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Army Educational Outreach Program

Gains in the Education of Mathematics and Science (GEMS)

2017 Annual Program Evaluation Report

PART 3: Appendices

February 2018

aeop
ARMY EDUCATIONAL OUTREACH PROGRAM

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3 | Appendix A – FY17 URAP Evaluation Plan

Questionnaires

Purpose:

As per the approved FY17 AEOP APP, the external evaluation of GEMS includes two post-program questionnaires:

1. AEOP Youth Questionnaire to be completed by student participants; and
2. AEOP Mentor Questionnaire to be completed by Army S&Es, Near Peer Mentors, and/or resource teachers that facilitate, assist, or support students during GEMS educational 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 were revised in FY 13 and 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.

Site Visits/Onsite Focus Groups

Purpose:

As per the approved FY17 AEOP APP, the external evaluation of GEMS includes site visits for 3 laboratories with a local GEMS-SEAP-CQL pipeline.

Site visits provide the evaluation team with first-hand opportunities to speak with apprentices and their mentors. We are able to observe the AEOPs in action. The information gleaned from these visits assists in illustrating and more deeply understanding the findings of other data collected (from questionnaires). In total, the evaluation findings are used to highlight program successes and inform program changes so that the AEOPs can be even better in the future.

Evaluation Activities during GEMS Site Visits:

- One 45-minute focus group with 6-8 youth participants (apprentices);
- One 45-minute focus group with 6-8 mentors;
- 30-60 minutes to observe the program (specifically, to see students engaged in program activities, preferably with their mentors); and
- 10-15 minute transitions between each evaluation activity for moving groups in and out and providing evaluators with time to organize paperwork and take nature breaks.

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.

Evaluators conducted inferential statistics to study any differences among participant groups (e.g., by gender or race/ethnicity) that could indicate inequities in the GEMS program. Statistical significance indicates whether a result is unlikely to be due to chance alone. Statistical significance was determined with t-tests, chi-square tests, and various non-parametric tests as appropriate, with significance defined at $p < 0.05$. Because statistical significance is sensitive to the number of respondents, it is more difficult to detect significant changes with small numbers of respondents. Practical significance, also known as effect size, indicates the magnitude of an effect, and is typically reported when differences are statistically significant. The formula for effect sizes depends on the type of statistical test used, and is specified, along with generally accepted rules of thumb for interpretation, in the body of the report.

4| Appendix B – Student Focus Group Protocol

2017 Gains in the Education of Mathematics and Science (GEMS) Evaluation Study Student Focus Group Protocol

Facilitator: My name is [evaluator] and I'd like to thank you for meeting with us today! We are really excited to learn more about your experiences in GEMS. In case you have not been in a focus group before, I'd like to give the group some ground rules that I like to use in focus groups. They seem to help the group move forward and make everyone a little more comfortable:

- What is shared in the room stays in the room.
- Only one person speaks at a time.
- If you disagree please do so respectfully.
- It is important for us to hear the positive and negative sides of an issue.
- This is voluntary - you may choose not to answer any question, or stop participating at any time.
- We will be audio recording the session for note-taking purposes only. Audio will be destroyed.
- Do you have any questions before we begin?

Key Questions

1. **Why did you choose to participate in GEMS this year?**
   - How did you hear about GEMS?
   - Who did you hear about it from?

   The Army Educational Outreach Program (AEOP) is a primary sponsor of GEMS. We do these focus groups to help the AEOP create reports and defend funding for the program. They need specific information to defend the money for the program.

2. **We need to understand more about how GEMS is teaching students about STEM career opportunities in the Army and Department of Defense.**
   - During GEMS, did you learn anything about STEM careers in the Army or Department of Defense?
   - How did you learn about them (e.g., field trips, invited speakers, other activities, etc.)?
   - Are you interested in pursuing a career in STEM with the Army or Department of Defense?
3. **The AEOP sponsors a wide range of national STEM outreach programs other than GEMS. You are definitely eligible to participate in some of these programs and we need to know if you learned about them during GEMS.**
   - During GEMS, did you learn about any of the outreach programs that the AEOP sponsors? (REAP, SEAP, CQL)
   - How did you learn about them?
   - Do you think that you will try to participate in any of those programs?
4. **Were you happy that you chose to participate in GEMS this year?**
   - What, specifically do you think you got out of participating in GEMS?
   - Were there any other benefits of participating in GEMS?
5. **Do you have any suggestions for improving GEMS for other students in the future?**
6. **Last Chance - Have we missed anything? Tell us anything you want us to know that we didn't ask about.**

5| Appendix C – Mentor Focus Group Protocol

Facilitator: My name is [evaluator] and I'd like to thank you for meeting with us today! We are really excited to learn more about your experiences in GEMS. In case you haven't been in a focus group before, I'd like to give you some ground rules that I like to use in focus groups. They seem to help the group move forward and make everyone a little more comfortable:

- What is shared in the room stays in the room.
- Only one person speaks at a time.
- If you disagree please do so respectfully.
- It is important for us to hear the positive and negative sides of all issues.
- We will be audio recording the session for note-taking purposes only. Audio will be destroyed.
- Do you have any questions about participating in the focus group?

