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Army Educational Outreach Program

Junior Science and Humanities Symposium (JSHS)



2017 Annual Program Evaluation Report

PART 1: Executive Summary

May 2018



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2 | Executive Summary

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 participants 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.

The Junior Science & Humanities Symposia Program (JSHS) is an Army, Navy, and Air Force program funded by the research arm of the Tri-Services and is administered by the Academy of Applied Science (AAS) as part of the cooperative agreement award to Battelle and its Consortium Partners. JSHS is an AEOP pre-collegiate science, technology, engineering, and mathematics (STEM) research competition for high school students. JSHS encourages high school students to engage in original research in preparation for future STEM career pathways. In regional (R-JSHS) and national (N-JSHS) symposia, students present their research in a forum of peer researchers and practicing researchers from government (in particular the DoD), industry, and academia.

This report documents the evaluation of the FY17 JSHS 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 JSHS included questionnaires for R-JSHS and N-JSHS participants and mentors; two focus groups with R-JSHS students; two focus groups with N-JSHS students; one focus group with R-JSHS mentors; one focus group with N-JSHS mentors; and an annual program report compiled by AAS.

Regional symposia were held in 47 university campus sites nationwide. The top five students in each region received an invitation to participate and compete at N-JSHS, an all-expense-paid trip hosted by the Services. Of these five, the top two students were invited to present their research as part of the national competition; the third-place student was invited to display a poster of his/her research in a competitive poster session; and the fourth and fifth place students were invited to attend as student delegates with the option to showcase their research in a non-competitive poster session.

2017 JSHS Fast Facts



Description	STEM Competition - Nationwide (incl. DoDEA schools), research symposium that includes 47 regional events and one national event
Participant Population	9th-12th grade students
No. of Applicants	8,900
No. of Students	5,577 Regional Participants (of whom 230 were selected to attend the National JSHS Symposium)
Placement Rate	65%
No. of All Adults (Mentors, Regional Directors, Volunteers S&Es, and Teachers)	3,555
Total Number of Adults	3,555
Number of Adults – Teachers	998
Number of Adults – Army S&Es	998
Number of Adults – University P.I.'s/S&E's	2,311
No. of Army/DoD Research Laboratories	37
No. of K-12 Schools	1,024
No. of K-12 Schools – Title I	378
No. of College/Universities	112
No. of Other Collaborating Organizations	200
DoDEA Students	246
DoDEA Teachers	20
DoDEA Schools	200
Total Cost	\$2,019,112
Administrative Costs (includes salaries, fringe, indirect, cost share)	\$299,732
Regional Site Awards	\$747,987
National Program	\$497,265
Scholarships and Awards	\$421,000
Other Operational Costs	\$53,129
Cost Per Student Participant	\$362

Summary of Findings

The FY17 evaluation of JSHS 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 below.

2017 JSHS Evaluation Findings



Participant Profiles

<p>Although application and enrollment rates in JSHS were only slightly lower than in FY16, there is a more substantial downward trend in applications and enrollment when viewed over a two-year period.</p>	<p>In FY17, JSHS the 47 R-JSHS sites received 8,663 applications (a decrease of 3% from FY16) and were able to accommodate only 64% of applying students (5,577). There has been a 3% decrease since FY16 (5,800) and 8% decrease in the number of applicants since FY15 (9,347).</p>
	<p>The majority (64%) of enrolled students in FY17 attended suburban schools. Only 3% of students reported attending urban schools, a sharp decline from the 27% who reported attending urban schools in FY16. About 20% of students reported attending rural schools (an increase from FY16 when 14% attended rural schools, but a decrease from FY15 when 40% reported attending rural schools).</p>
	<p>The overall demographics of students responding to the survey were similar to the demographics available for enrolled students, although slightly more White (55%) and more female students (59%) responded to the survey than were in the overall population, and substantially more urban students (33%) responded to the survey than the 3% of enrolled students indicating they attended urban schools. However, the majority of participants were from suburban schools (52%) who completed the survey, reflective of the overall participation being predominantly White.</p>
	<p>Half (50%) of the R-JSHS students responding to the questionnaire were oral presenters and 29% were poster presenters at the R-JSHS level while 60% of N-JSHS students responding to the survey were oral presenters and 40% were poster presenters.</p>
<p>Collection of demographic data for JSHS participants improved for FY17, however there remains room for growth in this area.</p>	<p>Fourteen regions of the 47 regional symposia provided incomplete demographic information about participants, and demographic data was missing for over 3,000 participants - over 50% of enrolled students. In FY16 demographic data was unavailable for 2,065 students (about 37% of enrollees) from 17 regional sites.</p>
<p>JSHS continued a trend of enrolling a majority of female participants.</p>	<p>More females than males participated in JSHS in FY17 (58% and 41% respectively), female participants composed a slightly larger percentage of JSHS enrollees in FY17 as compared to FY16 (58% versus 57%).</p>
<p>The ethnic/racial diversity of JSHS remains relatively constant compared to FY16 levels.</p>	<p>As in FY16, students identifying themselves as White were the largest racial/ethnic group of JSHS participants (53% in FY17 compared to 45% in FY16). Students identifying themselves as Asian were the second largest racial/ethnic group of participants (26% in FY17 as compared to 22% in FY16). Only 6% of students identified themselves as Black or African American in FY17 (compared to 4% in FY16), although the proportion of Hispanic or Latino students increased slightly from 6% in FY16 to 7% in FY17. These findings suggest that JSHS continues to struggle with growing the diversity of participants.</p>

