Army Educational Outreach Program

UNITE

FY13 Annual Program Evaluation Report

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Executive Summary

UNITE, managed by the Technology Student Association (TSA), is an Army Educational Outreach Program (AEOP) pre-collegiate initiative for talented high school students from historically underserved and underrepresented groups in science, technology, engineering, and mathematics (STEM). UNITE encourages and helps prepare high school students to pursue a college education and career in engineering. In a four- to six-week summer program, hosted at nine competitively selected university sites throughout the country, UNITE provides academic and social support to participants so that they have the ability and confidence to become successful engineers.

This report documents the evaluation of the FY13 UNITE 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 UNITE included pre- and post-UNITE questionnaires for students and on-site focus groups with students and mentors at three sites. In addition, TSA collected a final report from each UNITE site, which were provided to evaluators as an additional source of data.

UNITE sites included Alabama State University (ASU), City College of New York (CCNY), Jackson State University (JSU), Miami Dade College (MDC), Michigan Technological University (MTU), New Jersey Institute of Technology (NJIT), South Dakota School of Mines and Technology (SDSMT), Texas Southern University (TSU), and University of Colorado-Colorado Springs (UCCS).

Table 1. 2013 UNITE Fast Facts	
Major Participant Group	Current and rising high school students
Participating Students	188
Participating K-12 Teachers	32
Represented K-12 Schools	Not available
Participating Universities	9
Participating Army Agencies	7+
Participating Army S&Es	8+
Total Cost	$300,954
Total Stipends	$82,900
Cost Per Student Participant	$1601

Summary of Findings

The FY13 evaluation of UNITE collected data about participants, their perceptions of program processes, resources, and activities, and indicators of achievement related to AEOP's and UNITE's objectives and intended outcomes. A summary of findings is provided in Table 2.

Table 2. 2013 UNITE Evaluation Findings	
Participant Profiles	
UNITE student participation in evaluation yields high level of confidence in the findings.	• The statistical reliability achieved for the pre- and post-UNITE student questionnaires, as well as the pre- to post-UNITE matched cases, allow us to sufficiently generalize findings of the evaluation sample to the population. Additional evaluation data contribute to the overall narrative of UNITE's efforts and impact, and highlight areas for future exploration in programming and evaluation, though findings from these data are not intended to be generalized to all UNITE sites and participants.
UNITE serves students of historically underrepresented and underserved populations.	• UNITE was successful in attracting participation from female students—a population that is historically underrepresented in engineering fields. Student questionnaire respondents included more females (61%) than males (37%).
	• UNITE had success in providing outreach to students from historically underserved minority race/ethnicity and low-income groups. Student questionnaire respondents included minority students identifying as Black or African American (47%), American Indian or Alaskan Native (19%), and Hispanic or Latino (15%). Respondents most frequently reported qualifying for free or reduced lunch (47%).
	• UNITE served students across a range of school contexts. Most student questionnaire respondents attended public schools (85%) and schools in urban (36%) and rural (28%) settings, which tend to have higher numbers or proportions of underserved groups.
UNITE engages a diverse group of adult participants as STEM mentors.	• In total, 167 adults, including university faculty (39), high school and university students (84), local teachers (32), and industry STEM professionals (2), served as program mentors. Additional STEM professionals from a range of business sectors participated in career day activities.
	• At two of the sites visited by evaluators, students had access to mentors belonging to the same gender (female) and/or race/ethnicity group. In program reports, additional UNITE sites described efforts to achieve gender and race/ethnicity group diversity among program and career day mentors.
Actionable Program Evaluation	
UNITE is strongly marketed to schools and teachers serving historically underserved groups.	• Many UNITE sites employed multi-pronged efforts to market programs to and recruit students from schools and school networks identified as serving large populations of traditionally underserved students. Most frequently, UNITE sites sent a combination of email communications, printed promotional materials, and application packages to target schools, as well as participated in a variety of at-school events directed to students, parents, and STEM teachers.
	• Students most frequently learned about the local UNITE program from parents and family members (more than 28%) and from teachers and guidance counselors at school (more than 22%). UNITE generally found students, rather than students finding UNITE.
UNITE students are motivated by opportunities to clarify and advance their STEM pathways.	• Students were most frequently motivated to participate in UNITE to clarify and advance their STEM pathways, including: to expand understanding of a STEM field or a potential career, to develop STEM skills or gain experience with processes and tools of a STEM field, to clarify future STEM education or career goals, and to prepare for college.

UNITE mentors engage students in meaningful STEM learning, through team-based and hands-on activities.	• Mentors used a variety of mentor and/or instructional activities for productively engaging students in STEM learning. • Most students (61-87%) had opportunities to engage in collaborative or team-based activities at least 2-3 times per week. Differences in students' perceptions of these opportunities were detectable across the sites and plausibly relate to differences in key mentor and/or instructional activities identified from program reports. • Students contrasted "theoretical" and textbook-focused school STEM learning with opportunities to learn by "touching," "seeing," or "applying" STEM to real world contexts in UNITE. Students suggested that hands-on activities during UNITE provided positive experiences to learn about working on teams.
UNITE promotes Army STEM careers but can improve marketing of other AEOP opportunities.	• Most mentors had no awareness of or past participation in an AEOP initiative beyond UNITE or the AEOP's Research and Engineering Apprenticeship Program on their campus. Subsequently, students reported limited exposure and encouragement to pursue AEOP opportunities by mentors. • UNITE sites offered a variety of activities for promoting STEM careers, including interactive expert panels, off- and on-campus STEM expos, and field trips to Army, university, and other research labs and facilities. Six of the nine UNITE sites engaged Army engineers and/or Army research facilities in career day events. • Mentors described efforts to educate students about STEM majors, STEM programs, and funding sources for their educational pursuits, but suggested that more resources are necessary to allow them to comfortably educate students about STEM careers and Army/DoD STEM careers, in particular.
UNITE benefits participants over typical school STEM offerings.	• Students and mentors perceived that UNITE benefits students by clarifying and advancing their STEM pathways and providing learning opportunities (e.g., environments, resources, and activities) not available typical school settings. Mentors also perceived benefit to themselves and to students' communities. • Students offered a range of recommendations for improvement, focused on mentorship and instructional activities, differentiating learning to better accommodate students' readiness, and expanding opportunities for students to engage with STEM professionals.
Outcomes Evaluation	
UNITE's limited effect on students' already high confidence in STEM competencies appears specific to site program activities.	• Students entered and left UNITE with high levels of confidence in their skills and abilities, with limited evidence of significant growth across the UNITE program. Significant growth was evident for each of six different confidence items for at no more than one or two sites: ability to apply engineering principles to solve real world problems (ASU and CCNY); identifying, formulating, and solving engineering problems (across program, CCNY); sketching/drafting skills (across program, ASU); computer programming skills (ASU and CCNY); social abilities (program, TSU); and abilities to work on teams (CCNY). Most often, this change appeared to relate to a major feature of sites' specific program activities that targets that particular skill or ability.
UNITE generally maintains students' positive attitudes toward engineering. After UNITE some students perceive	• Students started UNITE with positive attitudes toward engineering and, while some students' exhibited growth and others decline on certain items, generally students' motivation, perceptions of importance, and engagement were maintained across the UNITE program. Students at JSU showed moderately large to very large

less importance in their mathematics and science abilities.	significant growth in motivations to pursue engineering and in perceived importance of working on teams. Some students showed moderately large to very large decline in their perceptions of the importance of mathematics abilities (NJIT), science abilities (MTU, NJIT, and SDSMT), and applying science and mathematics to solving real work problems (across program, SDSMT).
UNITE exposes students to engineering pathways but students' aspirations for future pursuit of STEM education and careers show limited change.	• UNITE exposed students to engineering pathways, with significant improvement in some students' knowledge of engineering students (JSU and MTU), professionals (across program, JSU and TSU), majors (across program, CCNY), and professional societies (across program, ASU) and intent to join a professional engineering society (ASU and JSU) and work in engineering (ASU and MTU).
	• Students began and ended UNITE with relatively high educational goals and confidence to achieve those goals. High percentages of UNITE students intend to pursue and achieve STEM-related degrees, and their intentions were sustained throughout the UNITE program (64.8% pre, 68.4% post). Students entered UNITE with an idea of the field that they intend to pursue, and UNITE served to sustain existing interests rather than inspiring interest in new fields about which they have learned. Most frequently, students had interest in engineering (33.6% pre, 34.4% post) and medicine (29.5% pre, 25.4% post).
UNITE students are largely unaware of AEOP initiatives, but students show substantial interest in future AEOP opportunities.	• Student and mentors were largely unaware of other AEOP initiatives. Yet, substantial student interest exists in AEOP opportunities. 39-42% of students were interested in competition programs, 74-79% of students were interested in high school and college apprenticeship programs. In particular, 83% of students would pursue a REAP apprenticeship at the UNITE host site.
UNITE increases students' intent to pursue Army STEM careers.	• Most students learned about multiple STEM jobs during UNITE (94% learn about 3 or more jobs), but Army STEM careers received less attention (59% learn about 3 or more jobs). Despite this, students' interest and intent to pursue Army STEM careers showed large, significant growth through participation in UNITE (program, ASU, CCNY, JSU, MTU, and TSU), while more limited change (across program, ASU and CCNY) were evident in students' intent to pursue STEM jobs and careers generally.

Recommendations

1. Mentors play important roles in UNITE. Mentors design and facilitate learning activities, deliver content through instruction, supervise and support collaboration and teamwork, provide one-on-one support to students, chaperone students, advise students on educational and career paths, and generally serve as STEM role models for UNITE students. The FY13 mentor focus groups served as a baseline effort to collect information from this participant group, but a more systemic assessment of mentors is required to evaluate their engagement as STEM-Savvy Educators in AEOPs. Any future survey of mentors should at a minimum gather information how mentors become aware of UNITE, motivating factors for participation in UNITE, satisfaction with and suggestions for improving UNITE programs, perceived benefits to participants, and mentor activities, including those relating to exposing students to AEOP opportunities and Army STEM careers.

2. As a whole, students began and ended UNITE with high levels of confidence in their STEM competencies, positive attitudes about STEM, and ambitious education and career aspirations, with limited evidence of growth across the UNITE program. Lack of significant growth, and even observations of decline, should not be regarded as UNITE having no or negative effect on students. Sustaining students' high levels of confidence, positive attitudes, and ambitious aspirations during rigorous programs should be considered a success of UNITE. Particular to students' confidence around STEM competencies, these observations could suggest that students become less confident (though arguably more competent) during UNITE as they are challenged to use their STEM skills and abilities in ways that go beyond what is typically expected of them in school activities. In other words, perhaps through their UNITE experience students realize the limitations of their skills and abilities, that they have much to learn, and for that reason become less confident. Employing a retrospective pre-post evaluation design in subsequent evaluations may help to determine if this is the case, by allowing students to reflect on pre- and post-UNITE status with the same internal standard. In addition, site-based efforts to employ objective measures of learning would provide even clearer understanding of site programs' effects on students' STEM competencies.

3. Students at several UNITE sites showed moderately large to very large decline in their perceptions of the importance of mathematics and science principles and their application to solving problems. UNITE sites should consider the extent to which students are learning and applying science and mathematics principles in service of to their engineering-focused learning in an effort to further explore these findings. If opportunities to learn and apply scientific and mathematics principles and skills are relatively disconnected from the engineering-focused learning, we might expect such declines in perceptions of importance of mathematics and science. In this case, helping students see the underlying necessity and contributions of scientific and mathematic principles in engineering disciplines and in the engineering design process would be an area of potential improvement for programs. For example, the mathematics portion of NJIT's curriculum appears to

focus more on reinforcing and extending ability to do school math—learning concepts, solving problems, and test preparation—rather than connecting math to the site's biomedical engineering focus or to other real world problems. NJIT might consider how key concepts learned in the math course could be applied to solving problems in the biomedical engineering course, or at a minimum, highlighted in vignettes of STEM professionals who have used these or similar mathematical concepts to solve engineering problems.

4. Mentor and student interviewees across the focus group samples reported limited or no awareness of any given AEOP initiative, except for the pipeline initiative, Research in Engineering Apprenticeship Program (REAP), being piloted at the UNITE sites. Mentor interviewees reported spending little or no time educating students about AEOP initiatives for which students qualify during daily program activities, aside from distributing AEOP brochures. Student interviewees received AEOP promotional materials, such as the AEOP brochure or the Rite in the Rain notebooks, but generally could not name, or recognize when named, AEOP initiatives. Yet, from what little students know about AEOP initiatives substantial student interest exists in AEOP opportunities when broadly described. This interest, especially from students of underserved populations, would benefit from more robust attention by program coordinators and mentors during UNITE program activities. Continued guidance by TSA is needed for educating UNITE site coordinators and staff to AEOP opportunities, including the possible provision of TSA-led information sessions.

5. Most UNITE sites were successful in exposing students to Army STEM careers through career day activities in meaningful ways that generated significant interest in Army STEM jobs and careers. Creative solutions and continued collaboration among TSA, Army Cooperative Agreement Managers, and UNITE sites may be necessary for providing and expanding engagement of Army STEM professionals and research facilities at each UNITE site. UNITE sites that are unable to benefit from proximity of Army research facilities might consider other alternatives that would provide for direct interactions between students and Army STEM professionals, such as videoconferencing and/or virtual tours of research facilities. Furthermore, deliberate connections of UNITE sites' curricula to related Army STEM research and careers may provide alternative or additional exposure; these connections could be made by Army STEM professionals or by UNITE mentors. Some GEMS sites have formalized efforts to educate students about Army/DoD STEM careers through their curricular materials, which make explicit connections between subject matter or skills being learned in GEMS and the Army/DoD STEM jobs or careers that apply those subject matter or skills. GEMS mentors, many of whom are university students and local teachers, reported that these curricular materials are helpful in their work to expose students to Army/DoD STEM careers, especially given the mentors' own limited awareness of Army/DoD STEM careers. UNITE programs may benefit from similar efforts to connect UNITE curricula with Army/DoD STEM careers.