Key Questions:

1. **When you think about GEMS, what kind of value does this program add**?
   - How do you think students benefit from participating in GEMS?
   - Can you think of a particular student or group of students that benefit the most from GEMS?
   - How have you benefited from participating in GEMS?

   One of the primary sponsors of the GEMS program is the Army Educational Outreach Program (AEOP). The AEOP needs specific information to create reports and defend funding for its outreach programs, GEMS included.

2. **We need to understand more about how GEMS is helping students know more about STEM career opportunities in the Department of Defense, especially civilian positions.**
   - Have you seen any efforts by GEMS to educate participants about the Army, DoD, or careers in the DoD?
   - What strategies seem to be the most effective for GEMS students?
   - Do you have any suggestions for helping GEMS teach students about careers in the DoD?

   The AEOP sponsors a wide range of national STEM outreach programs that these students qualify for.
3. **The AEOP needs to know if GEMS is teaching students about the other STEM outreach programs that it sponsors.**
   - First, are you aware of the other programs offered by the AEOP? (e.g., JSHS, JSS, REAP, SEAP, HSAP, etc.)
   - Have you seen any efforts at GEMS to educate adults or students about the other AEOP programs?
   - What seems to work the best? The worst?
   - Any suggestions for helping the AEOP educate these students about the other programs?
4. **The AEOP is trying to make sure that its programs become more effective at reaching adult and youth participants from underserved and underrepresented groups (racial/ethnic groups, low SES, etc.).**
   - Have you seen any efforts by GEMS to help engage underserved or underrepresented groups of adults and youth?
   - What strategies seem to work the best? The worst?
   - Any suggestions for helping GEMS reach new populations of adult and youth participants?
5. **What suggestions do you have for improving GEMS?**
6. **Last Chance - Have we missed anything? Tell us anything you want us to know that we didn't ask about.**
   - Any suggestions for helping the AEOP educate these students about the other programs?

6 | Appendix D – Student Questionnaire

Contact Information		
Please verify the following information:		
*First Name:		
*Last Name:		
*Email Address:		
All fields with an asterisk (*) are required.		

*1. Do you agree to participate in this survey? (required)(*Required)		
Select one.		
○	Yes, I agree to participate in this survey	
○	No, I do not wish to participate in this survey	Go to end of chapter

*2. What grade will you start in the fall? (select one)(*Required)	
Select one.	
○	4th
○	5th
○	6th
○	7th
○	8th
○	9th
○	10th
○	11th
○	12th
○	College freshman
○	Choose not to report
○	Other, (specify)::

*3. What is your gender?(*Required)	
Select one.	
○	Male
○	Female
○	Choose not to report

*4. What is your race or ethnicity?(*Required)	
Select one.	
○	Hispanic or Latino
○	Asian
○	Black or African American
○	Native American or Alaska Native
○	Native Hawaiian or Other Pacific Islander
○	White
○	Choose not to report
○	Other race or ethnicity, (specify)::

*5. Do you get free or reduced price lunches at school?(*Required)	
Select one.	
○	Yes
○	No
○	Choose not to report

*6. Which GEMS site did you participate in? (select one)(*Required)	
Select one.	
○	Fort Rucker, Alabama – U.S. Army Aeromedical Research Laboratory
○	Huntsville, Alabama – U.S. Army Aviation & Missile Research, Development & Engineering Center
○	Champaign, Illinois – U.S. Army Engineer Research & Development Center - Construction Engineering Research Laboratory
○	Aberdeen, Maryland – Aberdeen Proving Ground
○	Frederick, Maryland – U.S. Army Medical Research and Materiel Command
○	Silver Spring, Maryland – U.S. Army Medical Research and Materiel Command - Walter Reed Army Institute of Research
○	Adelphi, Maryland - U.S. Army Research Laboratory
○	Natick, Massachusetts – U.S. Army Institute of Environmental Medicine
○	Vicksburg, Mississippi – U.S. Army Engineer Research & Development Center
○	Picatinny, New Jersey -- U.S. Army Armament Research, Development and Engineering Center
○	White Sands, New Mexico – White Sands Missile Range
○	San Antonio, Texas – U.S. Army Institute of Surgical Research

*7. How often did you do each of the following in STEM classes at school before participating in GEMS?(*Required)

Select one per row.

	Not at all	*At least once*	*A few times*	*Most days*	*Every day*
*Work with a STEM researcher or company on a real world STEM research project	○	○	○	○	○
*Work with a STEM researcher on a research project assigned by my teacher	○	○	○	○	○
*Design my own research or investigation based on my own questions	○	○	○	○	○
*Present my STEM research to a panel of judges from industry or the military	○	○	○	○	○
*Interact with STEM researchers	○	○	○	○	○
*Use laboratory procedures and tools	○	○	○	○	○
*Design and carry out an investigation or experiment	○	○	○	○	○
*Analyze data or information and draw conclusions	○	○	○	○	○
*Work collaboratively as part of a team	○	○	○	○	○
*Build or make a computer model	○	○	○	○	○
*Solve real world problems	○	○	○	○	○
*Communicate with other students about STEM	○	○	○	○	○
*Learn about different careers that use STEM	○	○	○	○	○
*Learn about new discoveries in STEM	○	○	○	○	○

*8. How often did you do each of the following in GEMS this year?(*Required)

Select one per row.

