	❍	❍	❍	❍
Deciding what additional data or information may be needed to find the best explanation for a phenomenon	❍	❍	❍	❍	❍
Reading technical or scientific texts, or using other media, to learn about the natural or designed worlds	❍	❍	❍	❍	❍
Identifying the strengths and limitation of data, interpretations, or arguments presented in technical or scientific texts	❍	❍	❍	❍	❍
Integrating information from multiple sources to support your explanations of phenomena	❍	❍	❍	❍	❍
Communicating information about your investigations and explanations in different formats (orally, written, graphically, mathematically, etc.)	❍	❍	❍	❍	❍

Q29 AS A RESULT OF THE HSAP EXPERIENCE, how much did your student(s) GAIN in the following areas? **Only presented to respondents who selected "science" in Q26**

	No gain	A little gain	Some gain	Large gain	Extreme gain
Identifying real-world problems based on social, technological, or environmental issues	❍	❍	❍	❍	❍
Defining a problem that can be solved by developing a new or improved object, process, or system	❍	❍	❍	❍	❍
Applying knowledge, logic, and creativity to propose solutions that can be tested with investigations	❍	❍	❍	❍	❍
Making a model that represents the key features or functions of a solution to a problem	❍	❍	❍	❍	❍

Deciding what type of data to collect in order to test if a solution functions as intended	❍	❍	❍	❍	❍
Designing procedures for investigations, including selecting methods and tools that are appropriate for the data to be collected	❍	❍	❍	❍	❍
Identifying the limitations of the data collected in an investigation	❍	❍	❍	❍	❍
Carrying out procedures for an investigation and recording data accurately	❍	❍	❍	❍	❍
Testing how changing one variable affects another variable in order to determine a solution's failure points or to improve its performance	❍	❍	❍	❍	❍
Using computer-based models to investigate cause and effect relationships of a simulated solution	❍	❍	❍	❍	❍
Considering alternative interpretations of data when deciding if a solution functions as intended	❍	❍	❍	❍	❍
Displaying numeric data in charts or graphs to identify patterns and relationships	❍	❍	❍	❍	❍
Using mathematics or computers to analyze numeric data	❍	❍	❍	❍	❍
Supporting a proposed solution (for a problem) with data from investigations	❍	❍	❍	❍	❍
Supporting a proposed solution with relevant scientific, mathematical, and/or engineering knowledge	❍	❍	❍	❍	❍
Identifying the strengths and limitations of solutions in terms of how well they meet design criteria	❍	❍	❍	❍	❍
Using data or interpretations from other researchers or investigations to improve a solution	❍	❍	❍	❍	❍
Asking questions to understand the data and interpretations others use to support their solutions	❍	❍	❍	❍	❍
Using data from investigations to defend an argument that conveys how a solution meets design criteria	❍	❍	❍	❍	❍
Deciding what additional data or information may be needed to find the best solution to a problem	❍	❍	❍	❍	❍
Reading technical or scientific texts, or using other media, to learn about the natural or designed worlds	❍	❍	❍	❍	❍
Identifying the strengths and limitations of data, interpretations, or arguments presented in technical or scientific texts	❍	❍	❍	❍	❍
Integrating information from multiple sources to support your solution to a problem	❍	❍	❍	❍	❍
Communicating information about your design processes and/or solutions in different formats (orally, written, graphically, mathematically, etc.)	❍	❍	❍	❍	❍

Q30 AS A RESULT OF THE HSAP EXPERIENCE, how much did your student(s) GAIN (on average) in the following areas?

	No gain	A little gain	Some gain	Large gain	Extreme gain
Learning to work independently	❍	❍	❍	❍	❍

Setting goals and reflecting on performance	❍	❍	❍	❍	❍
Sticking with a task until it is completed	❍	❍	❍	❍	❍
Making changes when things do not go as planned	❍	❍	❍	❍	❍
Patience for the slow pace of research	❍	❍	❍	❍	❍
Working collaboratively with a team	❍	❍	❍	❍	❍
Communicating effectively with others	❍	❍	❍	❍	❍
Including others' perspectives when making decisions	❍	❍	❍	❍	❍
Sense of being part of a learning community	❍	❍	❍	❍	❍
Sense of contributing to a body of knowledge	❍	❍	❍	❍	❍
Building relationships with professionals in a field	❍	❍	❍	❍	❍
Connecting a topic or field and their personal values	❍	❍	❍	❍	❍

Q31 Which of the following statements describe YOUR STUDENT(S) after participating in the HSAP program?