Actionable Program Evaluation

<p>Students are motivated to participate in JSHS by various factors.</p>	<p>Factors motivating student participation in JSHS for FY17 were similar to those cited in FY16 and FY15. As in the past two years, the most often-chosen responses to an item asking students about their motivation for participating were an interest in STEM (78%), followed by a desire to learn something new (69%), and teacher or professor encouragement (61%).</p>
<p>Personal connections continue to be a primary means of information about JSHS, although information disseminated through schools or universities is also an important source of information.</p>	<p>Students reported learning about JSHS through various means, although the most often chosen response was “someone who works at the school or university I attend” (45%). Another 28% of students reported learning about JSHS via communications through their school (“school or university newsletter, email, or website), while another 19% indicated that a past participant of the program was an important source of JSHS information. Mentors offered similar responses when asked about how they had learned about the program. For mentors, however, the most often cited source of information was a past participant of the program (42%) followed by someone who works at their school or university (22%), and a communication through their school or university (20%).</p>
<p>Students reported being more engaged in STEM practices in JSHS than in their school experiences. However, mentor use of effective strategies and connecting students with other AEOPs is still less than desired.</p>	<p>Students’ responses to questionnaire items asking them about their activities in JSHS and their activities in schools showed that students are significantly more engaged in STEM practices during JSHS than they are in these STEM practices in school. For example, students reported solving real world problems and working with STEM researchers or companies more frequently in JSHS (51%) than in school (49%). Additionally, other areas of difference were: being able to present STEM research to a panel of judges (62% in JSHS compared to 52% in school); interacting with STEM researchers (78% in JSHS compared to 61% in school).</p> <p>Mentors reported using a variety of strategies to support learners. Mentors increased their use of all strategies in the category focused on establishing the relevance of learning activities for students as compared to FY16. However, mentor use of effective strategies in the three other categories decreased slightly from FY16 to FY17. Overall mentor use of strategies to support the needs of diverse learners, strategies to support students’ development of collaboration and interpersonal skills, and strategies to support students’ engagement in authentic STEM activities were less than in FY16. Further, only about a third (33%) of mentors reported recommending AEOPs that align with students’ goals as a strategy to support students’ educational and career pathways.</p>
<p>Students are exposed to STEM careers and jobs through JSHS although regional students learned less about STEM careers and jobs in the DoD</p>	<p>A large majority (85%) of R-JSHS students learned about at least one STEM job/career during JSHS. This is an improvement over FY16 when 22% of R-JSHS participants reported that they did not learn about any STEM jobs/careers during the program. Only about half (51%) of R-JSHS students learned about at least one DoD STEM jobs/careers. Again, however, this is an improvement over FY16 when</p>