Introduction

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

This report documents the evaluation of one of the AEOP elements, UNITE. UNITE is administered on behalf of the Army by the Technology Student Association. The evaluation was performed by Virginia Tech, the Lead Organization (LO) in the AEOP CA consortium.

AEOP Goals

Goal 1: STEM Literate Citizenry.

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

Goal 2: STEM Savvy Educators.

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

Goal 3: Sustainable Infrastructure.

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

Program Overview

UNITE is an AEOP pre-collegiate program for talented high school students from groups historically underrepresented and underserved in science, technology, engineering, and mathematics (STEM). UNITE encourages and helps prepare high school students to pursue a college education and career in engineering. In a four to six-week summer program, UNITE provides academic and social support to participants so that they have the ability and confidence to become successful engineers.

Nine sites were competitively selected in 2012 to receive 2-year awards through UNITE. Although UNITE sites differ from one another, they all meet universal program requirements. This allows for a general consistency in student experience and outcome, and still gives sites the flexibility to design the details of their program to meet the unique needs of their students. All UNITE programs are designed to meet the following objectives:

1. Effectively show participants the real-world applications of math and science;
2. Raise participant confidence in the ability to participate in engineering activities;
3. Inspire participants to consider engineering majors in college;
4. Remove social barriers and negative attitudes about engineering;

5. Promote collaboration and problem-solving in a team environment;
6. Expose participants to STEM careers in the Army and DoD; and,
7. Increase the number of STEM graduates to fill the projected shortfall of scientists and engineers in national and Department of Defense (DoD) careers.

The nine host sites received applications from more than twice as many qualified students as they had positions for the 2013 UNITE program: 434 students applied and 188 enrolled. This reflects a 3% increase in applicants over FY12 (420 applied) and a 3% loss in enrollment over FY12 (193 enrolled). Table 3 summarizes interest and final enrollment by site.

Table 3. 2013 UNITE Site Applicant and Enrollment Numbers

2013 UNITE Site	No. of Applicants	No. of Enrolled Participants
Alabama State University (ASU), AL	25	15
University of Colorado (UCCS), Colorado Springs, CO	18	10
Miami Dade College (MDC), Wolfson Campus, FL	40	28
Michigan Technological University (MTU), MI	20	10
Jackson State University (JSU), MS	21	15
City College of New York (CCNY), NY	150	20
South Dakota School of Mines and Technology (SDSMT), SD	40	40
New Jersey Institute of Technology (NJIT), NJ	34	24
Texas Southern University (TSU), TX	86	26
Total	434	188

UNITE programs also engaged 167 adult participants in day-to-day program activities, including university faculty and students, local teachers, and industry STEM professionals who play important roles as "mentors" to UNITE students.

Table 4. 2013 UNITE Participation

UNITE Site	Professors / Instructors	Teachers	Univ. Student Mentors	Classroom / Teaching Assistants	Others
Alabama State University (ASU)	2	5	1	4	
University of Colorado, Colorado Springs (UCCS)	5	6	5	-	2 Industry Instructors
Miami Dade College, Wolfson Campus (MDC)	10	12	-	-	
Michigan Technological University (MTU)	4	-	64	4	
Jackson State University (JSU)	3	-	-	1	
New Jersey Institute of Technology (NJIT)	-	4	1	2	
City College of New York (CCNY)	3	1	-	3	
South Dakota School of Mines & Technology (SDSMT)	6	1	4	2	
Texas Southern University (TSU)	6	3	-	3	
TOTAL	**39**	**32**	**75**	**19**	**2**

The total cost of the 2013 UNITE program was $300,954. The average cost per student was $1601. Aligned with the rates of similar AEOP initiatives, UNITE provides participants with a stipend of $100 per week. Table 5 summarizes these and other 2013 UNITE program costs.

Table 5. 2013 UNITE Program Costs	
2012 UNITE – Cost Per Participant	
Total Participants	188
Total Cost	$300,954
Cost Per Participant	**$1601**
2012 UNITE - Cost Breakdown Per Participant	
Average Administrative Cost to TSA	$309
Average Program Cost to Host Site (not including stipend)	$852
Average Participant Stipend	$440
Cost Per Participant	**$1601**

Evidence-Based Program Change

In response to the FY12 evaluation and site visits conducted by TSA, the LO, and the UNITE-designated Army Cooperative Agreement Manager, TSA made the following changes/additions to its administration of UNITE in 2013 in the effort to effectively and efficiently meet AEOP and program objectives:

1. In October 2012, all TSA sites received general and site-specific feedback from TSA based on summer 2012 site visits. This feedback occurred via individualized teleconferences with TSA's UNITE program manager and each site coordinator. Among the generalized feedback provided to sites were the following:
    - There was limited evidence that FY12 UNITE participants (or their parents) were aware that UNITE was funded/sponsored by the Army. The AEOP brochures with the UNITE rack card should be distributed to students and other AEOP opportunities be discussed with students and families before, during, and after UNITE programs.
    - Sites should initiate collaboration with other faculty at the site to establish a pipeline leading UNITE students to the Research and Engineering Apprenticeship Program (REAP). Two former UNITE students should be recruited for placement into a new or existing REAP program at the site. UNITE and REAP representatives would be available to assist with this process.
    - UNITE requires that sites host a STEM career day, with participation of an Army engineer or a visit to an Army research facility. TSA would provide assistance in arranging for an Army STEM presence if needed.
    - UNITE requires that sites participate in program evaluation by administering pre- and post-UNITE questionnaires. Each site should plan to distribute these to students, whether in hard copy or electronic format.

The FY13 evaluation also incorporated FY12 evaluation recommendations relevant to evidence-based changes made to UNITE programming and other changes that were made to assessments AEOP-wide, including:

2. Focus groups with students and mentors at three sites.
3. Enhanced Actionable Program Evaluation, including assessment of students and mentors:
    - Introduction to the UNITE program;
    - Motivation to participate in UNITE;
    - Perceptions of and satisfaction with UNITE activities;
    - Perceived benefits of UNITE; and,
    - Suggestions for improvement to UNITE.
4. Additions to the Outcomes Evaluation, including:
    - Assessment of students' past participation and interest in other AEOP opportunities; and,
    - Assessment of students' awareness of and interest in STEM jobs, and specifically Army/DoD STEM jobs.

FY13 Evaluation At-A-Glance

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

Inputs	Activities	Outputs	Outcomes (Short term)	Impact (Long Term)
• Army sponsorship • TSA providing oversight of site programming • Operations conducted by 9 universities • Students participating in 9 UNITE programs • STEM professionals and educators serving as UNITE instructors • Stipends for students to support meals and travel • Centralized branding and comprehensive marketing • Centralized evaluation	• Students engage in hands-on programs focused on rigorous classroom instruction that prepared students for admissions into engineering tracks in college • STEM professionals and educators facilitate hands-on learning experiences for students	• Number and diversity of student participants engaged in programs • Number and diversity of STEM professionals and educators serving as instructors for programs • Number and diversity of Army/DoD scientists and engineers and other military personnel engaged in programs • Number and Title 1 status of high schools served through participant engagement • Students, instructors, site coordinators, and TSA contributing to evaluation	• Increased participant STEM competencies (confidence, knowledge, skills, and/or abilities to do STEM) • Increased interest in future STEM engagement • Increased participant awareness of and interest in other AEOP opportunities • Increased participant awareness of and interest in STEM research and careers • Increased participant awareness of and interest in Army/DoD STEM research and careers • Implementation of evidence-based recommendations to improve UNITE programs	• Increased student participation in other AEOP opportunities and Army/DoD-sponsored scholarship/ fellowship programs • Increased student pursuit of STEM coursework in secondary and post-secondary schooling • Increased student pursuit of STEM degrees • Increased student pursuit of STEM careers • Increased student pursuit of Army/DoD STEM careers • Continuous improvement and sustainability of UNITE

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

Key Evaluation Questions

- What aspects of UNITE programs motivate participation?
- What aspects of UNITE program structure and processes are working well?
- What aspects of UNITE programs could be improved?
- Did participation in UNITE programs:
    - Increase students' STEM competencies?
    - Increase students' positive attitudes toward STEM?
    - Increase students' interest in future STEM learning?
    - Increase students' awareness of and interest in other AEOP opportunities?
    - Increase students' awareness of and interest in Army/DoD STEM careers?

The assessment strategy for UNITE included pre- and post-UNITE student questionnaires, onsite focus groups with student and mentor participants at three sites, and site program reports collected by TSA from sites, which were provided to Virginia Tech. Tables 6-8 outline the information collected in student and instructor assessments and site program reports that are relevant to this evaluation report.

Table 6. 2013 Student Assessments

Category	Description
Profile	**Demographics:** Participant gender, age, grade level, race/ethnicity, and socioeconomic status indicators
Satisfaction & Suggestions	Awareness of UNITE, motivating factors for participation, satisfaction with and suggestions for improving UNITE programs
AEOP Goal 1- Indicators of Program Achievement	**STEM Competencies:** Change in students' confidence in skills and abilities that are critical to engineering
	Attitudes toward STEM: Change in students' attitudes toward engineering
	Future STEM Engagement: Change in students' identification with engineering and pathways to engineering; change in students' intent to pursue STEM educational goals and confidence in achieving these goals
	Army STEM: AEOP Opportunities – Students' past participation, exposure to, and interest in participating in other AEOP programs
	Army STEM: Army/DoD STEM Careers – Students' perceptions of exposure to STEM and Army/DoD STEM jobs; changes in students' intent to pursue STEM and Army/DoD STEM jobs
AEOP Goal 2 Program Efforts	**Mentor Capacity: Local Educators -** opportunities provided by mentors for students to engage in collaboration and teamwork

Table 7. 2013 Mentor Focus Groups

Category	Description
Profile	Occupation, past participation
Satisfaction & Suggestions	Awareness of UNITE, motivating factors for participation, satisfaction with and suggestions for improving UNITE programs, benefits to participants
AEOP Goal 1 & 2 Program Efforts	**Army STEM: AEOP Opportunities –** Efforts to expose students to AEOP opportunities
	Army STEM: Army/DoD STEM Careers – Efforts to expose students to STEM and Army/DoD STEM jobs
	Mentor Capacity: Local Educators - Day-to-day mentor activities

Table 8. 2013 Site Program Reports

Category	Description
Program	Description of course content, activities, and academic level (high school or college)
AEOP Goal 1 & 2 Program Efforts	**Underserved Populations:** mechanisms for marketing to and recruitment of students from underserved populations
	Army STEM: Army/DoD STEM Careers – Career day exposure to Army STEM research and careers; Participation of Army engineers and/or Army research facilities in career day activities
	Mentor Capacity: Local Educators - University faculty and student involvement, teacher involvement

Detailed information about methods and instrumentation, sampling and data collection, and analysis are described in Appendix A, the evaluation plan. The reader is strongly encouraged to review Appendix A to clarify how data is summarized, analyzed, and reported in this document. Findings of statistical and/or practical significance are noted in the report narrative, with tables and footnotes providing results from tests for significance.[1] Questionnaires and respective data summaries are provided in Appendix B (pre-program) and Appendix C (post-program). Pre- to post-UNITE comparisons of matched cases, including site-level matched-bases analyses, are provided in Appendix D. Focus group protocols are provided in Appendices E (students) and F (instructors). Major trends in data and analyses are reported herein.

Study Sample

The pre- and post-UNITE questionnaires were provided to the 2013 UNITE host sites in either paper-and-pencil or electronic format using the Qualtrics® survey system hosted by Virginia Tech. Students from 8 of 9 UNITE sites responded to questionnaires; 5 sites administered paper versions and 3 sites administered one or both of the pre- and post-UNITE electronic versions.

Table 9 provides an analysis of students' participation in pre- and post-UNITE questionnaires, the response rate, and the statistical reliability achieved with each sample, as given by the margin of error at the 95% confidence level. The statistical reliability achieved for pre- and post-UNITE samples suggest adequate representativeness of the population. The pre- to post-UNITE matched cases approach an acceptable margin of error, and still allow us to sufficiently generalize findings of evaluation sample to the total population.

Table 9. 2013 UNITE Student Questionnaire Participation

Participant Group	Respondents (Sample)	Total Participants (Population)	Participation Rate	Margin of Error @ 95% Confidence[2]
Students – Pre-UNITE	155	188	82%	±3.3%
Students – Post-UNITE	135	188	72%	±4.5%
Students – Pre- to Post-UNITE Matched Cases	98	188	52%	±6.8%

Focus groups were conducted at three of the nine UNITE sites. Student focus groups included 43 students (18 females, 25 males) ranging from grades 8 to 12 (or rising 9 to college freshman). Two programs that evaluators visited served target demographics: Native American students from frontier or tribal schools and girls in urban settings, respectively. The third program provided more typical coed offerings for students in an urban environment. Mentor focus groups included 10 mentors (6 females, 4 males) at the same three UNITE sites. Mentors included a high school student teaching assistant (TA), three undergraduate student TAs, three local teachers, and three university faculty. Focus groups were not intended

[1] 2012 evaluation reports did not conduct significance testing on changes. The word "significant" was used incorrectly to describe changes that were perceived to be large. However, without significance testing, we cannot be sure which changes were real or due to chance, nor can we assess the strength of the effect causing the real changes.