	Disagree - This did not happen	Disagree - This happened but not because of HSAP	Agree - HSAP contributed	Agree - HSAP was primary reason
More confident in STEM knowledge, skills, and abilities	❍	❍	❍	❍
More interested in participating in STEM activities outside of school requirements	❍	❍	❍	❍
More aware of other AEOPs	❍	❍	❍	❍
More interested in participating in other AEOPs	❍	❍	❍	❍
More interested in taking STEM classes in school	❍	❍	❍	❍
More interested in attending college	❍	❍	❍	❍
More interested in earning a STEM degree in college	❍	❍	❍	❍
More interested in pursuing a STEM career	❍	❍	❍	❍
More aware of Department of Defense (DoD) STEM research and careers	❍	❍	❍	❍
Greater appreciation of DoD STEM research and careers	❍	❍	❍	❍
More interested in pursuing a STEM career with the DoD	❍	❍	❍	❍

Q32 What are the three most important strengths of HSAP?

Strength #1

Strength #2

Strength #3

Q33 What are the three ways HSAP should be improved for future participants?

Improvement #1

Improvement #2

Improvement #3

Q34 Tell us about your overall satisfaction with your HSAP experience.

HSAP Mentor Data Summary

How did you learn about HSAP? (Check all that apply) (n = 2)						
	Freq.	%			Freq.	%
Army Research Office website	0	0%		A student	0	0%
Army Educational Outreach Program (AEOP) website	0	0%		A colleague	0	0%
Facebook, Twitter, Pinterest, or other social media	0	0%		A supervisor or superior	1	50%
State or national educator conference	0	0%		HSAP site host/director	0	0%
STEM conference	0	0%		Workplace communications	0	0%
School, university, or professional organization newsletter, email, or website	0	0%		Someone who works at an Army laboratory	1	50%
A news story or other media coverage	1	50%		Someone who works with the Department of Defense	0	0%
Past HSAP participant	0	0%		Other, (specify):	0	0%

Which of the following were used for the purpose of recruiting your student(s) for apprenticeships? (select ALL that apply) (n = 2)						
	Freq.	%			Freq.	%
Applications from Army Research Office or the AEOP	2	100%		Communication(s) generated by a university or faculty (newsletter, email blast, website)	1	50%
Personal acquaintance(s) (friend, family, neighbor, etc.)	1	50%		Career fair(s)	0	0%
Colleague(s) in my workplace	1	50%		Education conference(s) or event(s)	0	0%
K-12 school teacher(s) outside of my workplace	1	50%		STEM conference(s) or event(s)	1	50%
University faculty outside of my workplace	0	0%		Organization(s) serving underserved or underrepresented populations	1	50%
Informational materials sent to K-12 schools or Universities outside of my workplace	1	50%		Student contacted mentor	1	50%
Communication(s) generated by a K-12 school or teacher (newsletter, email blast, website)	0	0%		I do not know how student(s) was recruited for apprenticeship	0	0%
				Other, Specify:	0	0%

How SATISFIED were you with each of the following HSAP program features?

	0	1	2	3	4	n	Avg.	SD
Application or registration process	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
Other administrative tasks	1 (50%)	0 (0%)	0 (0%)	0 (0%)	1 (50%)	2	**4.00**	0.00
Communications from Army Research Office	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00
Communications from [HSAP site]	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
Support for instruction or mentorship during program activities	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
Participation stipends (payment)	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
Research abstract preparation requirements	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71

Note. Response scale: 0 = "Did Not Experience," 1 = "Not at all," 2 = "A little," 3 = "Somewhat," 4 = "Very much".

The list below describes mentoring strategies that are effective ways to establish the relevance of learning activities for students. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.

		Yes – I used this strategy		No – I did not use this strategy	
	n	Freq.	%	Freq.	%
Finding out about students' backgrounds and interests at the beginning of the program	2	2	100%	0	0%
Giving students real-life problems to investigate or solve	2	2	100%	0	0%
Asking students to relate outside events or activities to topics covered in the program	2	1	50%	1	50%
Selecting readings or activities that relate to students' backgrounds	2	1	50%	1	50%
Encouraging students to suggest new readings, activities, or projects	2	1	50%	1	50%
Making explicit provisions for students who wish to carry out independent studies	2	1	50%	1	50%
Helping students become aware of the roles STEM plays in their everyday lives	2	2	100%	0	0%
Helping students understand how STEM can help them improve their communities	2	1	50%	1	50%
Other, (specify):	1	1	100%	0	0%

Note. Other = "link student's project with graduate student's projects".

The list below describes mentoring strategies that are effective ways to support the diverse needs of students as learners. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.

		Yes – I used this strategy		No – I did not use this strategy	
	n	Freq.	%	Freq.	%
Finding out about students' learning styles at the beginning of the program	2	2	100%	0	0%
Interacting with all students in the same way regardless of their gender or race and ethnicity	2	1	50%	1	50%
Using gender neutral language	2	2	100%	0	0%
Using diverse teaching/mentoring activities to address a broad spectrum of students	2	2	100%	0	0%
Integrating ideas from the literature on pedagogical activities for women and underrepresented students	2	1	50%	1	50%
Providing extra readings, activities, or other support for students who lack essential background knowledge or skills	2	1	50%	1	50%
Directing students to other individuals or programs if I can only provide limited support	2	1	50%	1	50%
Other, (specify):	0	0	0	0	0

The list below describes mentoring strategies that are effective ways to support students' development of collaboration and interpersonal skills. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.