<p>than about STEM careers more generally.</p>	<p>60% of participants reported that they did not learn about even one DoD STEM job/career. In contrast, all students (100%) attending N-JSHS reported learning about at least one DoD STEM job/career, and 61% of these students learned about five or more of these careers.</p> <p>A majority of mentors (69%) reported discussing STEM career opportunities in private industry or academia with students, however only 41% reported discussing these career opportunities within the DoD or other government agencies. When asked to rate the usefulness of various resources for exposing students to STEM career opportunities within the DoD, mentors indicated that program administrators or site coordinators are a useful resource and that simply participating in JSHS is very useful in exposing students to DoD STEM careers.</p>
<p>Students and mentors reported high levels of satisfaction with JSHS program components, although judging continues to be an area that students and mentors target for improvement.</p>	<p>The majority of R-JSHS students were very satisfied with aspects of their JSHS experience including the research experience overall (68%), their working relationship with mentors (67%), and the amount of time they spent doing meaningful research (73%). R-JSHS students expressed concerns about judging in open-ended survey responses and in focus groups, including comments about judges' lack of familiarity with students' areas of research, inconsistent judging, insufficient judge feedback, and negative or insulting judge feedback. These comments are similar to student comments about judging in FY16</p> <p>N-JSHS students interviewed in focus groups and open-ended survey responses in FY17 mentioned JSHS improvements in judging, and added that they would like to see more focus on poster presentations, would like more time to socialize with other students, and would like more demographic diversity in the event speakers.</p> <p>Mentors reported being satisfied with various program JSHS program features including communicating with JSHS site organizers (90% were at least somewhat satisfied) and the application or registration process (81% were at least somewhat satisfied). It is noteworthy that 21% of mentors indicated that they did not experience support for instruction or mentorship during JSHS activities. When asked to comment on the program in focus groups and open-ended questionnaire items, mentors expressed high levels of satisfaction with the program, but also commented that JSHS could be improved by increasing recruiting for and advertising of the program, increasing the number of judges available, providing students with more judge feedback, and improving the quality or consistency of judging.</p> <p>When asked to comment on the program in focus groups and open-ended questionnaire items, mentors expressed high levels of satisfaction with the program, but also commented that JSHS could be improved by increasing recruiting for and advertising of the program, increasing the number of judges</p>

	available, providing students with more judge feedback, and improving the quality or consistency of judging.
Outcomes Evaluation	
	Over 75% of students reported medium or large gains in their STEM knowledge including their in-depth knowledge of a STEM topic (80%) and knowledge of how scientists and engineers work on real problems in STEM (79%). In terms of their STEM competencies, large percentages of students reported medium or large gains in all areas of STEM competencies. Over 50% of students reported some gains in all areas including using knowledge and creativity to suggest a solution to a problem (77%), identifying limitations of methods and tools used for data collection (78%), carrying out procedures for an experiment and recording data accurately (78%), organizing data in charts and/or graphs to find patterns and relationships (74%), and supporting an explanation for an observation with data from experiments (77%).
R-JSHS participants reported gains in their 21st Century Skills as a result of participating in JSHS.	Large majorities of students reported gains in all areas of 21 st Century Skills, including setting goals and reflecting on performance (83%), communicating effectively with others (82%), and viewing failure as an opportunity to learn (81%).
Participants reported gains in areas associated with STEM identity and interest in engaging in STEM in the future as a result of participating in JSHS, indicating that JSHS has a lasting impact on students.	<p>Students reported gains in items intended to gauge their self-confidence in their abilities to succeed in STEM – their STEM identities – and their interest in STEM. Large majorities of students reported gains in all areas of STEM identity including their sense of accomplishing something in STEM (78%), confidence to try out new ideas or procedures on their own in STEM projects (79%), and interest in new STEM topics (71%).</p> <p>Likewise, a majority of R-JSHS students reported that after participating in JSHS they were more likely to engage in activities such as working on a STEM project or experiment in a university or professional setting (75%), talking about STEM with friends or family (67%), mentoring or teaching other students about STEM (66%), and taking an elective STEM class (64%). These findings suggest that JSHS has a lasting impact on students.</p>
Most JSHS participants had educational aspirations that extended beyond earning an undergraduate degree before they participated in JSHS. Slightly more students aspired	Over half of R-JSHS students (61%) indicated that before participating in JSHS they aspired to earn a master's degree, Ph.D., or a degree in a medical field. All students responded that after participating in JSHS that they would extend their education beyond high school, and a slightly larger percentage (63%) indicated that they aspired to earn a master's degree, Ph.D., or a degree in a medical field after participating. The percentage of students aspiring to a combined M.D./Ph.D. increased from 11% before JSHS to 15% after participating.