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

to yield generalizable findings; rather they were intended to provide additional evidence of, explanation for, or illustrations of student questionnaire data. They add to the overall narrative of UNITE's efforts and impact, and highlight areas for future exploration in programming and evaluation.

Respondent Profiles

Student demographics. Demographic information collected from UNITE respondents in the pre-UNITE questionnaire is summarized in Table 10. More females (61%) than males (37%) completed the questionnaire. More students identified with race/ethnicity category of Black or African American (47%) than any other single race/ethnic category, though there substantial representation of American Indians or Alaskan Natives (19%) and Hispanic or Latino (15%) populations. Respondents most frequently reported qualifying for free or reduced lunch (47%)—a common indicator of low income status. Most respondents attend public schools (85%). School settings reported were relatively balanced between urban (36%), suburban (24%), and rural (28%) settings. Of notable interest, the majority of students that reported attending schools in rural settings are American Indian students attending reservation or tribal schools, which tend to be extremely low-resourced schools. The average age of students was 15.6 years old, and most students have one or more years of high school left.

In summary, UNITE was successful in attracting participation from female students—a population that is historically underrepresented in STEM fields. UNITE had success in providing outreach to students from historically underserved minority race/ethnicity and low-income groups. UNITE served students across a range of grade levels and who regularly attended school in a variety of settings, including urban, rural, and reservation or tribal schools, which historically have lower or limited resources than suburban schools.

Table 10. 2013 UNITE Student Respondent Profile

Demographic Category	Pre-Questionnaire Respondents	
Respondent Gender (n = 132)		
Female	80	61%
Male	49	37%
Choose not to report	3	2%
Respondent Race/Ethnicity (n = 131)		
American Indian or Alaskan Native	25	19%
Asian or Other Pacific Islander	9	7%
Black or African American	61	47%
Hispanic or Latino	19	15%
White or Caucasian	10	8%
Other	3	2%
Choose not to report	4	3%
Respondent Socioeconomic Indicators (most frequent responses given, n = 128-131)		
Public School Type	111	85%
Urban School Setting	46	36%
Do Qualify for Free or Reduced Lunch	61	47%

Respondent Grade Level and Age (n = 115-116)		
Rising Grade 9	32	28%
Rising Grade 10	21	18%
Rising Grade 11	37	32%
Rising Grade 12	23	20%
Rising College Freshman	2	2%
Average Age	15.6 years	

Mentor demographics.[3] Mentor interviewees who participated in focus groups consisted of 6 females and 4 males identified as Asian (2), Black or African American (1), Hispanic or Latino (3) and White or Caucasian (4). One of the mentors served both as UNITE site coordinator and course instructor for the program. Another mentor served primarily as coordinator but routinely interacted with students during program activities, and thus was invited to join the focus group. At two of the sites visited, most students had access to mentors belonging to the same gender (females) and/or race or ethnicity group serving as a STEM role model—an example of someone with similar demographic characteristics who is succeeding in their pursuit of STEM education and/or career.

[3] In site program reports, some sites describe efforts to highlight gender and racial diversity of mentors pursuing or working in STEM fields, including but not limited to recruiting gender and racially diverse groups of university faculty and students and other STEM professionals to serve as instructors, classroom assistants, chaperones, and/or as career day speakers.

Actionable Program Evaluation

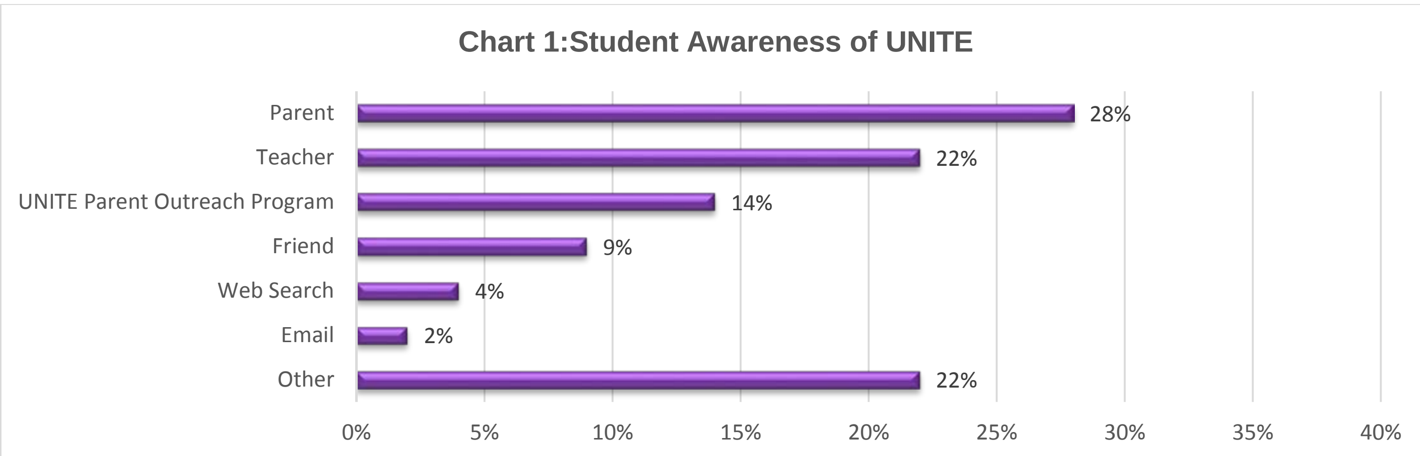
Actionable Program Evaluation is intended to provide assessment and evaluation of program processes, resources, and activities for the purpose of recommending improvements as the program moves forward. This section highlights information outlined in the Satisfaction & Suggestions sections of Tables 6-8 as well as the Goal 2 Program Efforts section of Tables 7 and 8.

A focus of the Actionable Program Evaluation are efforts toward the long-term goal of UNITE and all of the AEOP to increase and diversify the future pool of talent capable of contributing to the nation's scientific and technology progress. UNITE sites reach out to students of traditionally underserved populations. Thus, it is important to consider how UNITE is marketed and ultimately recruits student participants, the factors that motivate students to participate in UNITE, participants' perceptions of and satisfaction with activities, what value participants place on program activities, and what recommendations participants have for program improvement. In the sections that follow, we report perceptions of student, mentors, and site program coordinators (from their program reports), in an effort to both understand current efforts and recommend evidence-based improvements toward expanding and supporting the participation of students from underserved groups in achieving outcomes related to AEOP and program objectives.

Marketing and Recruiting Underserved Populations

Many UNITE sites employed multi-pronged efforts to market programs to and recruit students from schools and school networks identified as serving large populations of traditionally underserved students. Site program reports revealed that most UNITE sites market to specific schools and school networks to recruit students of underserved populations. These schools and school networks are typically identified as serving strong populations of traditionally underserved students, including Black or African American, Hispanic or Latino, Native American, and low-income students. UNITE sites defined their reach differently, including some that market statewide or even multi-state (e.g., NJIT, SDSMT), others that market programs regionally (e.g., ASU, and JSU), and in some cases, programs that market primarily in the immediate city or town served by the university (e.g., CCNY, MDC, MTU, and TSU). Most frequently, UNITE sites sent a combination of email communications, printed promotional materials, and application packages to target schools. Site coordinators and other staff also participated in a variety of at-school events, including career fairs and STEM presentations directed at students and teachers, as well as information sessions for parents. Some programs advertise in the local media—both newspaper and television. Several programs used various forms of on-campus advertising, including flyers, official university communications, and web pages. One program advertised to state educational agencies supporting higher education for the target population. One program advertised primarily to parents of past participants, who were "very instrumental in recruiting new students." Another program recruited participants by sending invitations and application materials to qualified students that were identified from another pre-collegiate program.

Student questionnaires asked how they heard about UNITE, in order to understand how UNITE sites ultimately attract students. Chart 1 summarizes students' responses. Students most frequently learned about the local UNITE program from a parent or other family member (more than 28%) and from teachers or guidance counselors at school (more than 22%). The "Other" category initially included references to the parent outreach programs in which UNITE programs are embedded, which were pulled out as a new category. The remaining 22% of "Other" responses represented a variety of individuals including other family members, university faculty, school counselors, as well as at-school events through which students learned of UNITE programs. The findings from how students learn about UNITE suggest that UNITE generally finds students, rather than students finding UNITE.



Motivating Factors for Participation

Motivating factors for students. Student questionnaires and focus groups included questions to explore student motivations to participate in STEM summer programs, and specifically, in UNITE. Detailed summaries of questionnaire data are found in Appendix C, while broad themes are described here. In questionnaires and focus groups, students most frequently reported being motivated to participate in UNITE to clarify and advance their stem pathways. For example, students wanted to expand understanding of a STEM field or a potential career, develop STEM skills or gain experience with processes and tools of a STEM field, clarify future STEM education or career goals, and prepare for college. Many students were influenced (and in the case of one site, required) to participate in UNITE through their ongoing participation in the multi-year parent outreach program in which the UNITE program in embedded. A smaller number of students were motivated by friends and family who had participated in the UNITE program previously. Program logistics (e.g., location, availability) and other characteristics of the local UNITE programs (e.g., range of topics, diversity within the program, girls only option) motivated participation for some students.

UNITE students were motivated by opportunities to clarify and advance their STEM pathways. These opportunities are not just provided by UNITE, but also by the parent outreach programs in which UNITE programs are situated. The parent outreach programs provide longer-term options (e.g., in the case of NJIT, 8 years-worth of engagement) for advancing students' college and career readiness, and reciprocally, provide a pipeline of potential STEM talent from which the university recruits. The findings above suggest that students may not otherwise have these opportunities if not for the robust, targeted marketing efforts directed toward students, their parents, and their teachers.

Motivating factors for mentors. Most UNITE mentor interviewees were influenced to participate through personal or professional connections with current or past UNITE staff who regarded their experiences highly. Two mentors (both undergraduate teaching assistants) were assigned to the UNITE program through their degree program. Two mentors valued previous participation in UNITE—one as a mentor and the other as a student—which influenced their decision to participate this year as a mentor. Mentors also identified specific characteristics of UNITE programs or students that motivated their involvement, including:

- UNITE provides opportunities to use specific teaching strategies that are not possible in regular school settings;
- UNITE provides a better overall experience for teachers than typical "summer school" situations; and
- UNITE students are good pupils and enjoyable to work with.

Mentor Capacity

The nature and quality of mentoring provided is a critical factor to maximizing students' participation in STEM and sustaining or inspiring their interest in future STEM work. Understanding mentor activities from the perspectives of mentors and students can inform programmatic improvement for sustaining students' interest and participation in STEM.

During focus groups, mentor interviewees were asked to describe the mentoring they provided to students on an average day. Because of the nature of the program activities, most mentors described instructional activities. While student assessments did not directly address students' perceptions of mentoring, items were included that do shed some light on the extent to which UNITE mentors implemented learner-centered models of mentoring and instruction with students:

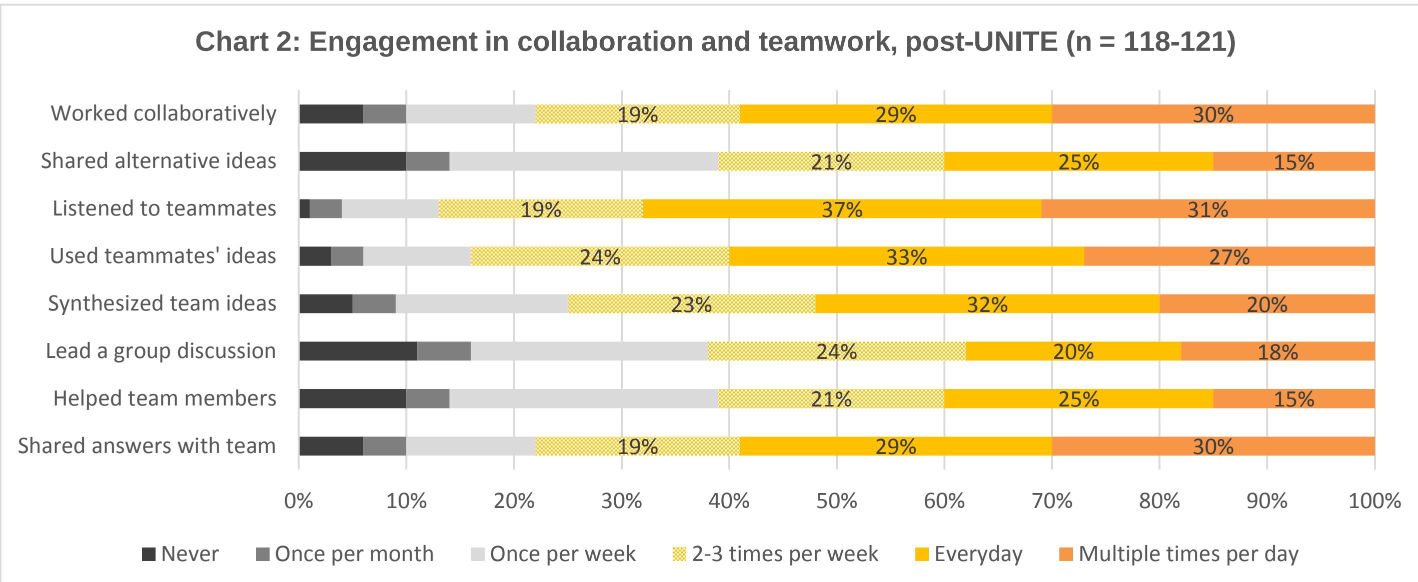
- student questionnaire items elicited the frequency with which students perceived having opportunities to engage in collaboration and teamwork during UNITE; and
- a student focus group item elicited student perceptions of the role of hands-on activities in their STEM learning.