	Not at all	*At least once*	*A few times*	*Most days*	*Every day*
*Work with a STEM researcher or company on a real world STEM research project	○	○	○	○	○
*Work with a STEM researcher on a research project assigned by my teacher	○	○	○	○	○
*Design my own research or investigation based on my own questions	○	○	○	○	○
*Present my STEM research to a panel of judges from industry or the military	○	○	○	○	○
*Interact with STEM researchers	○	○	○	○	○
*Use laboratory procedures and tools	○	○	○	○	○
*Design and carry out an investigation	○	○	○	○	○
*Analyze data or information and draw conclusions	○	○	○	○	○
*Work collaboratively as part of a team	○	○	○	○	○
*Build or make a computer model	○	○	○	○	○
*Solve real world problems	○	○	○	○	○
*Learn about new discoveries in STEM	○	○	○	○	○
*Learn about different careers that use STEM	○	○	○	○	○
*Communicate with other students about STEM	○	○	○	○	○

*9. The list below includes effective teaching and mentoring strategies. From the list, please indicate which strategies that your mentor(s) used when working with you in GEMS:(*Required)

Select one per row.

	Yes - my mentor used this strategy with me	*No - my mentor did not use this strategy with me*
*Helped me become aware of STEM in my everyday life	○	○
*Helped me understand how I can use STEM to improve my community	○	○
*Used a variety of strategies to help me learn	○	○
*Gave me extra support when I needed it	○	○
*Encouraged me to share ideas with others who have different backgrounds or viewpoints than I do	○	○
*Allowed me to work on a team project or activity	○	○
*Helped me learn or practice a variety of STEM skills	○	○
*Gave me feedback to help me improve in STEM	○	○
*Talked to me about the education I need for a STEM career	○	○
*Recommended Army Educational Outreach Programs that match my interests	○	○
*Discussed STEM careers with the DoD or government	○	○

*10. How much did each of the following resources help you learn about Army Educational Outreach Programs (AEOPs)?(*Required)

Select one per row.

	Did not experience	*Not at all*	*A little*	*Somewhat*	*Very much*
*Army Educational Outreach Program (AEOP) website	○	○	○	○	○
*AEOP on Facebook, Twitter, Pinterest or other social media	○	○	○	○	○
*AEOP brochure	○	○	○	○	○
*My GEMS mentor(s)	○	○	○	○	○
*Invited speakers or "career" events during GEMS	○	○	○	○	○
*Participation in GEMS	○	○	○	○	○

*11. How much did each of the following resources help you learn about STEM careers in the Army or Department of Defense (DoD)?(*Required)

Select one per row.

	Did not experience	*Not at all*	*A little*	*Somewhat*	*Very much*
*Army Educational Outreach Program (AEOP) website	○	○	○	○	○
*AEOP on Facebook, Twitter, Pinterest or other social media	○	○	○	○	○
*AEOP brochure	○	○	○	○	○
*My GEMS mentor(s)	○	○	○	○	○
*Invited speakers or "career" events during GEMS	○	○	○	○	○
*Participation in GEMS	○	○	○	○	○

*12. How SATISFIED were you with the following GEMS features?(*Required)

Select one per row.

	Did not experience	*Not at all*	*A little*	*Somewhat*	*Very much*
*Applying or registering for the program	○	○	○	○	○
*Communicating with your GEMS host site organizers	○	○	○	○	○
*The physical location(s) of GEMS activities	○	○	○	○	○
*The variety of STEM topics available to you in GEMS	○	○	○	○	○
*Teaching or mentoring provided during GEMS activities	○	○	○	○	○
*Stipends (payment)	○	○	○	○	○
*Educational materials (e.g., workbooks, online resources, etc.) used during program activities	○	○	○	○	○
*Invited speakers or "career" events	○	○	○	○	○
*Field trips or laboratory tours	○	○	○	○	○

*13. Answer the items below while thinking about how much you learned during GEMS. Mark for each item how much you learned in GEMS about each one.(*Required)

Select one per row.

	No new learning	*Learned a little*	*Learned more than a little*	*Learned a lot*
*Knowledge of a STEM topic(s)	○	○	○	○
*Knowledge of research conducted in a STEM topic or field	○	○	○	○
*Knowledge of research processes, ethics, and rules for conduct in STEM	○	○	○	○
*Knowledge of how scientists and engineers work on real problems in STEM	○	○	○	○
*Knowledge of what everyday research work is like in STEM	○	○	○	○

*14. Which category best describes the focus of your GEMS activities?(*Required)

Select one.

○	Science
○	Technology
○	Engineering
○	Mathematics
○	All of the above

*15. Answer the items below while thinking about how much you learned during GEMS. Mark for each item how much you learned in GEMS about each one.(*Required)

Select one per row.