<p>to advanced degrees after participating in JSHS.</p>	<p>100% of N-JSHS students indicated that, after participating in JSHS, they wanted to at least finish college, and 80% indicated wanting to earn a master's degree, Ph.D., or medical degree. 94% of N-JSHS participants planned to pursue a bachelor's degree in a STEM field.</p>
<p>Students and mentors had limited knowledge of AEOPs other than JSHS.</p>	<p>While over half of R-JSHS students indicated that they were more aware of other AEOPs and more interested in participating in other AEOPs after participating in JSHS, large numbers of respondents (72-87%) indicated that they had never heard of programs other than JSHS, including UNITE, CQL, and the GEMS Near Peer Mentor Program. Nearly all students were at least somewhat interested in participating in JSHS again, and students expressed at least some interest in other programs, including the SMART Scholarship (61% were at least somewhat interested), NSDEG Fellowship (40% were at least somewhat interested), and URAP (39% were at least somewhat interested).</p> <p>As in previous years, R-JSHS participants reported that participation in JSHS was the most useful resource available to learn about other AEOPs (49% indicated this was at least somewhat useful). Most students had never experienced resources such as the AEOP website or AEOP on social media, although the percentages of students who had not experienced these resources was lower than in FY16. Furthermore, while 87% of students had not experienced the AEOP brochure in FY16, this percentage dropped to 67% for FY17.</p> <p>Only small percentages of mentors had discussed AEOPs other than JSHS with students, although 21% reported having discussed Unite, and 16% reported discussing AEOP generally without a focus on any particular program.</p> <p>Mentors' reports of the usefulness of resources for exposing students to other AEOPs were similar to students'. The most useful resources for exposing students to AEOP according to mentors are participation in JSHS (65%) and the JSHS program administrator or site coordinator (51%).</p> <p>Like students, many mentors had not experienced several of the AEOP resources, although more mentors experienced these resources than in FY16. For example, while 76% had not experienced the AAS website in FY17, this represents a decline from FY16 when 87% had not experienced this resource.</p>
<p>Most R-JSHS students were more aware of and had positive views of Army/DoD</p>	<p>A majority of R-JSHS students indicated that they were more aware of Army or DoD STEM research and careers after participating in JSHS and that they have a greater appreciation for Army or DoD STEM research. About half of R-JSHS students also indicated that they were more interested in pursuing a STEM career with the Army or DoD after participating in JSHS.</p>

research after participating in JSHS.	The majority of JSHS students strongly agreed or agreed to statements about DoD researchers such as “DoD researchers solve real-world problems” (78%), “DoD research is valuable to society” (67%), and “DoD researchers advance science and engineering fields” (79%). Level of agreement with these statements had increased since FY16 by 8-10%.
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Responsiveness to FY16 Evaluation Recommendations

The primary purpose of the AEOP program evaluation is to serve as a vehicle to inform future programming and continuous improvement efforts with the goal of making progress toward the AEOP priorities. In previous years the timing of the delivery of the annual program evaluation reports has precluded the ability of programs to use the data as a formative assessment tool. However, beginning with the FY17 evaluation, the goal is for programs to be able to leverage the evaluation reports as a means to target specific areas for improvement and growth.

Evaluation recommendations from FY16 made to programs are highlighted along with a summary of efforts and outcomes reflected in the FY17 APR toward these areas.

AEOP Priority: Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base

FY16 Finding: In FY17 JSHS continued to experience a decrease in applications and participation in the program overall – which represents a three-year downward trend. For FY17 there were 8,663 applications and 5,577 participants – compared to 9,347 and 5,829 respectively in FY16. In FY17, 34 of the 47 R-JSHS used AEOP’s centralized application portal to capture 2,435 of its participants. The rest were self-reported by the remaining regions. This is an area that is in need of focus for FY18. We suggest as an example a couple of strategies for addressing enrollment concerns: 1) work with regions to expand their recruitment efforts beyond the local area utilizing websites, social media, and other marketing efforts of the consortium, 2) grow capacity for stronger regions to accept more participants. For example, most participants at the Kentucky regional site visit were from the greater Louisville region – with very little to no representation from other central and southeastern parts of the state. We suspect this may be the case for other regional sites. JSHS may also consider utilizing electronic formats to grow participation in JSHS from remote locations – similar to an eCybermission model – for the future. Additionally, it is recommended that JSHS provide the Regional Directors a forum to share best practices in both program administration as well as infusing information about AEOP programs and DoD research and careers into programming.