		Yes – I used this strategy		No – I did not use this strategy	
	n	Freq.	%	Freq.	%
Having students tell others about their backgrounds and interests	2	1	50%	1	50%
Having students explain difficult ideas to others	2	1	50%	1	50%
Having students exchange ideas with others whose backgrounds or viewpoints are different from their own	2	2	100%	0	0%
Having students participate in giving and receiving feedback	2	2	100%	0	0%
Having students work on collaborative activities or projects as a member of a team	2	2	100%	0	0%
Having students listen to the ideas of others with an open mind	2	2	100%	0	0%
Having students pay attention to the feelings of all team members	2	1	50%	1	50%
Having students develop ways to resolve conflict and reach agreement among the team	2	1	50%	1	50%
Other, (specify):	0	0	0	0	0

The list below describes mentoring strategies that are effective ways to support students' engagement in "authentic" STEM activities. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.					
		Yes – I used this strategy		No – I did not use this strategy	
	n	Freq.	%	Freq.	%
Teaching (or assigning readings) about specific STEM subject matter	2	2	100%	0	0%
Having students access and critically review technical texts or media to support their work	2	2	100%	0	0%
Demonstrating the use of laboratory or field techniques, procedures, and tools students are expected to use	2	2	100%	0	0%
Helping students practice STEM skills with supervision	2	1	50%	1	50%
Giving constructive feedback to improve students' STEM competencies	2	1	50%	1	50%
Allowing students to work independently as appropriate for their self-management abilities and STEM competencies	2	2	100%	0	0%
Encouraging students to seek support from other team members	2	2	100%	0	0%
Encouraging opportunities in which students could learn from others (team projects, team meetings, journal clubs)	2	2	100%	0	0%
Other, (specify):	0	0	0	0	0

The list below describes mentoring strategies that are effective ways to support students' STEM educational and career pathways. The list also includes items that reflect AEOP and Army priorities. From the list below, please indicate which strategies you used when working with your student(s) in HSAP.					
		Yes – I used this strategy		No – I did not use this strategy	
	n	Freq.	%	Freq.	%
Asking about students' educational and career interests	2	2	100%	0	0%
Recommending extracurricular programs that align with students' educational goals	2	1	50%	1	50%
Recommending Army Educational Outreach Programs that align with students' educational goals	2	2	100%	0	0%
Providing guidance about educational pathways that would prepare students for a STEM career	2	2	100%	0	0%
Sharing personal experiences, attitudes, and values pertaining to STEM	2	1	50%	1	50%
Discussing STEM career opportunities with the DoD or other government agencies	2	2	100%	0	0%
Discussing STEM career opportunities outside of the DoD or other government agencies (private industry, academia)	2	2	100%	0	0%

Discussing non-technical aspects of a STEM career (economic, political, ethical, and/or social issues)	2	1	50%	1	50%
Highlighting under-representation of women and racial and ethnic minority populations in STEM and/or their contributions in STEM	2	0	0%	2	100%
Recommending student and professional organizations in STEM	2	0	0%	2	100%
Helping students build effective STEM networks	2	0	0%	2	100%
Critically reviewing students' résumé, application, or interview preparations	2	0	0%	2	100%
Other, (specify):	0	0	0	0	0

How USEFUL were each of the following in your efforts to expose student(s) to Army Educational Outreach Programs (AEOPs) during HSAP?

	0	1	2	3	4	n	Avg.	SD
Army Research Office website	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	2	**2.50**	0.71
Army Educational Outreach Program (AEOP) website	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2	**3.00**	0.00
AEOP social media	1 (50%)	0 (0%)	0 (0%)	1 (50%)	0 (0%)	2	**3.00**	0.00
AEOP brochure	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2	**3.00**	0.00
AEOP instructional supplies (Rite in the Rain notebook, Lab coats, etc.)	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
Program administrator or site coordinator	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00
Invited speakers or "career" events	0 (0%)	0 (0%)	1 (50%)	0 (0%)	1 (50%)	2	**3.00**	1.41
Participation in HSAP	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00

Note. Response scale: 0 = "Did Not Experience," 1 = "Not at all," 2 = "A little," 3 = "Somewhat," 4 = "Very much".

Which of the following AEOPs did you EXPLICITLY DISCUSS with your student(s) during HSAP?