	No new learning	*Learned a little*	*Learned more than a little*	*Learned a lot*
*Asking a question that can be answered with one or more scientific experiments	○	○	○	○
*Using knowledge and creativity to suggest a testable explanation (hypothesis) for an observation	○	○	○	○
*Considering different interpretations of data when deciding how the data answer a question	○	○	○	○
*Supporting an explanation for an observation with data from experiments	○	○	○	○
*Defending an argument that conveys how an explanation best describes an observation	○	○	○	○
*Integrating information from technical or scientific texts and other media to support your explanation of an observation	○	○	○	○
*Communicating about your experiments and explanations in different ways (through talking, writing, graphics, or mathematics)	○	○	○	○

*16. Answer the items below while thinking about how much you learned during GEMS. Mark for each item how much you learned in GEMS about each one.(*Required)

Select one per row.

	No new learning	*Learned a little*	*Learned more than a little*	*Learned a lot*
*Defining a problem that can be solved by developing a new or improved object, process, or system	○	○	○	○
*Making a model of an object or system to show its parts and how they work	○	○	○	○
*Carrying out procedures for an experiment and recording data accurately	○	○	○	○
*Using computer models of an object or system to investigate cause and effect relationships	○	○	○	○
*Organizing data in charts or graphs to find patterns and relationships	○	○	○	○

*17. Answer the items below while thinking about how much you learned during GEMS. Mark for each item how much you learned in GEMS about each one.(*Required)

Select one per row.

	No new learning	*Learned a little*	*Learned more than a little*	*Learned a lot*
*Sticking with a task until it is finished	○	○	○	○
*Making changes when things do not go as planned	○	○	○	○
*Working well with students from all backgrounds	○	○	○	○
*Including others' perspectives when making decisions	○	○	○	○
*Communicating effectively with others	○	○	○	○
*Viewing failure as an opportunity to learn	○	○	○	○

*18. Answer the items below while thinking about how much you learned during GEMS. Mark for each item how much you agree with each statement.(*Required)

Select one per row.

	Strongly disagree	*Disagree*	*Don't agree or disagree*	*Somewhat agree*	*Agree*
*I am interested in a new STEM topic	○	○	○	○	○
*I am thinking about pursuing a STEM career	○	○	○	○	○
*I feel like I accomplished something in STEM	○	○	○	○	○
*I feel more prepared for more challenging STEM activities	○	○	○	○	○
*I am thinking creatively about a STEM project or activity	○	○	○	○	○
*I have a desire to build relationships with mentors who work in STEM	○	○	○	○	○
*I have connected a STEM topic or field to my personal values	○	○	○	○	○

*19. As a result of your GEMS experience, are you MORE or LESS likely to engage in the following activities in science, technology, engineering, or mathematics (STEM) outside of school requirements or activities?(*Required)

Select one per row.

	Much less likely	*Less likely*	*About the same before and after*	*More likely*	*Much more likely*
*Watch or read non-fiction STEM	○	○	○	○	○
*Tinker (play) with a mechanical or electrical device	○	○	○	○	○
*Work on solving mathematical or scientific puzzles	○	○	○	○	○
*Use a computer to design or program something	○	○	○	○	○
*Talk with friends or family about STEM	○	○	○	○	○
*Mentor or teach other students about STEM	○	○	○	○	○
*Help with a community service project related to STEM	○	○	○	○	○
*Participate in a STEM camp, club, or competition	○	○	○	○	○
*Take an elective (not required) STEM class	○	○	○	○	○
*Work on a STEM project or experiment in a university or professional setting	○	○	○	○	○

*20. After you have participated in GEMS, how far do you want to go in school?(*Required)
Select one.

○	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

*21. How interested are you in participating in the following programs in the future?(*Required)
Select one per row.

	I've never heard of this program	*Not at all*	*A little*	*Very much*
*Camp Invention	○	○	○	○
*eCYBERMISSION	○	○	○	○
*Junior Solar Sprint (JSS)	○	○	○	○
*Gains in the Education of Mathematics and Science (GEMS)	○	○	○	○
*UNITE	○	○	○	○
*Junior Science & Humanities Symposium (JSHS)	○	○	○	○
*Science & Engineering Apprenticeship Program (SEAP)	○	○	○	○
*Research & Engineering Apprenticeship Program (REAP)	○	○	○	○
*High School Apprenticeship Program (HSAP)	○	○	○	○
*College Qualified Leaders (CQL)	○	○	○	○
*GEMS Near Peer Mentor Program	○	○	○	○
*Undergraduate Research Apprenticeship Program (URAP)	○	○	○	○
*Science Mathematics, and Research for Transformation (SMART) College Scholarship	○	○	○	○
*National Defense Science & Engineering Graduate (NDSEG) Fellowship	○	○	○	○

*22. How many jobs/careers in STEM did you learn about during GEMS?(*Required)	
Select one.	
○	None
○	1
○	2
○	3
○	4
○	5 or more

*23. How many Army or Department of Defense (DoD) STEM jobs/careers did you learn about during GEMS?(*Required)	
Select one.	
○	None
○	1
○	2
○	3
○	4
○	5 or more

*24. How much do you agree or disagree with the following statements about Department of Defense (DoD) researchers and research:(*Required)

Select one per row.