In addition to increasing participation overall – JSHS should also continue and expand efforts to provide outreach to prospective participants from underserved populations. JSHS participants remained predominantly White or Asian in FY17, as nearly half (45%) of students identified themselves as White with another 22% identifying themselves as Asian. 21% of students chose not to report their

race/ethnicity, 4% identified themselves as Black or African American and 6% as Hispanic or Latino. Native American students comprised .3% of the students reporting their race/ethnicity, while .3% identified as Native Hawaiian or Pacific Islander. JSHS should examine housing regional sites within areas that provide great representation of potential diverse JSHS participants and work with regional directors to specifically target schools that have not been well represented in JSHS.

R-JSHS participants reported having experience with STEM activities within JSHS. However, most reported that they were able to use STEM practices more frequently in school than in JSHS. This should be an area of focus for JSHS and AAS should consider providing specific suggestions/guidelines/handbook to regional sites on how to include STEM practices within the programming for R-JSHS. Further, almost half (40%) reported large gains in their STEM knowledge, STEM competencies, and 21st Century Skills after participating in JSHS. In FY17 most participants did not feel that JSHS impacted their abilities to do STEM and associated knowledge. This is another data point that illuminates a need to provide more guidance and structure to the JSHS programming – particularly at the regional level – to ensure that participants are gaining these valuable experiences and abilities during the program.

Program provided/collected demographic data on participants was incomplete, as in FY15 and FY16. It is strongly suggested that JSHS require regional sites to collect full demographic data on all participants – ideally through Cvent in FY18.

JSHS FY17 Efforts:

- Continued to grow and expand student participation in JSHS by leveraging the reach of JSHS regional sites to encourage and invite student participation in STEM. R-JSHS used a variety of techniques to reach out to high schools within the geographic area served and invite participation in R-JSHS.
- Targeted outreach and marketing efforts to high schools, statewide teacher associations, regional and state science fairs, STEM affinity groups, internal and external apprenticeship programs, and collaboration with the network of high schools represented in AEOP programs and among the Consortium partners.
- AAS developed messaging, webinars, and Outreach Toolkit for regional symposia to communicate best practices, recruitment strategies and timelines.
- Coordinated with LO to integrate strategic partners from underrepresented groups.
- Shared best practices employed by regions to reach and engage underrepresented students through routine messaging to Regions, conduct of webinars and resource materials on building partnerships.
- Encouraged JSHS Regional Symposia to collaborate with internal and external partners which prepare underrepresented students for success in STEM. Partners included underrepresented school districts, internal and external programs such as Project Trio, Upward Bound, US 2020, Society for Black Engineers, American Chemical Society's Project

SEED, other internship programs. See list of additional JSHS partners by R-JSHS at Attachment 2.

- Developed JSHS nominee criteria under the Presidential Scholarship Program to recognize students who achieved high academic success despite challenges or hurdles to success.

JSHS FY17 Outcomes:

- JSHS Participation Decline and Recruitment. AAS identified JSHS Regional Symposia with successful recruitment strategies which reach high schools beyond the local area of competition. Additionally, AAS identified JSHS Regional Symposia who had established successful partnerships to identify and expand participation by underrepresented populations.
- In FY 17, AAS developed messaging, webinars, and an Outreach Toolkit to communicate best practices, recruitment strategies and timelines with regional symposia. To connect and develop peer-to-peer networking, the AAS established a **Best Practices Seminar Series** to feature presentations by regional symposia directors and strategic outreach partners. Two BPS sessions were hosted by the AAS via web conferencing tools with presentations on “Outreach to Underrepresented Populations,” and Judging.
- Purdue’s evaluation report singled out the Kentucky JSHS as an example of a regional symposium which served high schools within close proximity of the regional location. Purdue recommended that AAS support expanded outreach efforts; yet, AAS is aware that Kentucky, and some other rural regions such as Kentucky are already engaged in significant outreach efforts. According to reports from the University of Louisville to AAS, Kentucky publicizes JSHS through the Kentucky Science Teachers Association; yet, participation has not grown. “Kentucky states that many rural schools do not have the capacity to engage in competitive STEM projects appropriate for JSHS.” West Virginia’s outreach efforts in the last two years have been significant with no growth in participation. West Virginia has conducted visits by graduate students to high schools, partnered with two science and engineering fairs (state and Panhandle) and another STEM outreach program (WV SPOT), developed a website, and distributed AEOP and JSHS materials to targeted high schools, including underrepresented high schools. AAS has engaged with both of the above-mentioned regions to discuss support for increased participation in JSHS. The West Virginia Regional Director commented that they are a small region but deserve the opportunity to be affiliated with the JSHS Program. “The support of JSHS provides access to one of the few available STEM opportunities available for West Virginia students.” It is clear in the above two examples, that increased outreach efforts alone will have limited success. The AAS will engage with Kentucky and West Virginia, and other regions with similar challenges, to identify opportunities to provide meaningful programming activities to attract expanded student participation.
- JSHS Participation Data Inconsistencies. Each of the 47 JSHS Regional Symposia manages their registration process and has established administrative procedures which impact data collection. Implementing CVENT in 34 regions has allowed more consistency in data metrics and collection