Mentor activities. Mentor interviewees used a variety of mentor and/or instructional activities for productively engaging students in STEM learning, including:

- one-on-one teaching (includes posing and answering questions);
- content delivery through lectures, PowerPoint presentations, and video-casts;
- using hands-on activities to illustrate concepts;
- assessing and ensuring conceptual understanding;
- using project-based learning;
- using team competition-motivated learning;
- monitoring, pacing, and supporting cohorts appropriately;
- using varied forms of feedback; and
- connecting UNITE concepts to objects and phenomena encountered in everyday life.

UNITE mentors also encouraged STEM education and career pathways. In addition to career day activities enacted by each site, some mentors incorporated special projects for students to explore and reported on STEM careers individually, and/or discussed students' education goals and options available to them.

Opportunities to engage in collaboration and teamwork. Eight items in the post-UNITE questionnaire measured students' perceptions of their engagement in collaboration and teamwork during UNITE. The results are summarized in Chart 2. Most students engaged in the various collaborative behaviors multiple times per week. A small proportion (< 10%) of students claimed to never engage in such behaviors. Students most frequently actively listened to teammates, used ideas of teammates to find creative solutions, worked collaboratively on a project, and shared answers with the team.



A composite "collaboration and teamwork" score was calculated for each site, by assigning response categories to a scale of 1 = "Never" to 6 = "Multiple times per day" and calculating the average across all items in the scale. Composite scores are summarized in Table 11. City College of New York (CCNY) has the highest composite score, followed by Michigan Technological University (MTU). Texas Southern University (TSU) has the lowest composite score.

Table 11. Collaboration and teamwork composite score

Site	n	Mean	SD
1. CCNY	17	5.24	.64
2. MTU	10	4.98	.96
3. JSU	14	4.49	.93
4. SDSMT	25	4.44	.98
5. NJIT	22	4.26	1.14
6. UCCS	4	4.25	1.50
7. TSU	29	3.72	.99

Composite scores were statistically compared to explore whether site-based differences exist between students' perceptions of their UNITE activities. These comparisons suggest that significant differences exist in students' perceptions of teamwork across sites.[4] Further analyses suggest that the significant differences exist between students' perceptions

[4] $p < 0.05$ with One-Way ANOVA test of differences between groups; F = 4.001, p= .000

at the highest and lowest scoring institutions: between students at CCNY and TSU[5] and between students' at MTU and TSU[6]. TSU's curriculum focused on differentiated instruction in algebra, pre-calculus/calculus, physics, and chemistry. The TSU program coordinator identified only five hands-on activities, one field trip, and a program-long team project as the "active learning components" of the program. These represented far fewer opportunities than provided to students at CCNY and MTU where site program reports suggest (and student questionnaire data corroborate) that students engaged in collaborative and hands-on activities daily. CCNY students worked as teams daily to design, build, and compete their robots during robotics class. MTU students collaborated during a daily activity that focuses their learning of one or more concepts related to their weekly content area--Chemistry, Materials Science & Engineering, Aquatic Ecology, or General Engineering.

Role of hands-on activities in STEM learning. Students were asked in focus groups "How have the hands-on aspects of this program helped you learn STEM?" For many students, the hands-on experiences provided for more meaningful learning than could be obtained elsewhere. For example, students contrasted their UNITE experiences to school experiences. They described school learning as "theoretical" and focused on learning from textbooks. They described UNITE as learning by "touching," "seeing," or "applying" STEM learning to real world contexts. A number of students at all three sites reported that hands-on activities provided especially positive experiences to learn about working on teams, including practicing communication skills, delegating roles based on expertise, explaining using STEM principles, and problem-solving as teams. One focus group suggested these would be very atypical activities in their regular school setting.

Mentor interviewees used a variety of mentor and/or instructional activities for productively engaging students in STEM learning. Site program reports and student questionnaire respondents (61-87%) suggested that most students have opportunities to engage in collaborative or team-based activity at least 2-3 times per week, as well as in hands-on activities. Differences in students' perceptions of those opportunities were detectable across the sites, and plausibly relate to the key mentoring and instructional activities that students were offered, as identified from site program reports. Student interviewees expressed that hands-on aspects provided learning experiences not possible in school, and that team-based and hands-on learning are potentially synergistic learning opportunities for students.

Army STEM

The ideology of exposing students to different real-world applications and careers employing STEM early in a students' academic career is rooted in the belief that exposing students might unearth hidden curiosity and passion that students never knew they possessed. Separate studies from University of Indiana[7] and University of Virginia[8] found that exposure to STEM as adolescents peaked immediate interest in near-term STEM-related pursuits and had a significant effect on future pursuit of STEM degrees and careers, respectively. Subsequently, the Army's goal of establishing a coherent pipeline

[5] $p < 0.05$ with Tukey's HSD test, differences between groups; Mean Diff = 1.511, $p = 0.000$

[6] $p < 0.05$ with Tukey's HSD test, differences between groups; Mean Diff = 1.241, $p = 0.013$

[7] Alexander, J. M. & Johnson, K. E. (2012) Longitudinal analysis of the relations between opportunities to learn about science and the development of interests related to science. *Science Education 96 (5)* 763-786

[8] Dabney, K. P., Tai, R. H., Almarode, J.T., Miller-Friedmann, J.L., Sonnert, G., Sadler, P. M. & Hazari, Z. (2012) Out of school time science activities and their association with career interest in STEM. *International Journal of Science Education 2 (1)* 63-79.

for developing STEM talent from kindergarten to college and attracting that talent to Army/DoD careers, requires that each program promote participants' awareness of both AEOP initiatives and Army/DoD STEM careers. Guidance provided by TSA that UNITE sites market other AEOP programs and engage Army STEM professionals and research facilities in career day activities demonstrate FY13 efforts made to improve visibility of Army-sponsorship while advancing the Army's goals:

- Objective 1.e.—Increase awareness of DoD STEM career opportunities; and
- Objective 2.d.—Provide and expand the mentor capacity of the Army's highly qualified scientists and engineers

AEOP opportunities. There was limited evidence that FY12 UNITE participants (or their parents) were aware that UNITE was funded/sponsored by the Army. In FY13, TSA provided guidance that UNITE sites should distribute AEOP brochures with the UNITE rack card and discuss other AEOP opportunities with students and families before, during, and after UNITE programs.

The evaluation did not directly collect information from sites (e.g., program reports) regarding their efforts to educate students about AEOP opportunities. Focus groups with mentors assessed whether mentors were knowledgeable of AEOP initiatives and the extent to which they educated their students about future AEOP opportunities. Most mentor interviewees had no awareness of or past participation in an AEOP initiative other than UNITE. Two mentors that also serve as the UNITE site coordinator are familiar with REAP. Mentor interviewees reported spending little or no time educating students about AEOP initiatives for which students qualify during daily program activities. However, the two mentor-coordinators distributed the AEOP brochure to students and parents during the orientation phase of their program, as well as selecting and advising two students at their site to pursue REAP after UNITE. During one site visit, AEOP brochures were visible under the classroom materials in use by students, and references were made to REAP during classroom activities at that site.

Army/DoD STEM careers. UNITE sites employ a variety of activities for their career day events to provide students with exposure to STEM careers, and in particular, Army/DoD STEM careers. These activities include the following:

- Expert panels of STEM professionals from the Army and some combination of ROTC, civil service, private industry, and academic sectors (JSU, NJIT, TSU, UCCS; CCNY and MDC panels did not include representation of Army STEM professionals);
- Off- or on-campus STEM Expos, festivals, or symposia in which students engage in learning about research and careers with current or prospective STEM professionals from Army, ROTC, civil service, industry, private and/or academic sectors (CCNY, MTU, SDSMT);
- Field trip to a regional Army research facility to tour labs and have opportunities to meet with engineers serving in the Army and civil services sectors (NJIT);
- Field trip to other facilities, such as a nuclear power plants or a museum, including tours, demonstrations, and exposure to careers (ASU, CCNY); and

- Field trip to other university laboratories or facilities, including tours and opportunities for students to learn about programs and research offered at those institutions (ASU).

Six of the nine UNITE sites engaged Army STEM Scientists and Engineers (S&Es) or research facilities in their career day events. Additionally one UNITE site engaged US Coast Guard STEM professionals. Two sites—ASU and CCNY—were ultimately unable to engage Army STEM personnel or research facilities that had previously committed, due to unforeseen and last minute conflicts with the Army labs. Four sites—JSU, NJIT, TSU, and UCCS—successfully engaged a total of eight Army engineers. Two additional sites—MTU and SDSMT—engaged an unknown number of local Army recruiters, ROTC representatives, and Army STEM professionals in STEM Expos. One UNITE site—NJIT—visited a local Army research facility. In total, evaluators ascertained that a minimum of seven Army installations or research facilities or their personnel participated in UNITE career day events, including these named facilities: US Army Engineer and Research Development Center (MS), US Corps of Engineers (MS), US Army Picatinny Arsenal (New Jersey), and US Army Fort Carson (Colorado).

Beyond career day events, mentor interviewees described efforts to promote future engagement in STEM as primarily focused on topics such as undergraduate majors, undergraduate and graduate programs, and funding for educational pursuits, rather than on STEM careers. Mentor interviewees suggested that more resources would be necessary to allow them to comfortably speak to students about STEM careers, and especially about Army/DoD STEM careers.

Perceptions of UNITE

Questionnaire and focus group assessments elicited student and mentor perceptions of UNITE, including perceived value of UNITE, perceived influence of UNITE on STEM pathways and careers, overall satisfaction with program activities, and perceived areas for improvement.

Value of UNITE. Mentors were asked in focus groups what they perceive as the value of the UNITE program. Mentors' comments primarily center on value to students, but also suggest benefit to mentors and to the community.

First, mentors most frequently described the ways in which UNITE serves to advance students in their STEM pathways. Mentors reported that UNITE

- previews and prepares students for the college environment and workload;
- exposes students to new degree, program, and career options; and
- builds the foundational confidence and competence students need to continue pursuing STEM goals.

Second, mentors perceived that UNITE provides learning experiences and resources that are not otherwise available to students. Mentors—who include local teachers—described unique learning environments, activities, and resources available to UNITE students, which are perceived as atypical of regular school classrooms. They also described the ways in which the learning processes go beyond typical school learning processes. In UNITE, students

- apply school knowledge to solve real world problems;

- learn new knowledge and skills learned not taught in schools often due to lack of technology, materials, and other resources; and
- learn about STEM in ways that are relevant to them at home and in their communities.

Third, mentors described the UNITE's value in terms of their own benefit. Mentors reported that during UNITE they

- develop or expand their teaching and mentoring skills;
- learn subject matter more intensely by teaching it to students;
- acquire new knowledge and resources that can be applied in their own classroom teaching; and
- become motivated to pursue more educational training and future UNITE teaching opportunities.

Fourth, mentors perceived that UNITE programs (and through UNITE, mentors) benefit the community by educating its youth and by providing opportunities for students to learn about how STEM impacts students' own communities.

Influence on STEM pathways and careers. As reported previously, student questionnaires revealed that students were motivated to participate in UNITE because of the potential to clarify and advance their STEM pathways. Students were also asked in focus groups near the end of their UNITE experience how UNITE prepared them for a possible STEM pathway or career. Students responses frequently pertained to the notion that UNITE broadened their horizons in STEM careers—by exposing them to more possibilities in engineering fields and careers, as well as by providing insights for what to expect in preparing for and engaging in engineering careers. Nearly as frequently, students described a specific experience, activity, or resource from UNITE that impacted their interest, motivation, or STEM aspirations. Students described instances in which UNITE confirmed students' interest and motivation, or inspired new interest in a STEM field or career, as well as instances in which UNITE helped students' rule out a STEM-related field or career that they turned out not to enjoy. A number of student interviewees described that learning to productively work with others in team—a necessary skill in STEM that is often not prioritized in school settings—was a particularly valuable way in which UNITE advanced their STEM pathway or career, or any career for that matter.

Overall satisfaction. Students were asked two items to gauge their overall satisfaction. First, in focus groups students were asked what they would share with a friend who is considering participating in UNITE. Students offered a range of general insights, and, though less frequent, subject-specific insights. General advice to peers included things like the following: pay attention, be motivated, be open-minded, take advantage of opportunities, take notes, ask questions, be friendly, and express yourself. Others commented that UNITE has allowed for networking, hands-on experiences not possible in school, and provided a good "head start" in an area of intended future study.

Second, in post-UNITE questionnaires, students were asked if they would participate in the UNITE program again if given the chance. 107 of 112 respondents said they would participate again if given the chance. Their reasons most frequently included that they benefit from learning or expanding foundational skills and abilities in STEM in UNITE. Related to that, are exposed to STEM in ways that advance their STEM pathway. Most students expressed general satisfaction with their UNITE program experience. A few reported satisfaction in specific aspects such as networking, hands-on STEM learning, and particularly interesting or challenging learning experiences. Of those claiming that they would not or are unsure if they would participate again, the reasons include that they are not particularly interested in STEM, they are not interested in the specific STEM field(s) highlighted by the program, or they intend to explore programs offering different or more challenging content.