	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 solve real-world problems	○	○	○	○	○
*DoD research is valuable to society	○	○	○	○	○

*25. Which of the following statements describe you AFTER participating in the GEMS program?(*Required)

Select one per row.

	Disagree - This did not happen	*Disagree - This happened but not because of GEMS*	*Agree - GEMS contributed*	*Agree - GEMS 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 earning a STEM degree	○	○	○	○
*I am more interested in pursuing a career in STEM	○	○	○	○
*I am more aware of Army or DoD STEM research and careers	○	○	○	○
*I have a greater appreciation of Army or DoD STEM research	○	○	○	○
*I am more interested in pursuing a STEM career with the Army or DoD	○	○	○	○

26. What are the three most important ways that GEMS has helped you?	
Benefit #1:	
Benefit #2:	
Benefit #3:	

27. What are the three ways that we could make GEMS better?	
Improvement #1:	
Improvement #2:	
Improvement #3:	

28. Please tell us about your overall satisfaction with your GEMS experience.

7 | Appendix E – Mentor Questionnaire

Contact Information		
Please verify the following information:		
*First Name:		
*Last Name:		
*Email Address:		
All fields with an asterisk (*) are required.		

*1. Do you agree to participate in this survey? (required)(*Required)		
Select one.		
○	Yes, I agree to participate in this survey	(Go to question number 2.)
○	No, I do not wish to participate in this survey	Go to end of chapter

*4. What is your gender?(*Required)	
Select one.	
○	Male
○	Female
○	Choose not to report

*5. What is your race or ethnicity?(*Required)	
Select one.	
○	Hispanic or Latino
○	Asian
○	Black or African American
○	Native American or Alaska Native
○	Native Hawaiian or Other Pacific Islander
○	White
○	Choose not to report
○	Other race or ethnicity, (specify):

*6. Which of the following BEST describes the organization you work for? (select ONE)(*Required)	
Select one.	
○	No organization
○	School or district (K-12)
○	State educational agency
○	Institution of higher education (vocational school, junior college, college, or university)
○	Private Industry
○	Department of Defense or other government agency
○	Non-profit
○	Other, (specify):

*7. Which of the following BEST describes your current occupation (select ONE)(*Required)		
Select one.		
○	Teacher	(Go to question number 8.)
○	Other school staff	(Go to question number 8.)
○	University educator	(Go to question number 13.)
○	Scientist, Engineer, or Mathematician in training (undergraduate or graduate student, etc.)	(Go to question number 13.)
○	Scientist, Engineer, or Mathematics professional	(Go to question number 13.)
○	Other, (specify)::	(Go to question number 13.)

*8. What grade level(s) do you teach (select all that apply)?(*Required)	
Select all that apply.	
☐	Upper elementary
☐	Middle school
☐	High school
☐	N/A

*9. Which best describes the location of your school?(*Required)	
Select one.	
○	Frontier or tribal school
○	Rural (country)
○	Suburban
○	Urban (city)
○	N/A

*10. At what kind of school did you teach while participating in GEMS?(*Required)	
Select one.	
○	Public school
○	Private school
○	Home school
○	Online school
○	Department of Defense school (DoDDS, DoDEA)
○	N/A

*11. Do you work at a "Title-I" school?(*Required)	
Select one.	
○	Yes
○	No
○	I am not sure
○	N/A

*12. Which of the following subjects do you teach? (select ALL that apply)(*Required)

Select all that apply.

☐	Upper elementary
☐	Physical science (physics, chemistry, astronomy, materials science, etc.)
☐	Biological science
☐	Earth, atmospheric, or oceanic science
☐	Environmental science
☐	Computer science
☐	Technology
☐	Engineering
☐	Mathematics or statistics
☐	Medical, health, or behavioral science
☐	Social Science (psychology, sociology, anthropology)
☐	Other, (specify)::
☐	N/A

*13. Which of the following best describes your primary area of research?(*Required)	
Select one.	
○	Physical science (physics, chemistry, astronomy, materials science, etc.)
○	Biological science
○	Earth, atmospheric, or oceanic science
○	Environmental science
○	Computer science
○	Technology
○	Engineering
○	Mathematics or statistics
○	Medical, health, or behavioral science
○	Social Science (psychology, sociology, anthropology)
○	Other, (specify)::
○	N/A

*14. Which GEMS site did you participate in? (select one)(*Required)
Select one.

○	Fort Rucker, Alabama
○	Huntsville, Alabama
○	Champaign, Illinois
○	Aberdeen, Maryland
○	Frederick, Maryland
○	Silver Spring, Maryland
○	Adelphi, Maryland
○	Natick, Massachusetts
○	Vicksburg, Mississippi
○	Picatinny, New Jersey
○	White Sands, New Mexico
○	San Antonio, Texas

*15. Which of the following BEST describes your role during GEMS?(*Required)
Select one.