of student applications. Regions which did not use CVENT were requested to include the exact language for the AEOP common questions, demographic questions and their responses as published in CVENT to encourage consistency in data collection across all regions. The independent and unique structure of each regional registration process results in inconsistencies in the data collection, due to the pool of participants included and in the format in which data driven questions are phrased. Another contributing factor to data discrepancy is that all data from participants at the regional and national levels are self-reported. The AAS will work to normalize the participant population required to register and report data by all regions in FY18. While JSHS Regions are collecting data on student applications, the data does not report on the broader impact of JSHS.

- In many states, pre-qualifying events are held that require students to progress in local and school wide competitions to advance to the Regional event. Data is not captured on participation in the pre-qualifying event. Clear-cut examples are seen through JSHS Sub-regions in the States of Alabama, Minnesota, and New York. However, there are many pre-qualifying school events where data is not captured. For example, Virginia states that participating Governors' schools in Virginia have 50 or more students in a classroom doing research projects. In other JSHS regions, the regional director may limit the number of participants who may advance to the regional event. Establishing a quota for the number of student participants by school may be considered due to space limitations or to avoid one school's domination and representation in the event.

AEOP Priority: Support and empower educators with unique Army research and technology resources

FY16 Finding: In FY16 JSHS participants continued to report dissatisfaction with judging practices and judging feedback at regional competitions – a finding that has been reported in FY14, FY15, and FY16 as well. There were several data points that reinforced this finding, from the R-JSHS survey to N-JSHS focus group sessions and the N-JSHS survey. Participants reported not being satisfied with the quality of and amount of feedback provided from judges – including receiving no written feedback from judges. Further, participants felt that the judges were not content experts and that they were judged primarily for their presentation skills rather than the actual content and focus of their research project. As has been recommended in previous years, JSHS should develop and implement guidelines for judging that include templates for providing feedback (written and oral) to participants. Further, regional sites should make every effort to have judges that reflect the breadth and depth of STEM content that participants may focus on as much as possible. STEM experts as well as Army/DoD STEM experts should be sought to engage in R-JSHS events. Virtual judging processes that may enable more qualified STEM judges to participate may be a potential strategy – along with virtual competitions for those that are regionally unable to participate.

JSHS FY17 Efforts and Outcomes: In FY16, the AAS facilitated an intentional discussion about the topic of judging at the Annual Meeting of Regional Directors and received recommendations to strengthen the

judging process. In FY17, the AAS reinstituted the Regional Directors Advisory Council (RDAC) and met to review and revise judging policies and the rules of competition for FY17. The judging revisions have been published in the National guidelines and were distributed to all regional directors through email and website publications. A Best Practice Sharing Seminar (BPSS) on the JSHS Judging Process was also hosted by the AAS in FY17 with presentations on National JSHS rules of competition and judges' recruitment delivered by the Chair of the National JSHS Judging Committee. Regional directors requested that the AAS replicate the PowerPoint files used in the seminar for use by regional symposia in training judges. These were distributed via email and the seminar posted online for reference.

AEOP Priority: Develop and implement a cohesive, coordinated and sustainable STEM education outreach infrastructure across the Army

FY16 Finding: As in FY15 and FY16, less than 50% of JSHS participants agreed that JSHS made them more aware of other AEOPs and only 46% were interested in participating in other AEOPs. Additionally, only 15% of JSHS participants had used the AEOP website and fewer had used social media related to AEOP (9%). Further, only 13% of participants had been provided with the AEOP brochure. Most mentors did not discuss AEOPs with participants – as only 23% discussed Unite, 14% SMART, 12% eCybermission, 11% SEAP, 10% URAP, 10% REAP, 9% HSAP, 5% CQL, and 6% NDSEG Fellowship. These findings are concerning, primarily because these are areas that AAS could address through collective and organized marketing efforts for JSHS. In FY18 AAS should share materials with participants (i.e. brochures, handouts) as well as instructional resources for regional sites (mandatory) to go through with all regional site participants during the overview/orientation session prior to competition or at the conclusion (e.g. slides, speakers). Promotion of the AEOPs should be collective responsibility of each and every program within the consortium.