Areas for improvement. The post-UNITE questionnaire asked students for their suggestions about improving UNITE. The 108 student responses are summarized in Appendix C and major themes are shared here. Nearly 20% offer no recommendations. Most frequently students recommended ways to improve mentorship and/or instructional activities:

- expand opportunities for learner-centered activities, most notably hands-on activities;
- reduce the number of lectures and improve quality of remaining lectures; and
- improve the quality or quantity of mentors, ensuring match between UNITE content and mentors' area of expertise.

Students suggested differentiating learning to better accommodate student interests and readiness for working with challenging content:

- offer a broader range of topics and levels of difficulty;
- provide opportunities for students to choose the from those range of topics/difficulty levels offered; and
- group students according to knowledge and abilities and/or age and grade level.

In addition, students also recommended more exposure to STEM careers. They suggest providing more opportunities to engage with STEM professionals:

- have more guest speakers;
- take more field trips, especially to the work places of engineers; and
- provide more opportunities to learn about Army STEM careers.

Not surprisingly, some students also preferred having more opportunities for, or a better balance of, fun with their intense learning schedules. A small number requested that programs serve lunch or snacks, or ensure sufficient time for lunch daily.

Outcomes Evaluation

The evaluation of UNITE included measurement of several outcomes relating to AEOP and program objectives aligned with AEOP Goal 1: STEM Literate Citizenry. Toward AEOP Goal 1, the evaluation measured students' pre- and post-UNITE perceptions of STEM competencies, attitudes toward STEM, interest in future STEM engagement, and awareness and interest in educational and career opportunities in Army STEM.

STEM Competencies

STEM competencies are necessary for a STEM-literate citizenry. STEM competencies include foundational knowledge, skills, and abilities in STEM, as well as the confidence to apply them appropriately. STEM competencies are important for those engaging in STEM enterprises, but also all members of society as critical consumers of information and effective decision makers in a world that is heavily reliant on STEM. The evaluation of UNITE measured students self-reported confidence in STEM competencies and engagement in opportunities intended to develop what is considered to be a critical STEM skill in the 21st century—collaboration and teamwork. These measures align with the following UNITE Objectives:

- Objective 1—Effectively show participants the real-world applications of math and science;
- Objective 2—Raise participant confidence in the ability to participate in engineering activities; and
- Objective 5—Promote collaboration and problem-solving in a team environment.

Fifteen items, designed to measure participants' confidence in their ability to participate in engineering activities, were included in both the pre- and post-UNITE questionnaires. The items reflect the skills and abilities that the Accreditation Board for Engineering and Technology (ABET) has determined critical to engineering[9]. The items measure students' confidence in their skills and abilities in applying STEM to solve real-world problems, in engineering practices, and in collaboration and teamwork. Students responded on a 6-point scale of 1 = "Very Untrue of Me" to 6 = "Very True of Me."

Confidence to apply STEM to real world problems. Charts 3 and 4 on the next page summarize pre- and post-UNITE responses to items that elicited students' confidence to apply math, science, and engineering principles to solve real world problems. Across all three categories, the proportions of students claiming the statement is "true of me" or "very true of me" increased, with the largest increase observed in their confidence to apply engineering principles to solve problems. These data may suggest growth in students' perceptions of confidence to apply STEM principles from pre- to post-UNITE.

[9] The Accreditation Board for Engineering and Technology (ABET) is nonprofit, non-governmental organization responsible for accrediting college and university programs in applied science, computing, engineering, and engineering technology. The UNITE assessment tool items designed to measure confidence and ability necessary for engineering are informed by the student outcome criteria laid out in ABET's "Criteria for Accrediting Engineering Programs, 2011-2012" (http://www.abet.org/DisplayTemplates/DocsHandbook.aspx?id=3139).

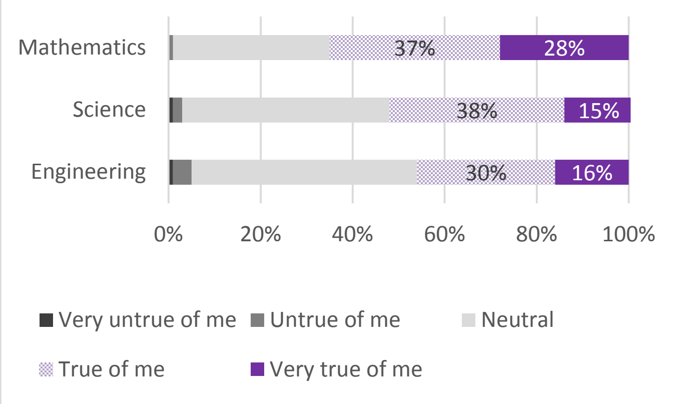


Chart 21: Confidence to Apply STEM to Solve Problems, pre-UNITE (n =148-149)

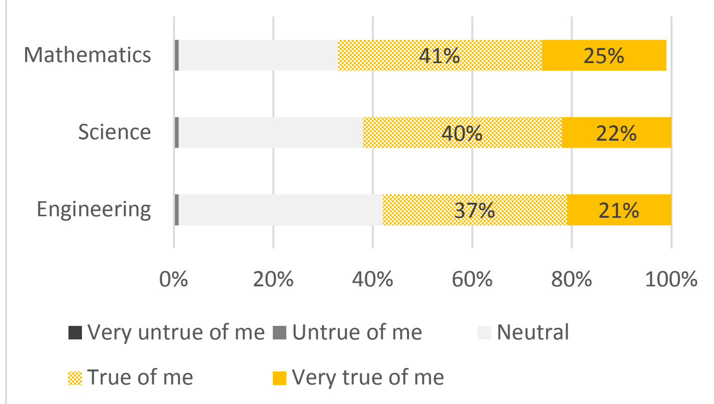


Chart 22: Confidence to Apply STEM to Solve Problems, post-UNITE (n =134-135)

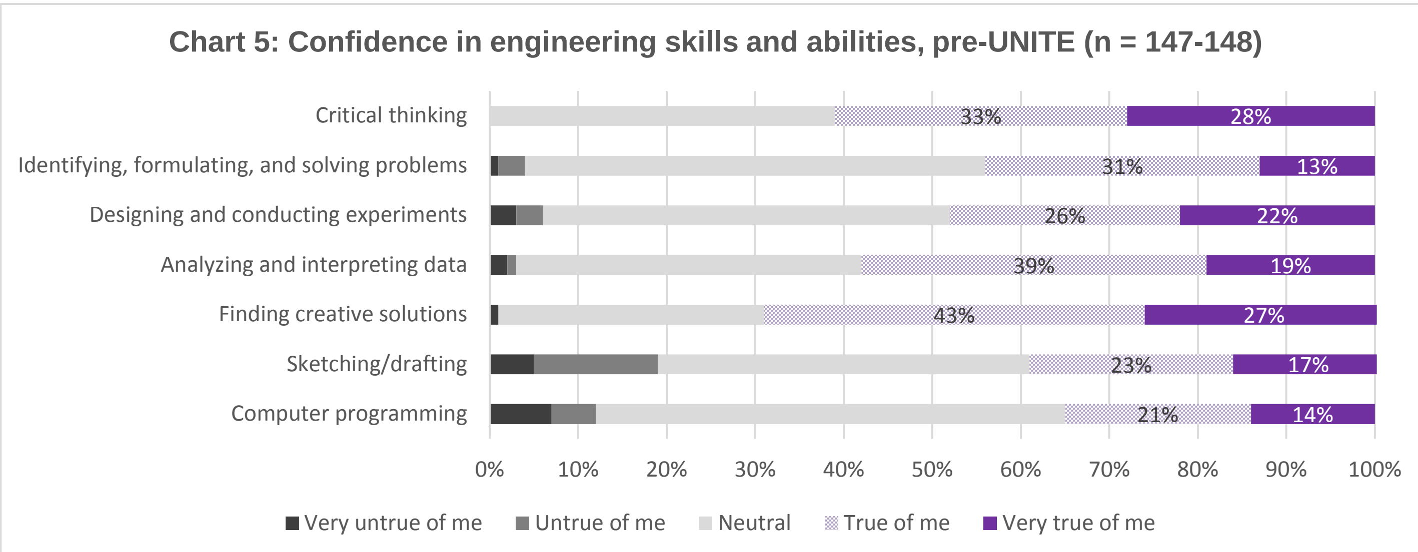
Table 12. Confidence to apply STEM to solve problems, matched cases pre- to post-UNITE

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my ability to apply Mathematics to solve real world problems.	4.90 (.90)	4.81 (.96)	98	**-.092**	.953	.344	-.097
I am confident in my ability to apply Science to solve real world problems.	4.64 (.96)	4.75 (.86)	96	**.115**	.893	.212	.129
I am confident in my ability to apply Engineering principles to solve real world problems.	4.49 (1.04)	4.68 (.97)	98	**.194**	1.109	.088	.175

Table 12 reveals, however, that the small changes in students' pre- to post-UNITE confidence are not generally not significant in the program-wide comparison of matched cases. The pre- to post-UNITE change in confidence to apply engineering to solve real world problems approaches significance with a very weak, not substantially important effect.[10] When looking at confidence to apply engineering to real world problem at specific sites, we find significant differences with moderately strong to strong effects for the students at ASU[11] and CCNY,[12] respectively. At ASU, students learned and applied foundational engineering principles as they relate to the engineering industry through a hands-on, kit- and computer-based curriculum. At CCNY, students learned and applied fundamental engineering design principles through a competition-oriented robotics class.

[10] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = .194, p = .088, d = 0.175 very weak effect
[11] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = .583, p = 0.046, d = .648 moderate effect
[12] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = .500, p = 0.033, d = .935 strong effect

Confidence in engineering skills and abilities. Students' pre- to post-UNITE confidence in six skills and/or abilities needed in engineering are summarized in Charts 5 and 6. The proportions of students claiming the statement is "true of me" or "very true of me" increased across all seven skills and/or abilities, with the strongest increase in their confidence to apply engineering principles to solve problems. These data suggest growth in students' perceptions of confidence in their engineering skills and abilities from pre- to post-UNITE, with the largest change in abilities to identify, formulate, and solve problems, and the smallest change in ability to find creative solutions to problems.



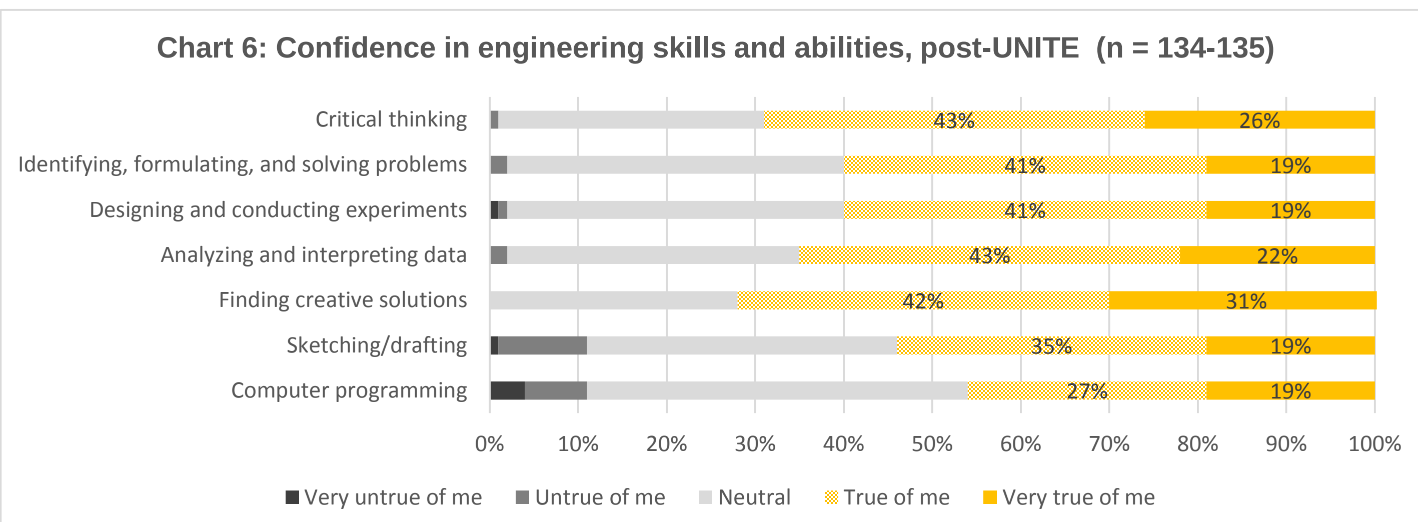


Table 13 summarizes the pre- to post-UNITE comparison of confidence in engineering skills and abilities for the program-wide matched cases. These data indicate high confidence levels before and after participating in the UNITE program, with significant change in two items at the program level and a third item at the site level. First, students do have significantly higher levels of confidence for identifying, formulating, and solving engineering problems, but the effect is very weak.[13] Looking at sites we find significantly higher confidence with a strong effect for students at CCNY.[14] Second, the comparison of matched cases also reveals significantly higher levels of confidence with sketching/drafting with a weak effect.[15] ASU's students contribute to this finding, showing significant perceptions of growth on this item from pre-post with a moderately strong effect.[16] ASU's Engineering Laboratory course utilized drafting software such as CAD®. Third, the matched cases comparison of confidence in computer programming skills approaches significance and with a very weak effect at the site-level[17] Differences in ASU and CCNY students' confidence in computer programming approach statistical significance with moderately strong effects.[18] ASU's Engineering Laboratory course engaged students in computer programming with software like LEGO Mindstorm® and LabView® for engineering applications. CCNY's robotics course had similar computer programming component, but specific software are not mentioned in the site program report.