		Yes - I discussed this program with my student(s)		No - I did not discuss this program with my student(s)	
	n	Freq.	%	Freq.	%
Camp Invention	2	0	0%	2	100%
eCYBERMISSION	2	0	0%	2	100%
Junior Solar Sprint (JSS)	2	0	0%	2	100%
West Point Bridge Design Contest (WPBDC)	2	0	0%	2	100%
Junior Science & Humanities Symposium (JSHS)	2	0	0%	2	100%
Gains in the Education of Mathematics and Science (GEMS)	2	0	0%	2	100%

GEMS Near Peers	2	0	0%	2	100%
UNITE	2	0	0%	2	100%
Science & Engineering Apprenticeship Program (SEAP)	2	0	0%	2	100%
Research & Engineering Apprenticeship Program (REAP)	2	2	100%	0	0%
High School Apprenticeship Program (HSAP)	2	1	50%	1	50%
College Qualified Leaders (CQL)	2	0	0%	2	100%
Undergraduate Research Apprenticeship Program (URAP)	2	0	0%	2	100%
Science Mathematics, and Research for Transformation (SMART) College Scholarship	2	0	0%	2	100%
National Defense Science & Engineering Graduate (NDSEG) Fellowship	2	1	50%	1	50%
I discussed AEOP with my student(s) but did not discuss any specific program	2	2	100%	0	0%

How USEFUL were each of the following in your efforts to expose your student(s) to Department of Defense (DoD) STEM careers during HSAP?

	0	1	2	3	4	n	Avg.	SD
Army Research Office website	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	2	**2.50**	0.71
Army Educational Outreach Program (AEOP) website	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00
AEOP social media	1 (50%)	1 (50%)	0 (0%)	0 (0%)	0 (0%)	2	**1.00**	0.00
AEOP brochure	1 (50%)	0 (0%)	0 (0%)	0 (0%)	1 (50%)	2	**4.00**	0.00
AEOP instructional supplies (Rite in the Rain notebook, Lab coats)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00
Program administrator or site coordinator	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00
Invited speakers or "career" events	0 (0%)	0 (0%)	1 (50%)	0 (0%)	1 (50%)	2	**3.00**	1.41
Participation in HSAP	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00

Note. Response scale: 0 = "Did Not Experience," 1 = "Not at all," 2 = "A little," 3 = "Somewhat," 4 = "Very much".

Rate how much you agree or disagree with each of the following statements about Department of Defense (DoD) researchers and research:

	1	2	3	4	5	n	Avg.	SD
DoD researchers advance science and engineering fields	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**5.00**	0.00
DoD researchers develop new, cutting edge technologies	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**5.00**	0.00

DoD researchers support non-defense related advancements in science and technology	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**5.00**	0.00
DoD researchers solve real-world problems	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**5.00**	0.00
DoD research is valuable to society	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**5.00**	0.00

Note. Response scale: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Neither Agree nor Disagree," 4 = "Agree," 5 = "Strongly Agree".

How often did YOUR STUDENT(S) have opportunities do each of the following in HSAP?

	1	2	3	4	5	n	Avg.	SD
Learn new science, technology, engineering, or mathematics (STEM) topics	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Apply STEM knowledge to real life situations	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Learn about cutting-edge STEM research	0 (0%)	0 (0%)	1 (50%)	0 (0%)	1 (50%)	2	**4.00**	1.41
Learn about different STEM careers	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	2	**3.50**	0.71
Interact with STEM professionals	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Practice using laboratory or field techniques, procedures, and tools	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**5.00**	0.00
Participate in hands-on STEM activities	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Work as part of a team	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Communicate with other students about STEM	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Pose questions or problems to investigate	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2	**4.00**	0.00
Design an investigation	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	2	**3.50**	0.71
Carry out an investigation	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**5.00**	0.00
Analyze and interpret data or information	0 (0%)	0 (0%)	1 (50%)	0 (0%)	1 (50%)	2	**4.00**	1.41
Draw conclusions from an investigation	0 (0%)	0 (0%)	1 (50%)	0 (0%)	1 (50%)	2	**4.00**	1.41
Come up with creative explanations or solutions	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	2	**3.50**	0.71

Note. Response scale: 1 = "Not at all," 2 = "At least once," 3 = "A few times," 4 = "Most days," 5 = "Every day".

Which category best describes the focus of your student's HSAP project?

	Freq.	%
Science	1	50%
Technology	0	0%
Engineering	1	50%
Mathematics	0	0%

Total	**2**	**100%**

AS A RESULT OF THE HSAP EXPERIENCE, how much did your student(s) GAIN in the following areas?

	1	2	3	4	5	n	Avg.	SD
Knowledge of a STEM topic or field in depth	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Knowledge of research conducted in a STEM topic or field	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Knowledge of research processes, ethics, and rules for conduct in STEM	0 (0%)	0 (0%)	1 (50%)	0 (0%)	1 (50%)	2	**4.00**	1.41
Knowledge of how professionals work on real problems in STEM	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2	**4.00**	0.00
Knowledge of what everyday research work is like in STEM	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71

Note. Response scale: 1 = "No gain," 2 = "A little gain," 3 = "Some gain," 4 = "Large gain," 5 = "Extreme gain".

AS A RESULT OF THE HSAP EXPERIENCE, how much did your student(s) GAIN in the following areas?