The majority of participants in R-JSHS (78%) in FY17 reported learning about STEM careers during the program and most (68%) learned about more than one career. However, JSHS did a much less effective job of exposing participants to Army/DoD STEM careers – as only 40% learned about at least one Army/DoD STEM career. Conversely, a large majority of N-JSHS (80%) students indicated that invited speakers or career events were a key resource for learning about DoD STEM careers. The difference in growth of learning about STEM careers overall and DoD STEM careers specifically may be attributed to mentor level of discussion of each during the program. Mentors (78%) reported discussing STEM careers with participants. However, only 35% discussed Army/DoD STEM careers. Mentors (78%) reported discussing STEM careers with participants. However, only 35% discussed Army/DoD STEM careers. In FY17 JSHS should address this area through development of a toolkit for regional sites to use (i.e. slideshow, handouts, social media posts) and also an inventory of potential regional Army/DoD STEM career people who could be engaged to participate in person or by video in the programming.

JSHS FY17 Efforts and Outcomes:



- The AAS distributes AEOP materials to the JSHS regional symposia for distribution to all JSHS participants, including students, teachers and mentors. The AAS continues to support all AEOP programs through cross-marketing and through social media. In FY17, AAS made pointed efforts to collaborate with the LO and Widmeyer to promote AEOP programs among JSHS participants and alumni. In FY17, targeted communication was sent to alumni to recruit volunteers for eCybermission, for STEM Expo's hosted by both the Army and Navy, and N-JSHS. JSHS participants and alumni were also informed directly by email and social media of the Apprenticeship opportunities available through AEOP. The AAS will continue to distribute branded materials for use by JSHS regional symposia and encourage all regions to include appropriate AEOP language. The AAS has developed a design template for use by R-JSHS in publishing the symposium schedule. The design shows all AEOP/DoD logos properly placed and includes language consistent with JSHS mission and objectives. The design template will be distributed to all R-JSHS for use in FY17.
- Collaborated with the Apprenticeship Program to inform apprentices and invite participation in JSHS.
- Incentivized students through publicizing JSHS scholarship opportunities and other benefits available to participating students.
- Collaborated with Widmeyer, CAM and IPA's to distribute a call to JSHS constituents to apply or volunteer across AEOP programs.
- The AAS continued to collaborate with the Army, Navy and Air Force to identify STEM personnel to participate in regional and national symposia. Travel funds limit participation in regional symposia to those within commuting distance. In FY17, the AAS coordinated a pilot project with RDECOM to showcase Army researchers to student participants. The AAS will continue to explore opportunities to virtually showcase Army/DoD researchers at regional symposia with limited access to resources. With AEOP permission, the AAS will post videos to YouTube and share with JSHS regional sites.
- Recruited and identified a diverse pool of DoD STEM mentors to participate in Regional and National Symposia and showcase experience in pursuit of a DoD STEM career.
- Collaborated with the CAM and tri-service sponsors to develop materials which showcase critical areas of STEM of interest to DoD.
- Collaborated with the AEOP Marketing team to obtain AEOP printed materials and collateral to distribute at regional and national levels.
- Collaborated with the AEOP Alumni team to create profiles on JSHS Alumni and share their experiences with JSHS and DoD STEM careers. Distributed DoD STEM career brochure to R-JSHS.

Recommendations for FY18 Program Improvement/Growth

Evaluation findings indicate that JSHS experienced success as in previous years. Notable successes for the year include the continued high participation rate for females, growth in percentage of participants that learned about STEM jobs/careers, growth in student reported acquisition of 21st Century Skills and STEM knowledge, and student reported gains in self-confidence and interest in STEM. While these successes are commendable, there are some areas that remain with potential for growth and/or improvement. The evaluation team therefore offers the following recommendations for FY18 and beyond:

AEOP Priority: Broaden, deepen, and diversify the pool of STEM talent in support of our Defense Industry Base