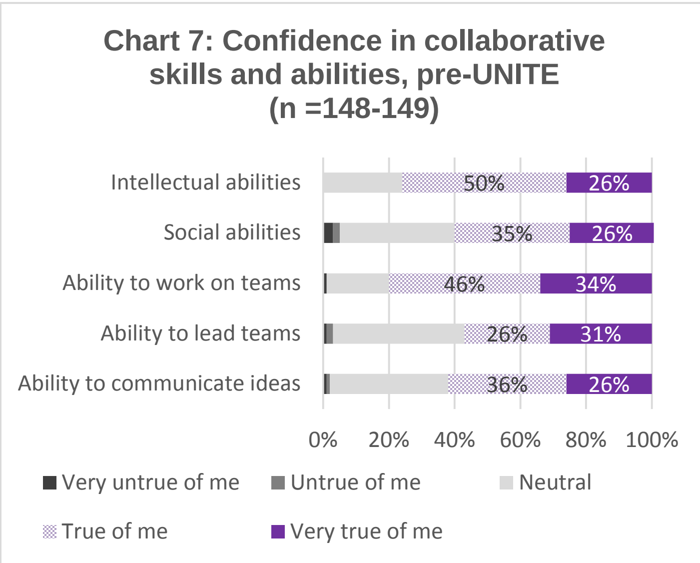
Table 13. Confidence in engineering skills and abilities, matched cases pre- to post-UNITE

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my critical thinking skills.	4.93 (.84)	4.95 (.79)	98	**.020**	.812	.804	.025
I am confident that I can find creative solutions to problems.	5.01 (.82)	5.01 (.82)	97	**.000**	.854	1.00	.000
I am confident that I can identify, formulate, and solve engineering problems.	4.44 (1.06)	4.67 (.97)	97	**.227***	.984	.026	.231
I am confident that I can design and conduct meaningful experiments.	4.60 (1.12)	4.70 (.91)	98	**.102**	.902	.266	.113
I am confident that I can effectively analyze and interpret data.	4.68 (1.06)	4.77 (.95)	98	**.082**	1.002	.422	.082
I am confident that I can find creative solutions to problems.	5.01 (.82)	5.01 (.82)	97	**.000**	.854	1.00	.000
I am confident in my sketching/drafting skills.	4.04 (1.41)	4.43 (1.23)	98	**.388***	1.118	.001	.347
I am confident in my computer programming skills.	4.21 (1.26)	4.39 (1.20)	97	**.186**	1.064	.090	.175

Confidence in collaborative skills and abilities. Charts 7 and 8 summarize students' confidence with their collaborative skills and abilities pre- and post-UNITE, respectively. Across all but one item the proportions of students' claiming the statement is "true of me" or "very true of me" increased, with the largest increases in confidence around social abilities

13 $p < 0.05$ with paired samples t test (two tailed);Mean Diff. = .227, $p = .026$, $d = .231$, very weak effect
14 $p < 0.05$ with paired samples t test (two tailed); Mean Diff = .625, $p = 0.049$, $d = .840$, strong effect
15 $p < 0.05$ with paired samples t test (two tailed); Mean Diff = .388, $p = .001$, $d = .347$, weak effect
16 $p < 0.05$ with paired samples t test (two tailed); Mean Diff = 1.00, $p = 0.26$, $d = .742$, moderate effect
17 $p < 0.05$ with paired samples t test (two tailed); Mean Diff = .186, $p = .090$, $d = 0.175$, very weak effect
18 $p < 0.05$ with paired samples t test (two tailed); ASU: Mean Diff = .375, $p = .080$, $d = .724$, moderate effect; CCNY: Mean Diff = .625, $p = .095$, $d = .682$, moderate effect

and abilities to lead teams. Although a smaller proportion of students were confident in their ability to work on teams after UNITE, these data generally suggest growth in students' perceptions of confidence in their collaborative skills from pre- to post-UNITE.



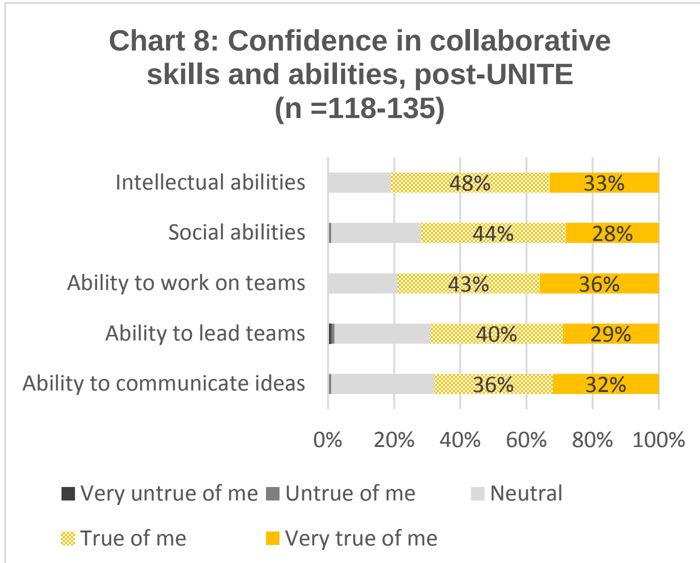


Table 14. Confidence in collaborative skills and abilities., matched cases pre- to post-UNITE

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my intellectual abilities	5.10 (.71)	5.14 (.80)	97	**.041**	.789	.608	.052
I am confident in my social abilities	4.74 (1.15)	4.98 (.91)	97	**.237***	.899	.012	.264
I am confident in my ability to lead teams	4.80 (1.17)	4.93 (1.00)	97	**.124**	.869	.164	.143
I am confident in my abilities to work on teams	5.12 (.84)	5.15 (.82)	78	**-.038**	.829	.684	-.046
I am confident when I communicate my ideas to other people	4.82 (1.10)	4.92 (.98)	98	**.102**	.914	.272	.112

Table 14 summarizes the pre- to post-UNITE comparison of students' confidence in their skills and abilities to collaborate. For four of the five skills and abilities, student confidence does not change significantly from pre- to post-UNITE. Student confidence in social abilities, however, does increase significantly from pre- to post-UNITE and the effect is weak.[19] Students at Texas Southern University (TSU) contributed this finding, showing significant growth in their perceptions of social abilities with a weak effect.[20] The TSU program report suggested that student are encouraged to share their aspirations with the group, receive regular "pep talks" about their STEM futures, have opportunities to individually defend their answers in front of the class, and work as a team to explore and debate alternative energy sources. Any of these activities, and other contextual factors, could contribute to this growth. In addition, while there is no significant change at

[19] $p < 0.05$ with paired samples t test (two tailed); (Mean Diff. = .237, p = .006, d = .264, weak effect
[20] $p < 0.05$ with paired samples t test (two tailed);Mean Diff = .393, p = .032, d = .429, weak effect

the program level, students at CCNY showed significantly large growth in students' confidence in their abilities to work on teams.[21] This is not surprising given the daily emphasis on collaboration and teamwork for the design and building of the robot, as well as team and inter-team strategizing for the weekly robot soccer competition. It is noteworthy that students at four sites exhibited declining perceptions of confidence, albeit not significant, in one or more of these five skills and abilities.

Students entered and left UNITE with high levels of confidence in their skills and abilities, with limited evidence of significant growth across the UNITE program. Significant growth was evident for each of six different confidence items at no more than one or two sites: ability to apply engineering principles to solve real world problems (ASU and CCNY); identifying, formulating, and solving engineering problems (program, CCNY); sketching/drafting skills (program, ASU); computer programming skills (ASU and CCNY); social abilities (program, TSU); and abilities to work on teams (CCNY). Most often, this change appeared to relate to a major feature of a site's specific program activities that target the particular skill or ability.

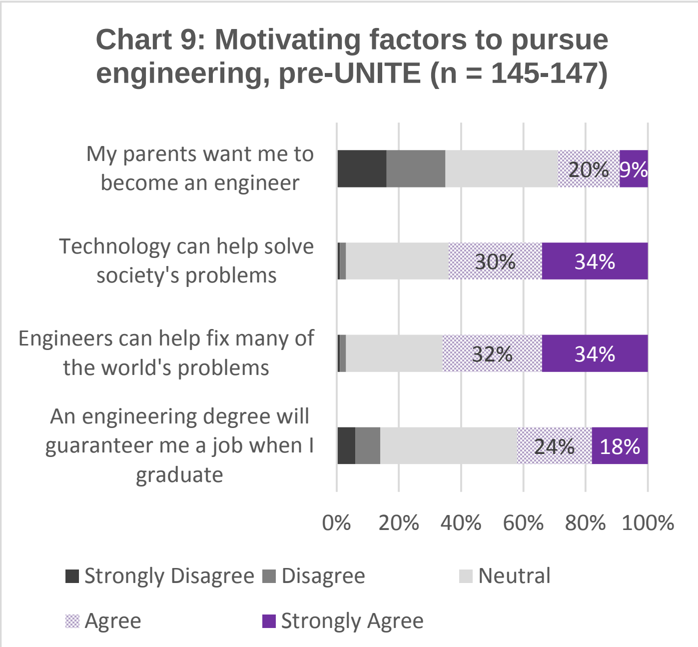
Attitudes toward STEM

Eleven items in the pre- and post-UNITE questionnaires measured students' attitudes toward engineering activities.[22] The items measured motivating factors to pursue engineering, perceived importance of knowledge and skills, and disengagement during STEM courses. Students responded on a 6-point scale of 1 = "Strongly Disagree" to 6 = "Strongly Agree." These items address UNITE Objective 4—Remove social barriers and negative attitudes about engineering.

[21] $p < 0.05$ with paired samples t test (two tailed);Mean Diff = .625, $p = .049$, $d = .840$, strong effect

[22] Eris, Chen, Bailey, Engerman, Loshbaugh, Griffin, Lichtenstein, & Cole, 2005; http://papers.asee.org/conferences/paper-view.cfm?id+21365.

Motivating factors to pursue engineering. Charts 9 and 10 summarize pre- and post-UNITE data for four factors potentially motivating students' to pursue engineering. All four factors appear to become slightly more motivating to students after participating in UNITE, with the largest change in the proportion of students agreeing that engineers' help fix the world's problems.



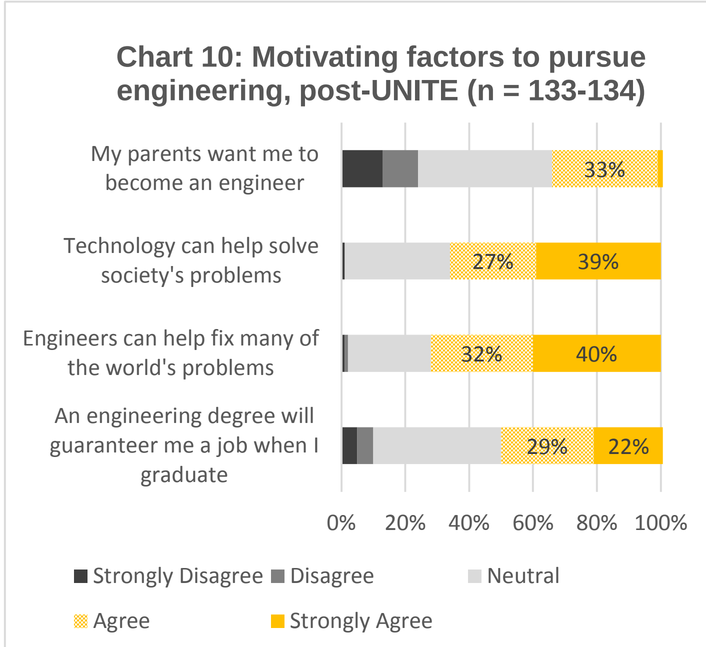


Table 15. Motivating factors to pursue engineering, matched cases pre- to post-UNITE

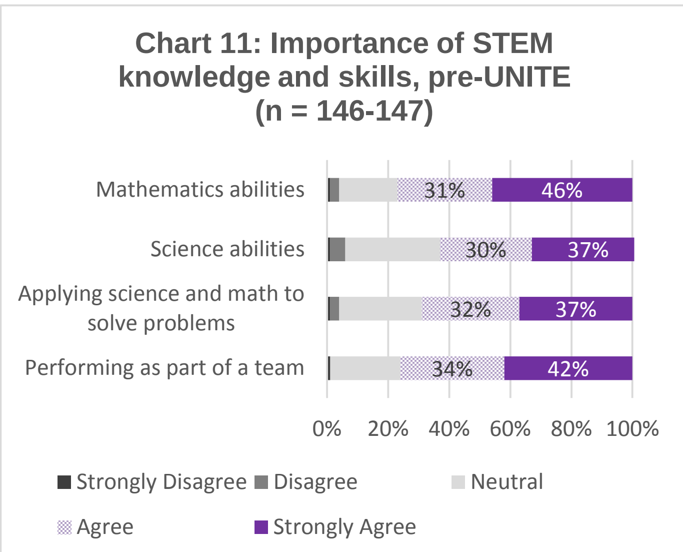
Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
My parents want me to become an engineer.	3.70 (1.64)	3.79 (1.45)	96	**.094**	1.067	.392	.088
Technology can help solve society's problems.	4.89 (1.12)	4.94 (.95)	96	**.052**	.977	.604	.053
Engineers can help fix many of the world's problems.	4.93 (1.15)	4.99 (1.02)	96	**.063**	1.113	.584	.057
An engineering degree will guarantee me a job when I graduate.	4.40 (1.24)	4.51 (1.24)	96	**.115**	1.213	.358	.095

However, the comparison of matched cases pre- to post-UNITE shown in Table 15 reveal there were no significant changes on any of these items at the program level. Table 15 indicates that UNITE students generally agree with all of the statements except that their parents want them to become an engineer. They generally reported the same level of agreement after UNITE. Looking at site-level pre- to post-UNITE comparisons reveal significantly large increases in two motivating factors for Jackson State UNITE students: Engineers' role in fixing world's problems[23] and the guarantee of a

[23] $p < 0.05$ with paired samples t test (two tailed); Mean Diff = 1.00, $p = .002$, $d = 1.172$, very strong effect

job after graduation.[24] In the Jackson State University (JSU) UNITE program, the principles of math and science were applied to real-world engineering applications, with opportunities for students to learn more about related engineering careers from Army and private sector civil engineering professionals.