○	Instructor (typically a University or Army Scientist or Engineer)
○	Classroom Assistant
○	Resource Teacher
○	Near Peer mentor
○	Assistant Near Peer mentor
○	Other, (specify)::

*16. How many GEMS students did you work with this year?(*Required)
_____ students.

*19. How SATISFIED were you with the following GEMS features?(*Required)

Select one per row.

	Did not experience	*Not at all*	*A little*	*Somewhat*	*Very much*
*Application or registration process	○	○	○	○	○
*Communicating with the National Science Teachers Association (NSTA)	○	○	○	○	○
*Communicating with GEMS organizers / site coordinators	○	○	○	○	○
*The physical location(s) of GEMS's activities	○	○	○	○	○
*Support for instruction or mentorship during program activities	○	○	○	○	○
*Stipends (payment)	○	○	○	○	○
*Invited speakers or "career" events	○	○	○	○	○
*Field trips or laboratory tours	○	○	○	○	○

*20. 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 GEMS.(*Required)

Select one per row.

	Yes - I used this strategy	*No - I did not use this strategy*
*Become familiar with my student(s) background and interests at the beginning of the GEMS experience	○	○
*Giving students real-life problems to investigate or solve	○	○
*Selecting readings or activities that relate to students' backgrounds	○	○
*Encouraging students to suggest new readings, activities, or projects	○	○
*Helping students become aware of the role(s) that STEM plays in their everyday lives	○	○
*Helping students understand how STEM can help them improve their own community	○	○
*Asking students to relate real-life events or activities to topics covered in GEMS	○	○

*21. 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 GEMS.(*Required)

Select one per row.

	Yes - I used this strategy	*No - I did not use this strategy*
*Identify the different learning styles that my student (s) may have at the beginning of the GEMS experience	○	○
*Interact with students and other personnel the same way regardless of their background	○	○
*Use a variety of teaching and/or mentoring activities to meet the needs of all students	○	○
*Integrating ideas from education literature to teach/mentor students from groups underrepresented in STEM	○	○
*Providing extra readings, activities, or learning support for students who lack essential background knowledge or skills	○	○
*Directing students to other individuals or programs for additional support as needed	○	○
*Highlighting under-representation of women and racial and ethnic minority populations in STEM and/or their contributions in STEM	○	○

*22. 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 GEMS.(*Required)

Select one per row.

	Yes - I used this strategy	*No - I did not use this strategy*
*Having my student(s) tell other people about their backgrounds and interests	○	○
*Having my student(s) explain difficult ideas to others	○	○
*Having my student(s) listen to the ideas of others with an open mind	○	○
*Having my student(s) exchange ideas with others whose backgrounds or viewpoints are different from their own	○	○
*Having my student(s) give and receive constructive feedback with others	○	○
*Having students work on collaborative activities or projects as a member of a team	○	○
*Allowing my student(s) to resolve conflicts and reach agreement within their team	○	○

*23. 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 GEMS.(*Required)

Select one per row.

	Yes - I used this strategy	*No - I did not use this strategy*
*Teaching (or assigning readings) about specific STEM subject matter	○	○
*Having my student(s) search for and review technical research to support their work	○	○
*Demonstrating laboratory/field techniques, procedures, and tools for my student(s)	○	○
*Supervising my student(s) while they practice STEM research skills	○	○
*Providing my student(s) with constructive feedback to improve their STEM competencies	○	○
*Allowing students to work independently to improve their self-management abilities	○	○
*Encouraging students to learn collaboratively (team projects, team meetings, journal clubs, etc.)	○	○
*Encouraging students to seek support from other team members	○	○

*24. This list 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 this list, please indicate which strategies you used when working with your student(s) in GEMS.(*Required)

Select one per row.

	Yes - I used this strategy	*No - I did not use this strategy*
*Asking my student(s) about their educational and/or career goals	○	○
*Recommending extracurricular programs that align with students' goals	○	○
*Recommending Army Educational Outreach Programs that align with students' goals	○	○
*Providing guidance about educational pathways that will prepare my student(s) for a STEM career	○	○
*Discussing STEM career opportunities within the DoD or other government agencies	○	○
*Discussing STEM career opportunities in private industry or academia	○	○
*Discussing the economic, political, ethical, and/or social context of a STEM career	○	○
*Recommending student and professional organizations in STEM to my student(s)	○	○
*Helping students build a professional network in a STEM field	○	○
*Helping my student(s) with their resume, application, personal statement, and/or interview preparations	○	○

*25. How useful were each of the following in your efforts to expose student(s) to Army Educational Outreach Programs (AEOPs) during GEMS?(*Required)

Select one per row.

	Did not experience	*Not at all*	*A little*	*Somewhat*	*Very much*
*Army Educational Outreach Program (AEOP) website	○	○	○	○	○
*AEOP on Facebook, Twitter, Pinterest or other social media	○	○	○	○	○
*AEOP brochure	○	○	○	○	○
*It Starts Here! Magazine	○	○	○	○	○
*GEMS Program administrator or site coordinator	○	○	○	○	○
*Invited speakers or "career" events	○	○	○	○	○
*Participation in GEMS	○	○	○	○	○

*26. How USEFUL were each of the following in your efforts to expose your student(s) to Department of Defense (DoD) STEM careers during GEMS.(*Required)

Select one per row.