	1	2	3	4	5	n	Avg.	SD
Asking questions based on observations of real-world phenomena	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Asking a question (about a phenomenon) that can be answered with one or more investigations	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Applying knowledge, logic, and creativity to propose explanations that can be tested with investigations	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Making a model to represent the key features and functions of an observed phenomenon	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Deciding what type of data to collect in order to answer a question	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Designing procedures for investigations, including selecting methods and tools that are appropriate for the data to be collected	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Identifying the limitations of data collected in an investigation	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Carrying out procedures for an investigation and recording data accurately	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00

Testing how changing one variable affects another variable, in order to understand relationships between variables	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Using computer-based models to investigate cause and effect relationships of a simulated phenomenon	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Considering alternative interpretations of data when deciding on the best explanation for a phenomenon	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Displaying numeric data from an investigation in charts or graphs to identify patterns and relationships	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Using mathematics or computers to analyze numeric data	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Supporting a proposed explanation (for a phenomenon) with data from investigations	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Supporting a proposed explanation with relevant scientific, mathematical, and/or engineering knowledge	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Identifying the strengths and limitations of explanations in terms of how well they describe or predict observations	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Using data or interpretations from other researchers or investigations to improve an explanation	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Asking questions to understand the data and interpretations others use to support their explanations	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Using data from investigations to defend an argument that conveys how an explanation describes an observed phenomenon	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Deciding what additional data or information may be needed to find the best explanation for a phenomenon	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Reading technical or scientific texts, or using other media, to learn about the natural or designed worlds	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Identifying the strengths and limitation of data, interpretations, or arguments presented in technical or scientific texts	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Integrating information from multiple sources to support your explanations of phenomena	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Communicating information about your investigations and explanations in different	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00

formats (orally, written, graphically, mathematically, etc.)								

Note. Response scale: 1 = "No gain," 2 = "A little gain," 3 = "Some gain," 4 = "Large gain," 5 = "Extreme gain".

AS A RESULT OF THE HSAP EXPERIENCE, how much did your student(s) GAIN in the following areas?								
	1	2	3	4	5	n	Avg.	SD
Identifying real-world problems based on social, technological, or environmental issues	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Defining a problem that can be solved by developing a new or improved object, process, or system	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Applying knowledge, logic, and creativity to propose solutions that can be tested with investigations	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Making a model that represents the key features or functions of a solution to a problem	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Deciding what type of data to collect in order to test if a solution functions as intended	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Designing procedures for investigations, including selecting methods and tools that are appropriate for the data to be collected	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Identifying the limitations of the data collected in an investigation	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Carrying out procedures for an investigation and recording data accurately	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Testing how changing one variable affects another variable in order to determine a solution's failure points or to improve its performance	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Using computer-based models to investigate cause and effect relationships of a simulated solution	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Considering alternative interpretations of data when deciding if a solution functions as intended	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Displaying numeric data in charts or graphs to identify patterns and relationships	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Using mathematics or computers to analyze numeric data	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Supporting a proposed solution (for a problem) with data from investigations	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00

Supporting a proposed solution with relevant scientific, mathematical, and/or engineering knowledge	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)	1	**2.00**	0.00
Identifying the strengths and limitations of solutions in terms of how well they meet design criteria	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Using data or interpretations from other researchers or investigations to improve a solution	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Asking questions to understand the data and interpretations others use to support their solutions	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Using data from investigations to defend an argument that conveys how a solution meets design criteria	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Deciding what additional data or information may be needed to find the best solution to a problem	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	**3.00**	0.00
Reading technical or scientific texts, or using other media, to learn about the natural or designed worlds	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1	**5.00**	0.00
Identifying the strengths and limitations of data, interpretations, or arguments presented in technical or scientific texts	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Integrating information from multiple sources to support your solution to a problem	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00
Communicating information about your design processes and/or solutions in different formats (orally, written, graphically, mathematically, etc.)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	**4.00**	0.00

Note. Response scale: 1 = "No gain," 2 = "A little gain," 3 = "Some gain," 4 = "Large gain," 5 = "Extreme gain".

AS A RESULT OF THE HSAP EXPERIENCE, how much did your student(s) GAIN (on average) in the following areas?								
	1	**2**	**3**	**4**	**5**	**n**	**Avg.**	**SD**
Learning to work independently	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2	**4.00**	0.00
Setting goals and reflecting on performance	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2	**4.00**	0.00
Sticking with a task until it is complete	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2	**4.00**	0.00
Making changes when things do not go as planned	0 (0%)	0 (0%)	1 (50%)	0 (0%)	1 (50%)	2	**4.00**	1.41
Patience for the slow pace of research	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Working collaboratively with a team	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71

Communicating effectively with others	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Including others' perspectives when making decisions	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	2	**3.50**	0.71
Sense of being part of a learning community	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Sense of contributing to a body of knowledge	0 (0%)	0 (0%)	1 (50%)	0 (0%)	1 (50%)	2	**4.00**	1.41
Building relationships with professionals in a field	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71
Connecting a topic or field and their personal values	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**4.50**	0.71

Note. Response scale: 1 = "No gain," 2 = "A little gain," 3 = "Some gain," 4 = "Large gain," 5 = "Extreme gain".