Perceived importance of STEM knowledge and skills. Students' pre- and post-UNITE perceptions of the importance of critical STEM knowledge and skills are summarized in Charts 11 and 12. Most UNITE students agreed that engineering knowledge and skills are important before they participate in the program and a slightly higher proportion agrees after UNITE that mathematics abilities and performing as a team are important.



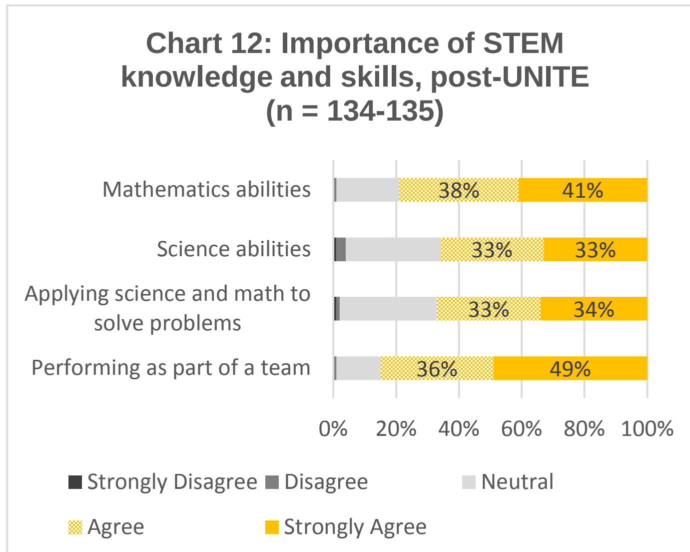


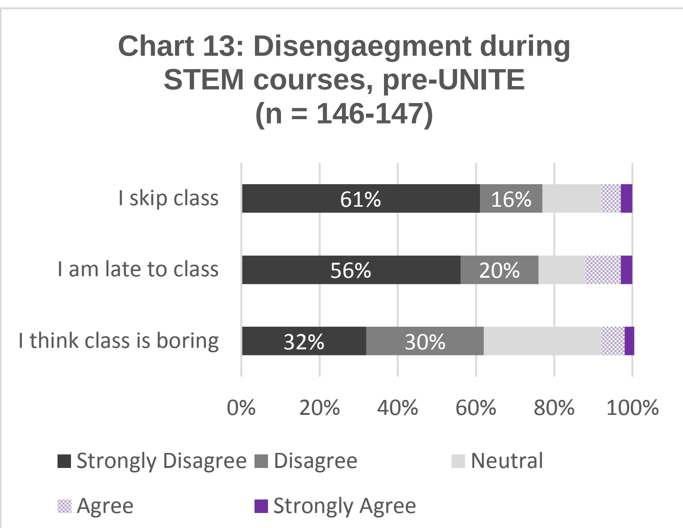
Table 16. Importance of STEM knowledge and skills, matched cases pre- to post-UNITE

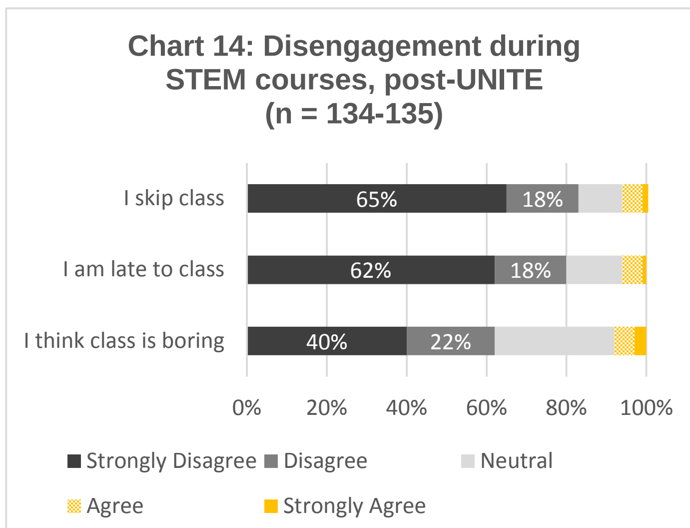
Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
Having strong Mathematics abilities is very important to me.	5.11 (1.08)	5.06 (.92)	96	**-.052**	.944	.590	-.055
My Science abilities are very important to my success.	4.94 (1.07)	4.75 (1.14)	96	**-.188**	.955	.058	-.197
It is very important that I can apply Science and Math to solve real-world problems.	5.01 (1.12)	4.84 (1.04)	97	**-.175***	.829	.040	-.211
It is important that I can effectively perform as part of a team.	5.16 (.95)	5.27 (.81)	97	**.103**	.848	.234	.121

[24] $p < 0.05$ with paired samples t test (two tailed);Mean Diff = .833, p = .017, d = .809, strong effect

The program level comparison of matched cases shown in Table 16 suggests that that student beliefs generally do not differ significantly from pre- to post-UNITE. But more careful examination of site-level matched cases reveal findings of interest.

JSU students had weak but significant growth in perceptions of importance of effectively performing as part of a team.[25] For each of the other three items, students at one or more sites showed significant decline in perceptions of the importance of mathematics and science abilities. First, student beliefs about the importance of strong math abilities did not significantly differ from pre- to post-UNITE. Yet at the site level, NJIT students showed very strong, significant decline in their beliefs about the importance of their mathematics abilities.[26] Second, decline in student beliefs about the importance of their science abilities approached significance at the program level, though the effect is very weak.[27] Site-level data revealed significant decline in perceptions of importance of science abilities at SDSMT,[28] NJIT,[29] and MTU,[30] showing moderately strong to strong effect. Similarly, student beliefs about the importance of their ability to apply science and math to solve real world problems[31] decreased significantly from pre- to post-UNITE, but the effect is very weak. SDSMT students, however, showed moderately strong, significant decline in perceptions of importance in applying science and mathematics to solving real world problems.[32] There is not enough detail about the specific coursework or curricula to explain these findings, but the extent to which coursework or curricula help students develop and apply mathematics and science principles in service of solving engineering problems should be considered further.





[25] $p < 0.05$ with paired samples t test (two tailed);Mean Diff. = .583, $p = .046$, $d = .648$, moderate effect
[26] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = -.667, $p = .005$, $d = -1.025$, very strong effect
[27] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = -.188, $p = .029$, $d = -.197$, very weak effect
[28] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = -643, $p = .045$, $d = -.594$, moderate effect
[29] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = -.333, $p = .039$, $d = -.677$, moderate effect
[30] $p < 0.05$ with paired samples t test (two tailed);Mean Diff. = -.600, $p = .005$, $d = -1.163$, very strong effect
[31] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = -.175, $p = .020$, $d = -.211$, very weak effect
[32] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = -.714, $p = .027$, $d = -.668$, moderate effect

Disengagement during STEM classes. Charts 13 and 14 summarize student agreement with three behaviors characteristic of disengagement. These data suggest that most students disagreed that they exhibit behaviors related to disengagement in STEM courses before UNITE, and a greater proportion of students disagreed after UNITE. The comparison of matched cases summarized in Table 16 reveal that students do not become significantly more or less disengaged after participating in UNITE.

Table 16. Disengagement in STEM courses, matched cases pre- to post-UNITE							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
Sometimes I skip math, science, or engineering classes.	1.62 (1.13)	1.63 (1.13)	95	**.011**	1.325	.938	.008
I am often late to math, science, or engineering classes.	1.79 (1.30)	1.68 (1.14)	97	**-.113**	1.554	.474	.073
I think math, science, and engineering classes are boring.	2.36 (1.36)	2.36 (1.42)	96	**.000**	1.407	1.00	.000

Taken together, students started UNITE with positive attitudes toward engineering and, while some students' exhibited growth and others decline, generally students' motivation, perceptions of importance, and engagement were maintained across the UNITE program. Students at JSU showed moderately large to very large significant growth in their motivations to pursue engineering and in perceived importance of working on teams. Some students showed moderately large to very large decline in their perceptions of the importance of mathematics abilities (NJIT), science abilities (MTU, NJIT, and SDSMT), and applying science and mathematics to solving real work problems (program, SDSMT).

Future STEM Learning

The pre- and post-UNITE questionnaires included items to measure the extent to which participants identified with engineering and have identified pathways to engineering. In addition, two items measured students' educational goals and their confidence to achieve these goals. Finally, students were asked to report the field of STEM they want to pursue. These outcome measures correspond with the following UNITE Objectives:

- Objective 3—Inspire participants to consider engineering majors in college; and,
- Objective 7—Increase the number of STEM graduates to fill the projected shortfall of scientists and engineers in national and DoD careers.

Engineering pathways. Eight items were used to measure the extent to which students identify with engineering and have pathways and support systems for their engineering pursuits. The content of these items include key factors of the cultural connections and identity construction that have been noted as best practices in STEM outreach to historically underserved populations. Change in pre- to post-UNITE responses to these items are intended to serve as a metric of the extent to which UNITE influences student exposure and intentions to pursue engineering. The matched cases comparison is summarized in Table 19. Students responded on a 6-point scale of 1 = "Strongly Disagree" to 6 = "Strongly Agree."

Table 19. Confidence to achieve educational goals, matched cases pre- to post-UNITE

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I personally know at least one college student who is majoring in engineering.	4.14 (1.61)	4.37 (1.52)	98	**.224**	1.396	.116	.160
I personally know at least one working engineer.	4.29 (1.65)	4.51 (1.59)	96	**.219***	1.078	.050	.203
I know what high school classes I need to take so I am ready to be an engineering major in college.	4.12 (1.47)	4.18 (1.31)	98	**.061**	1.299	.642	.047
I am going to major in engineering in college.	3.80 (1.60)	3.82 (1.52)	97	**.021**	1.207	.868	.017
I am aware of several kinds of engineering majors that are available to me.	4.49 (1.52)	4.77 (1.31)	97	**.278***	1.078	.014	.258
I am going to work in engineering for my career.	3.71 (1.54)	3.79 (1.46)	98	**.071**	1.254	.574	.057
I am aware of several professional engineering societies.	3.83 (1.59)	4.10 (1.43)	98	**.276***	1.266	.034	.218
I think that I will become a member of a professional engineering society someday.	3.60 (1.59)	3.57 (1.37)	97	**-.031**	1.303	.816	-.024

From Table 19, after participating in UNITE students had significantly higher agreement with three engineering exposure items: that they know at least one working engineer, that they are aware of several kinds of engineering majors that are available to them, and that they are aware of several professional engineering societies. All of these changes, while significant, are very small to small in effect size. Student responses do not significantly change for any of the intentions to pursue engineering from pre-UNITE to post-UNITE, which is consistent with other findings (see STEM Fields below).

Site-level data reveal potentially more growth areas. Students at MTU and JSU had significant increases and with moderate to strong effect in their knowledge of at least one college student who is majoring in engineering.[33] MTU's program, for example, incorporated 50 university students as mentors to UNITE program students which may influence the large difference from pre- to post-UNITE. JSU and TSU students also showed growth in their knowledge of at least one working engineer.[34] TSU's program report mentioned that engineers who spoke for career days were from race/ethnic minority groups, so not only did TSU UNITE students meet engineers, but they met engineers with diverse demographic characteristics—a potential motivator for reducing stereotypes and increasing students' persistence in STEM. Students at CCNY experienced growth in their awareness of engineering majors, perhaps related to multi-pronged approach to career awareness, that included opportunities to learn about research conducted by students at CCNY and at the City University of New York.[35] ASU's UNITE students showed a moderately large increase in awareness of professional engineering

[33] $p < 0.05$ with paired samples t test (two tailed); JSU: Mean Diff. = 1.077, p = .020, d = .747; MTU: Mean Diff. = .800, p = .037, d = .774

[34] $p < 0.05$ with paired samples t test (two tailed); JSU: Mean Diff. = .769, p = .026, d = .704; TSU: Mean Diff. = .464, p = .017, d = .482

[35] $p < 0.05$ with paired samples t test (two tailed); Mean Diff. = 744, p = .0249 d = .840

societies that approaches significance.[36] ASU and MTU UNITE students exhibited large and significant gains in their intent to work in engineering.[37] ASU and JSU UNITE students also had moderately higher, nearly significant, inclination to join a professional engineering society.[38]

Educational goals. Pre- and post-UNITE questionnaires elicited students' intent to pursue STEM education in the future. Chart 15 summarizes student responses. All (100%) UNITE students intend to pursue a college degree, and a clear majority intend to pursue a STEM degree.