	Did not experience	*Not at all*	*A little*	*Somewhat*	*Very much*
*Army Educational Outreach Program (AEOP) website	○	○	○	○	○
*AEOP on Facebook, Twitter, Pinterest or other social media	○	○	○	○	○
*AEOP brochure	○	○	○	○	○
*It Starts Here! Magazine	○	○	○	○	○
*GEMS Program administrator or site coordinator	○	○	○	○	○
*Invited speakers or “career” events	○	○	○	○	○
*Participation in GEMS	○	○	○	○	○

*27. Which of the following AEOPs did YOU EXPLICITLY DISCUSS with your student(s) during GEMS? (check ALL that apply)(*Required)

Select one per row.

	Yes - I discussed this program with my student(s)	*No - I did not discuss this program with my student(s)*
*Gains in the Education of Mathematics and Science (GEMS)	○	○
*UNITE	○	○
*Junior Science & Humanities Symposium (JSHS)	○	○
*Science & Engineering Apprenticeship Program (SEAP)	○	○
*Research & Engineering Apprenticeship Program (REAP)	○	○
*High School Apprenticeship Program (HSAP)	○	○
*College Qualified Leaders (CQL)	○	○
*GEMS Near Peer Mentor Program	○	○
*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	○	○

*28. How much do you agree or disagree with the following statements about Department of Defense (DoD) researchers and research:(*Required)

Select one per row.

	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 solve real-world problems	○	○	○	○	○
*DoD research is valuable to society	○	○	○	○	○

*29. How often did YOUR STUDENT(S) have opportunities to do each of the following in GEMS?(*Required)

Select one per row.

	Not at all	*At least once*	*A few times*	*Most days*	*Every day*
*Work with a STEM researcher or company on a real world STEM research project	○	○	○	○	○
*Work with a STEM researcher on a research project assigned by my teacher	○	○	○	○	○
*Design their own research or investigation based upon their own questions	○	○	○	○	○
*Present my STEM research to a panel of judges from industry or the military	○	○	○	○	○
*Interact with STEM researchers	○	○	○	○	○
*Use laboratory or field techniques, procedures, and tools	○	○	○	○	○
*Design and carry out an investigation or experiment	○	○	○	○	○
*Analyze data or information and draw conclusions	○	○	○	○	○
*Work collaboratively as part of a team	○	○	○	○	○
*Build or make a computer model	○	○	○	○	○
*Solve real world problems	○	○	○	○	○
*Communicate with other students about STEM	○	○	○	○	○
*Learn about different careers that use STEM	○	○	○	○	○
*Learn about new discoveries in STEM	○	○	○	○	○

*30. AS A RESULT OF THEIR GEMS EXPERIENCE, how much did your student(s) GAIN in the following areas?(*Required)

Select one per row.

	No gain	*A little gain*	*Some gain*	*Large gain*	*Extreme gain*
*In depth knowledge of a STEM topic(s)	○	○	○	○	○
*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	○	○	○	○	○

*31. Which category best describes the focus of your student(s) GEMS activities?(*Required)

Select one.

○	Science
○	Technology
○	Engineering
○	Mathematics
○	All of the above

*32. AS A RESULT OF THEIR GEMS EXPERIENCE, how much did your student(s) GAIN in their abilities to do each of the following?(*Required)

Select one per row.

If answered, go to question number 34.

	No gain	*Small gain*	*Medium gain*	*Large gain*
*Asking a question that can be answered with one or more scientific experiments	○	○	○	○
*Using knowledge and creativity to suggest a testable explanation (hypothesis) for an observation	○	○	○	○
*Considering different interpretations of data when deciding how the data answer a question	○	○	○	○
*Supporting an explanation for an observation with data from experiments	○	○	○	○
*Defending an argument that conveys how an explanation best describes an observation	○	○	○	○
*Integrating information from technical or scientific texts and other media to support your explanation of an observation	○	○	○	○
*Communicating about your experiments and explanations in different ways (through talking, writing, graphics, or mathematics)	○	○	○	○

*33. AS A RESULT OF THEIR GEMS EXPERIENCE, how much did your student(s) GAIN in their ability to do each of the following?(*Required)

Select one per row.