1. JSHS continued to experience a decrease in applications and participation in the program overall – which represents a three-year downward trend of 8%. For FY17 there were 8,663 applications and 5,577 students were supported to participate. In FY16 there were 8,900 applications and 5,300 participants – compared to 9,347 and 5,829 respectively in FY15. This is an area that is in need of focus again in FY18. We suggest three strategies for addressing enrollment concerns: 1) work with regions to expand their recruitment efforts beyond the local area utilizing websites, social media, and other marketing efforts of the consortium, 2) grow capacity for stronger regions to accept more participants, 3) asking FY17 alumni to recruit two new participants for the program.
2. Though JSHS has steadily had participation from female students (59% in FY17), the diversity of other groups in JSHS has continued to decline. 55% of participants in FY17 were White and 24% Asian. Only 6% of participants identified as Black/African American and 7% Hispanic or Latino. Geographical representation was predominantly suburban (52%) as well, as the urban school representation declined to 3%. Recruitment and marketing strategies in FY17 should intensively focus on working with regions to expand their reach into communities with more diversity. JSHS should also work with strategic outreach partners to address recruiting challenges as well.
3. Program provided/collected demographic data on participants was incomplete, as in FY15 and FY16. Our recommendation from FY16 is repeated this year. It is strongly suggested that JSHS require regional sites to collect full demographic data on all participants in FY18 and beyond.

AEOP Priority: Support and empower educators with unique Army research and technology resources

In FY17 JSHS participants continued to report dissatisfaction with judging practices and judging feedback at regional competitions – a finding that has been reported in FY14, FY15, and FY16 as well. There were several data points that reinforced this finding, from the R-JSHS survey to N-JSHS focus group sessions and the N-JSHS survey. Participants reported not being satisfied with the quality of and amount of feedback provided from judges – including receiving no written feedback from judges. Further, participants felt that

the judges were not content experts and that they were judged primarily for their presentation skills rather than the actual content and focus of their research project. As has been recommended in previous years, JSHS should develop and implement guidelines for judging that include templates for providing feedback (written and oral) to participants. Further, regional sites should make every effort to have judges that reflect the breadth and depth of STEM content that participants may focus on as much as possible. STEM experts as well as Army/DoD STEM experts should be sought to engage in R-JSHS events. Virtual judging processes that may enable more qualified STEM judges to participate is a strategy that should be considered, given the concerns in this area that have been prevalent the last three years of the program.

AEOP Priority: Develop and implement a cohesive, coordinated, and sustainable STEM education outreach infrastructure across the Army

As in FY17, 59% of R-JSHS participants agreed that JSHS made them more aware of other AEOPs and 55% were interested in participating in other AEOPs. These percentages are slightly improved from FY16 (50% and 46% respectively). However, most mentors did not discuss AEOPs with participants and the percentages decreased in FY17 – as only 21% discussed Unite (compared to 23% in FY16), 14% SMART (compared to 7% in FY16), 12% eCybermission (compared to 8% in FY16), 11% SEAP (compared to 9% in FY16), 10% URAP (compared 4% in FY16), 10% REAP (compared to 8% in FY16), 9% HSAP (compared to 6% in FY16), 5% CQL (compared to 2% in FY16), and 6% NDSEG Fellowship (compared to 3% in FY16). These findings are concerning, primarily because these are areas that AAS could address through collective and organized marketing efforts for JSHS. Widmeyer developed slide decks and other materials should be better utilized by programs to expose participants to other important components of the AEOP pipeline. Promotion of the AEOPs should be collective responsibility of each and every program within the consortium.

The majority of participants in R-JSHS (85%) in FY17 (similar to FY16 78%) reported learning about STEM careers during JSHS. There was also growth in the percentage of participants that learned about at least one Army/DoD STEM career in FY17 (51% compared to 40% FY16). Conversely, a large majority of N-JSHS (80%) students indicated that invited speakers or career events were a key resource for learning about DoD STEM careers. The difference in growth of learning about STEM careers overall and DoD STEM careers specifically may be attributed to mentor level of discussion of each during the program. Mentors (78%) reported discussing STEM careers with participants. However, only 35% discussed Army/DoD STEM careers. Mentors (78%) reported discussing STEM careers with participants. However, only 35% discussed Army/DoD STEM careers. In FY17 JSHS should address this area through development of a toolkit for regional sites to use (i.e. slideshow, handouts, social media posts) and also an inventory of potential regional Army/DoD STEM career people who could be engaged to participate in person or by video in the programming.