Which of the following statements describe YOUR STUDENT(S) after participating in the HSAP program?

	1	2	3	4	n	Avg.	SD
More confident in STEM knowledge, skills, and abilities	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2	**3.00**	0.00
More interested in participating in STEM activities outside of school requirements	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
More aware of other AEOPs	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
More interested in participating in other AEOPs	0 (0%)	0 (0%)	2 (100%)	0 (0%)	2	**3.00**	0.00
More interested in taking STEM classes in school	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
More interested in attending college	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
More interested in earning a STEM degree in college	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
More interested in pursuing a STEM career	0 (0%)	0 (0%)	1 (50%)	1 (50%)	2	**3.50**	0.71
More aware of Department of Defense (DoD) STEM research and careers	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00
Greater appreciation of DoD STEM research and careers	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00
More interested in pursuing a STEM career with the DoD	0 (0%)	0 (0%)	0 (0%)	2 (100%)	2	**4.00**	0.00

Note. Response scale: **1** = "Disagree – This did not happen," **2** = "Disagree – This happened but not because of HSAP," **3** = "Agree – HSAP contributed," **4** = "Agree – HSAP was the primary reason".

Appendix D

FY14 HSAP Apprentice Interview Protocol

2014 Army Educational Outreach Program
Apprentice Interview Protocol

Key Questions:

1. Why did you choose to participate in [X] this year?
    - How did you hear about [X]?

2. One AEOP objective is to increase your awareness of the AEOP's pipeline of STEM programs. Did you learn about other AEOPs in [X]?
    - Which ones did you learn about?
    - How did you learn about them?
    - Which AEOPs are you interested in pursuing?

3. One AEOP objective is to increase your awareness of STEM research and career opportunities within the Department of Defense. Did you learn about DoD STEM research and careers in [X]?
    - Which ones did you learn about?
    - How did you learn about them?
    - Which AEOPs are you interested in pursuing?

4. Overall, were you happy that you chose to participate in [X]?
    - How have you benefited from participating in [X]?

5. What would you suggest for improving [X] in the future?

Ending Question:

6. Have we missed anything? Tell us anything you want us to know that we didn't ask about.

Appendix E

FY14 HSAP Mentor Focus Group Protocol

2014 Army Educational Outreach Program
Adult Focus Group

Facilitator: "Thank you for meeting with us today so that we can learn more about your experiences in [X] program. We'd like to suggest some basic ground rules to help the group's discussion proceed smoothly and respectfully for everyone:

- What is shared in the room stays in the room.
- Only one person speaks at a time--we'll call on sites, if you have something to add or wish to build on another's idea, just type 'add' in the chat window and we'll come back to you.
- It is important for us to hear everyone's ideas and opinions. If you disagree, be respectful.
- It is important for us to hear all sides of an issue—both the positive and negative.
- Your participation is voluntary--you may choose not to answer any question, or stop participating at any time.
- We will be audio recording the session for notetaking purposes and will delete the email after the notes have been taken."

Key Questions

1. What do you perceive as the value of [X]?
    - How do you think students benefit from participating?
    - How have you benefited?

2. One AEOP objective is to increase participation of underserved and underrepresented populations in STEM. What strategies have you used this year to increase the diversity of participants in [X]?
    - What strategies seem to work the best?
    - What do you need in order to achieve greater success?

3. One AEOP objective is to increase participants' awareness of the AEOP's pipeline of STEM programs. What strategies have you used this year to educate participants about other AEOP initiatives?
    - What strategies seem to work the best?
    - What do you need in order to achieve greater success?

4. One AEOP objective is to increase participants' awareness of STEM research and career opportunities within the Department of Defense. What strategies have you used this year to expose participants to DoD STEM research and careers?
    - What strategies seem to work the best?
    - What do you need in order to achieve greater success?

5. What suggestions do you have for improving [X]?

Ending questions:

6. Have we missed anything? Tell us anything you want us to know that we didn't ask about.

Appendix F

APR Template

Program Overview

Provide a one or two paragraph overview of your program.

Accomplishments

Provide the following for *<u>each</u>* program objective listed in the Proposed Work section of the FY14 Annual Program Plan.

1. **What were the major activities conducted to accomplish the FY14 target for the objective. Report major activities undertaken by of the program adninistrator as well as a selection of 3-5 different site-level activities.**

2. **What were the results of those activities? Specifically, what progress was made toward achieving the FY14 target for the objective?**

3. **What is the proposed FY15 target for for the objective, considering the 5-year target?**

4. **What is planned to accomplish the FY15 target for the objective?**

The following structure can be used for each program objective (replicate as needed). Information in the top two rows ("Objective" and "FY14 Target") should be copied directly from the approved FY14APP.