	No gain	*Small gain*	*Medium gain*	*Large gain*
*Defining a problem that can be solved by developing a new or improved object, process, or system	○	○	○	○
*Using knowledge and creativity to propose a testable solution for a problem	○	○	○	○
*Making a model of an object or system to show its parts and how they work	○	○	○	○
*Carrying out procedures for an experiment and recording data accurately	○	○	○	○
*Using computer models of an object or system to investigate cause and effect relationships	○	○	○	○
*Considering different interpretations of the data when deciding if a solution works as intended	○	○	○	○
*Organizing data in charts or graphs to find patterns and relationships	○	○	○	○
*Supporting a solution for a problem with data from experiments	○	○	○	○
*Defend an argument that conveys how a solution best meets design criteria	○	○	○	○
*Integrating information from technical or scientific texts and other media to support your solution to a problem	○	○	○	○
*Communicating information about your design experiments and solutions in different ways (through talking, writing, graphics, or math equations)	○	○	○	○

*34. AS A RESULT OF THE GEMS EXPERIENCE, how much did your student(s) GAIN (on average) in the skills/abilities listed below?(*Required)

Select one per row.

	No gain	*Small gain*	*Medium gain*	*Large gain*
*Sticking with a task until it is finished	○	○	○	○
*Making changes when things do not go as planned	○	○	○	○
*Including others' perspectives when making decisions	○	○	○	○
*Communicating effectively with others	○	○	○	○
*Desire to build relationships with professionals in a field	○	○	○	○
*Connecting a topic or field with their personal values	○	○	○	○

*35. Which of the following statements describe YOUR STUDENT(S) after participating in the GEMS program?(*Required)

Select one per row.

	Disagree - This did not happen	*Disagree - This happened but not because of GEMS*	*Agree - GEMS contributed*	*Agree - GEMS 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 earning a STEM degree	○	○	○	○
*More interested in pursuing a career in STEM	○	○	○	○
*More aware of DoD STEM research and careers	○	○	○	○
*Greater appreciation of DoD STEM research	○	○	○	○
*More interested in pursuing a STEM career with the DoD	○	○	○	○

36. What are the three most important strengths of GEMS?	
Strength #1:	
Strength #2:	
Strength #3:	

37. What are the three ways GEMS should be improved for future participants?	
Improvement #1:	
Improvement #2:	
Improvement #3:	

38. Please tell us about your overall satisfaction with your GEMS experience.

9 | NSTA Response to FY17 Evaluation Report

NSTA welcomes the findings, commendations, and recommendations of the 2017 Annual Program Evaluation Report. In response to the recommendations found in the Executive Summary.

From the Evaluation:
As in FY16, GEMS student participants continued to report that their primary source of information about GEMS was personal connections which emphasizes the quality of experience that students have in the program that motivates them to tell others about the program. However, this does exclude students who may not have connections to current or past participants. Given the large proportions of students who learned about GEMS through family, friends, and past participants of the program, the recommendation is repeated for FY17 to take measures to diversify the applicant and participant pool and to ensure that students without personal connections to sites have access to the GEMS program.

NSTA's Response:
GEMS took the following measures in FY17 to diversify the applicant and participant pool. The IPA worked with multiple partners of diverse reach during the Strategic Outreach Initiative proposal processes, provided Local Program Coordinators with materials to advertise and inform local parents, shared stories of GEMS students and leaders who come from underserved backgrounds with AEOP Alumni and Marketing partners, incorporated marketing and participation to underserved populations through AEOP's Camp Invention partner, and represented AEOP and GEMS at no less than 5 conferences per year with cumulative annual attendance of more than 20,000 education professionals. The IPA will continue these measures in future years and will continuously look to improve its efforts.

When asking students who rely on parents and guardians to provide transportation and other logistical support, it is reasonable to believe that there is a high likelihood that they would have heard of the program from a parent or guardian. This could help explain the high percentage of those who self-reported as having heard about the program from a family member. However, this information may not accurately reflect if the parent is a person who works or supports the research laboratory that hosts the GEMS program they attend. About 80% of FY17 GEMS participating students were 9th grade or lower, making it unlikely that 80% of the participating students were able to drive in their State.

From the Evaluation:
In FY17, GEMS participants and mentors both echoed findings that have been prevalent across the AEOP portfolio. Only a very few number of participants and mentors are accessing and/or utilizing AEOP social media, including the website. In regards to GEMS, only 40% had accessed the AEOP website. It is important for GEMS to play a role in working with the consortium overall to determine the strategy and plan for use of social media within and across the AEOPs.

NSTA's Response:

The IPA worked across the consortium to encourage and distribute content for social media, and will continue to do so in FY18. The IPA would support an effort to work with both the Consortium's evaluation partner and the marketing partner to establish a baseline of reasonable and expected participant engagement on web and social media platforms.

From the Evaluation:
A majority of student participants reported they had not learned about other AEOPs that would be next in their pipeline of opportunities, including JSS (48%), eCM (68%), and JSHS (72%). More than half of mentors reported only generally discussing AEOPs with participants. GEMS should invest additional effort in FY18 to provide sites with resources to use to introduce and teach participants about AEOPs in more than a one-time manner. A virtual alumni panel or using NPMs to teach GEMS participants would be good strategies to consider.

NSTA's Response:
The IPA will look for opportunities to improve upon the toolkit that Near-peer Mentors (NPM) and Resource Teachers (RT) have in FY18. Education First completed a mentor tool in FY17, but that tool was incomplete during training of NPM and RT. The upcoming year will be the first implementation of the tool for GEMS. The IPA will leverage that tool to incorporate AEOP program information.