Objective: [STATE OBJECTIVE] (**Supports AEOP Goal** [STATE GOAL #], **Objectives** [STATE OBJECTIVE LETTERS]) **Proposed Plan:** [STATE PROPOSED PLAN]
FY14 Target: [STATE TARGET]
Major activities: [REPORT ACTIVITIES OF PROGRAM ADMISTRATOR] [REPORT SELECTED SITE-LEVEL ACTIVITIES]
Results: [REPORT RESULTS] [REPORT PROGROSS TOWARD ACHEIVEING FY14 TARGET]
FY15 Target: [STATE TARGET]
FY15 Plan: [STATE PLAN TO ACCOMPLISH FY15 TARGET]

Changes / Challenges

1. **What changes (if any) were made to the plan for meeting FY14 targets for each objective? What were the reasons for the changes?**

2. **Do any of these changes have significant impact on budget/expenditures?**

3. **What challenges or delays (if any) prevented the program from meeting FY14 targets for each objective? What actions or plans were implemented to resolve those challenges or delays?**

4. **Do any of these challenges or delays require the assistance of the Army, the Consortium, or the Lead Organization to resolve? Please specify.**

Products

1. **For all programs, list and briefly describe any products resulting from the administration of the program (program administrator or site coordinator) during FY14.**
   - **Websites and social media (provide website urls, social media handles, etc.)**
   - **Instructional materials and other educational aids or resources**
   - **Audio or video products**
   - **Guiding documents**
   - **Marketing or promotional materials**
   - **Presentations[11] (provide citations)**
   - **Publications[12] (provide citations)**
   - **Educational research or evaluation assessments**
   - **Other**
2. **In addition to the above, how many of each product resulted from the Army/AEOP-sponsored research conducted by students participating in apprenticeship programs?**
   - **Abstracts**

[11] Presentations include things like conference contributions (oral or poster) or presentations to the public, news media, educational agencies, and other associations. Conference booths may also be reported.

[12] Publications include things like peer reviewed articles, technical papers and reports, books or book chapters, news media releases.

- **Presentations**
- **Publications**
- **Patents**
- **Other**

Participants

Recruitment and selection of participants

1. **Who is the audience(s) targeted by your program and how was the program was marketed to the audience(s)? Report major activities undertaken by of the program administrator as well as a selection of 3-5 different site-level activities toward marketing and recruitment.**

2. **What criteria were used to select participants for the program? Report any efforts of the program administrator (including guidance provided to sites) as well as a selection of 3-5 different site-level criteria.**

3. **AEOP Pipeline: Explain any efforts that were made to specifically recruit alumni of other AEOP initiatives into your program? Explain any efforts to specifically recruit alumni of your program into other AEOP initiatives?**

Participant numbers and demographic characteristics

1. **How many of each participant group enrolled in the program? How many of each group applied and/or were selected/invited to participate? Report data using the following categories and enter "NA" where not applicable.**

	Applied	Selected	Enrolled
Participant Group	**No.**	**No.**	**No.**
Elementary school students (grades K-5)			
Middle school students (grades 6-8)			
High school students (grades 9-12)			
Undergraduate students (including community college)			
Graduate students (including post-baccalaureates)			
In-service K-12 teachers			
Pre-service K-12 teachers			
College/university faculty or other personnel			
Army/DoD Scientists & Engineers			
Other volunteers (e.g., if a competition program)			

2. **For the target audience(s) listed in the previous section (replicate the table as needed), how many were enrolled in the program per program site? How many of each group applied and/or were selected/invited to participate per program site?**

[Identify Participant Group]	Applied	Selected	Enrolled
Site	**No.**	**No.**	**No.**
(List each site by name)			

3. **For the target audience(s) listed in the previous section (replicate the table as needed), what are the demographic characteristics of the applicants and enrolled participants? Report data using the following categories:**

Identify Participant Group]	Applied		Enrolled	
Demographic Category	**No.**	%	**No.**	%
Gender				
Male				
Female				
Choose not to report				
Race/ethnicity				
Native American or Alaskan Native				
Asian				
Black or African American				
Hispanic or Latino				
Native Hawaiian or Other Pacific Islander				
White				
Choose not to report				
School setting (students and teachers)				
Urban (city)				
Suburban				
Rural (country)				

Frontier or tribal School				
DoDDS/DoDEA School				
Home school				
Online school				
Choose not to report				
Receives free or reduced lunch (students only)				
Yes				
No				
Choose not to report				
English is a first language (students only)				
Yes				
No				
Choose not to report				
One parent/guardian graduated from college (students only)				
Yes				
No				
Choose not to report				
Documented disability (students only)				
Yes				
No				
Choose not to report				

4. For the target audience(s) listed in the previous section (replicate the table as needed), what are the rates of past AEOP participation of the applicants and enrolled participants? Report data using the following categories:

[Identify Participant Group]	Applied		Enrolled	
AEOP element	**No.**	%	**No.**	%
Camp Invention				
Junior Solar Sprint				
eCYBERMISSION				
West Point Bridge Design Competition				
Junior Science & Humanities Symposium				
Gains in the Education of Mathematics and Science				
UNITE				
Science and Engineering Apprentice Program				
Research and Engineering Apprenticeship Program				
High School Apprenticeship Program				
College Qualified Leaders				

Undergraduate Research Apprenticeship Program				
STEM Teachers Academy				
SMART Scholarship				
NDSEG Fellowship				

Organizations participating or served

1. How many of each organization are served by the program? Report data in the following categories:

Organizations	No.
K-12 schools	
Title 1 K-12 schools	
Colleges/universities (including community colleges)	
Army/DoD laboratories	
Other collaborating organizations (educational agencies, professional associations, external sponsors, etc.)	

2. Please list all colleges/universities served by the program.

3. Please list all Army/DoD laboratories served by the program.

4. Please list other collaborating organizations served by the program.

Other Impacts

Have the FY14 program activities impacted human and/or infrastructure resources in any additional areas beyond the primary objectives of the program? If so, please describe any activities and results of those activities, especially pertaining to the following:

- **Engagement opportunities for the public (beyond those persons typically considered program participants) to increase interest in STEM, perception of STEM's value to their lives, or their ability to participate in STEM**
- **Professional development for pre-service or in-service STEM teachers to improve their content knowledge and pedagogical skills**
- **Development and/or dissemination of instructional materials or educational resources**
- **Support for the development or advancement of STEM personnel (i.e., Army Scientists & Engineers, Army-sponsored university faculty and other personnel), programs, or other physical infrastructure**
- **Contributions having intellectual merit or broader impact to the field of informal science education and outreach**

If any of these activities are conducted through websites and/or social media, the summary of results should include the analysis of key website or social media analytics.

Funding, Budget, and Expenditures

1. Provide an overview of FY14 funding

FY14 Funding Overview	Amount
Carry-forward funding from FY13	
New funding received in FY14	
Total budget for FY14 (FY13 carry-over plus FY14 new funding)	
Total FY14 expenses (estimate for 30 Sept)	
Carry-forward funding from FY14 into FY15 (total FY14 budget minus estimate of total FY14 expenses)	

2. Funding to the cooperative agreement comes from a variety of sources (general purpose funds, laboratory specific stipend funds, and Navy and Air Force funds for HSAP, etc.). The type of funding is indicated on AEOP CA modifications. What type of funds supported your program in FY14 (include funding carried over from FY13 in your totals)?

FY14 AEOP CA Funding Type/Source	Amount
General purpose funds	
Laboratory specific stipend funds - [Indicate Laboratory and replicate row as needed so that each contributing laboratory is represented on a separate line]	
Total laboratory specific stipend funds	
Air Force/ Navy HSAP funds	
Total FY14 funding (add types of funding, should be equivalent to "Total budget for FY14" in table above)	

3. How do your actual FY14 expenditures (estimate for 30 Sept cut-off) compare with your approved FY14 budget? Report totals in the following categories:

	Approved FY14 Budget (includes FY13 carry-over and new FY14 funding)	Actual FY14 Expenditures (estimate through 30 Sept)	Carry-over from FY14 into FY15
Marketing & Outreach (include additional funding received through special AEOP Cross-Marketing RFP process)			
National Event (where applicable)			

Scholarships/awards			
Stipends			
Other direct costs (including salary & fringe); Number of FTEs =[Indicate number of FTEs including PT wage workers]			
Overhead – Indirect Rate= [Indicate Indirect Rate and to which costs the indirect applies (i.e. labor, direct costs, etc.)]			
TOTALS (should match totals provided in tables above)			

4. Calculate average cost per student and explain how the calculation was made.

Fast Facts

Complete the summary chart below. Report data using the following categories and enter "NA" where not applicable.

FY14 [Enter Program Name]	No.
Applications & Participants	
Student Applications	
Student Participants	
Student Participation Rate (no. participants/no. applications x 100)	%
Teacher Applications	
Teacher Participants	
Teacher Participation Rate	**%**
Near-Peer Mentor Applications	
Near-Peer Mentor Participants	
Near-Peer Mentor Participation Rate	**%**
Partners	
Participating Colleges/Universities (including community colleges)	
Participating Army/DoD Laboratories	
Science & Engineer Participants	
Apprenticeships, Awards & Stipends	
Apprenticeships Provided	
Scholarships/Awards Provided	
Expenses Toward Scholarships/Awards	**$**

Expenses Toward Stipends	**$**
Budget & Expenses	
FY14 Total Budget (including carry-over from FY13 and new FY14 funding)	**$**
FY14 Total Expenses (estimate through 30 Sept)	**$**
Carry-Over from FY14 to FY15	**$**
Average cost per student	**$**