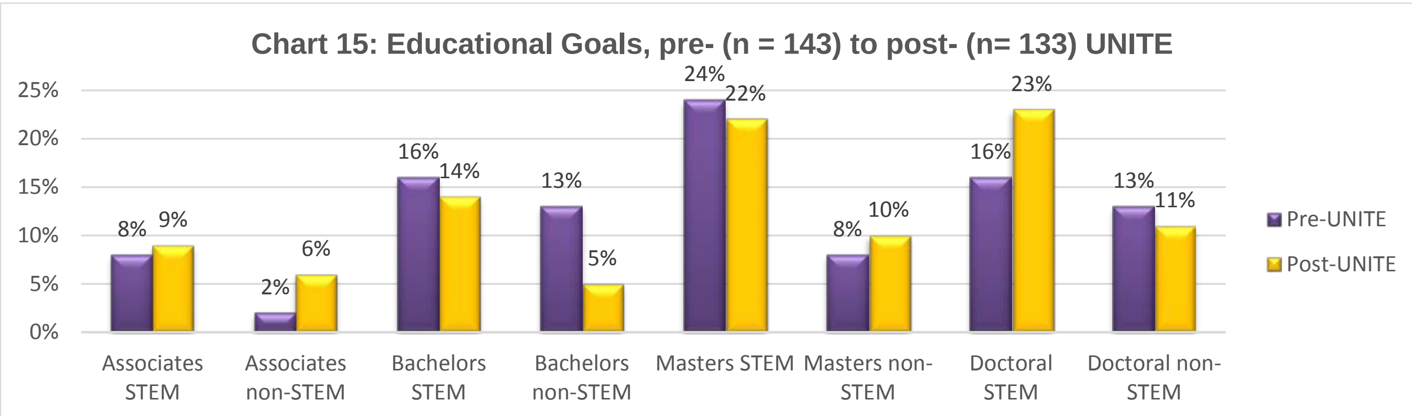


Table 17. Educational goals, matched cases pre- to post-UNITE

	Pre-UNITE % (SD)	Post-UNITE % (SD)	n	Diff.	*p*
STEM-related degrees	64.8% (.479)	68.4% (.467)	95	**3.6%**	1.00
Associates Non-STEM	2.1% (.143)	6.0% (.239)	95	**3.9%***	.031
Associates in STEM	7.6% (.266)	9.0% (.286)	95	**1.4%**	1.00
Bachelors Non-STEM	12.4% (.331)	5.3% (.224)	95	**-7.2%***	.021
Bachelor in STEM	15.9% (.367)	14.3% (.351)	95	**-1.6%**	.454
Masters Non-STEM	8.3% (.276)	9.8% (.298)	95	**1.5%**	.289
Masters in STEM	24.8% (.434)	21.8% (.414)	95	**-3.0%**	1.00
Doctorate Non-STEM	12.4% (.331)	10.5% (.308)	95	**-1.9%**	1.00
Doctorate in STEM	16.6% (.373)	23.3% (.424)	95	**6.8%**	.581

The pre- to post-UNITE comparison of matched cases reveals that the proportion of students who plan to pursue STEM-related degrees did not change significantly over the course of the UNITE program. The proportion of students who plan to pursue non-STEM associate's degrees increased significantly over the course of UNITE[39] while the proportion of students who plan to pursue non-STEM bachelor's degrees decreased significantly over the course of UNITE.[40] The proportion of students' intending to pursue a doctorate degree in STEM does increase, but the change is not significant.

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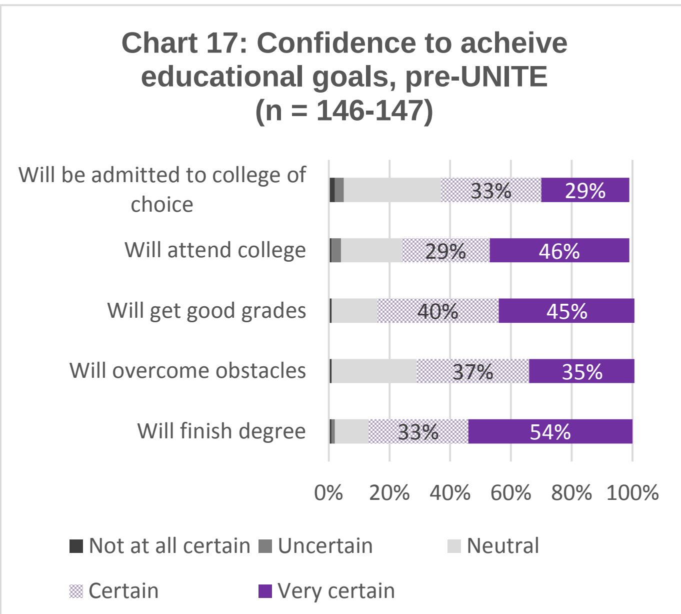
[36] $p < 0.05$ with paired samples t test (two tailed); Mean Diff = .917, $p = .076$, $d = .566$
[37] $p < 0.05$ with paired samples t test (two tailed); ASU:Mean Diff. = .833, $p = .010$, $d = .889$; MTU: Mean Diff. = .800, $p = .037$, $d = .774$
[38] $p < 0.05$ with paired samples t test (two tailed); ASU: Mean Diff. = .667, $p = .087$, $d = .542$; JSU: Mean Diff. = .692, $p = .095$, $d = .503$
[39] $p < 0.05$ with McNemar binomial test of significance for matched cases (two-tailed); Diff. = 3.9%, p. = .031
[40] $p < 0.05$ with McNemar binomial test of significance for matched cases (two-tailed); Diff. = -7.2%, $p = .021$

Confidence to achieve goals. UNITE students were asked how certain they are that they will achieve their education goals on a 6-point scale of 1 = "Not at All Certain" to 6 = "Very Certain." Charts 17 and 18 summarize pre- and post-UNITE perceptions. On all items more than 60% of students claimed to be certain or very certain. Students were most certain (87%) that they will attain their ultimate education goal—a degree. Students were least certain (62% pre-UNITE, 64% post-UNITE) they will be admitted to the college and their program of choice. The pre- to post-UNITE comparison of matched cases shown in Table 18 suggests that students' certainty in achieving their educational goals does not significantly change.



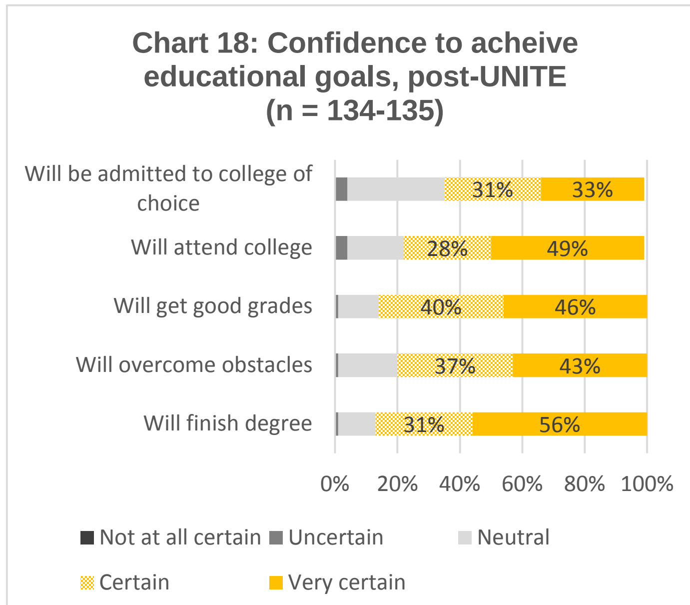
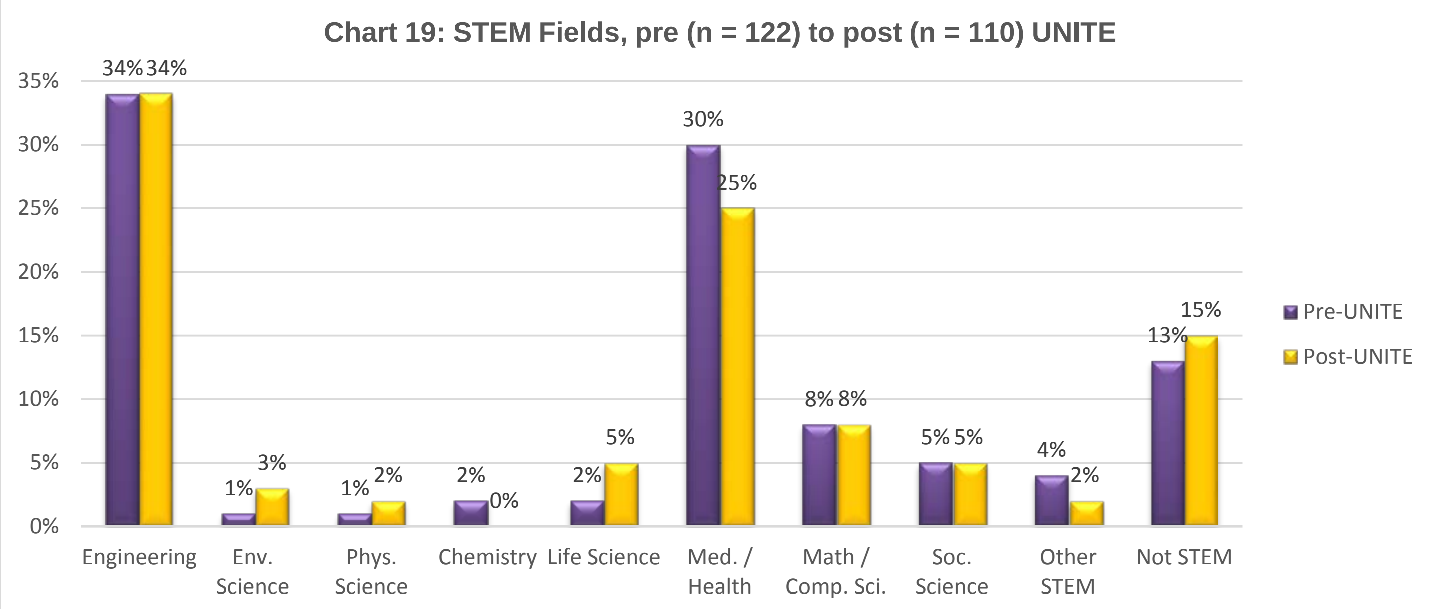


Table 18. Confidence to achieve educational goals, matched cases pre- to post-UNITE

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will be admitted to my college and program of choice	4.87 (1.12)	4.85 (1.06)	97	**-.021**	.946	.831	-.022
I will attend college to pursue this educational degree	5.07 (1.20)	5.17 (1.02)	96	**.094**	1.206	.448	.078
I will get good grades in my classes	5.38 (.79)	5.36 (.76)	96	**-.010**	.888	.909	-.011
I will be able to overcome any obstacle between me and this educational degree	5.11 (.94)	5.22 (.82)	96	**.104**	1.021	.320	.102
I will finish this degree	5.38 (.93)	5.38 (.81)	96	**.000**	1.066	1.00	.000

Pursuit of STEM fields. The pre- and post-UNITE student questionnaires asked students to report which STEM field they would like to pursue. Student responses are summarized in Chart 19.

The majority of UNITE students (87% pre-UNITE, 85% post-UNITE) indicated their intent to pursue a career in a STEM field. More students intended to pursue careers in engineering than any other field, with medicine/health being the next most frequently reported field. The comparison of pre- to post-UNITE matched cases reveals that no significant changes occurred in students' field of interest from pre- to post-UNITE (see Appendix D).



Overall, UNITE exposed students to engineering pathways but students' intent to pursue STEM education and careers were virtually unchanged from pre- to post-UNITE. Data suggest significant improvement in some students' knowledge of engineering students (JSU and MTU), professionals (program, JSU and TSU), majors (program, CCNY), and professional societies (program, ASU) and intent to join a professional engineering society (ASU and JSU) and work in engineering (ASU and MTU). Students began and ended UNITE with relatively high educational goals and confidence to achieve those goals. High percentages of UNITE students intend to pursue and achieve STEM-related degrees, and their intentions were sustained throughout the UNITE program (64.8% pre- and 68.4% post-UNITE). Students entered UNITE with an ideas of the field that they intend to pursue and UNITE served to sustain existing interests rather than inspire interest in any new fields about which they have learned. Most frequently, students were interested in engineering (33.6% pre- and 34.4% post-UNITE) or medicine (29.5% pre- and 25.4% post-UNITE).

Army STEM

Army Educational Outreach Programs

- Junior Solar Sprint (JSS)
- Gains in Mathematics and Science Education (GEMS)
- West Point Bridge Design Competition (WPBDC)
- eCYBERMISSION (eCM)
- High School Apprenticeship Program (HSAP)
- Research and Engineering Apprenticeship Program (REAP)
- Science and Engineering Apprentice Program (SEAP)
- Undergraduate Research Apprenticeship Program (URAP)
- College Qualified Leaders (CQL)

AEOP Opportunities. The evaluation measured students' self-reported awareness and interest in participating in AEOP opportunities after participating in UNITE.

Student questionnaires elicited past participation in other AEOP programs that students may have been exposed to in or outside of school. A very small number of students had participated in Junior Solar Sprint (1% of 153), eCYBERMISSION (1% of 155), and West Point Bridge Design Competition (3% of 155). Similarly, only 1 student interviewee had participated in an AEOP in the past and no more than three student interviewees across the focus group sample have awareness of any given AEOP initiative. Student interviewees received AEOP promotional materials, such as the brochure and the Rite in the Rain notebooks, but generally could not name, or recognize when named, AEOP initiatives.

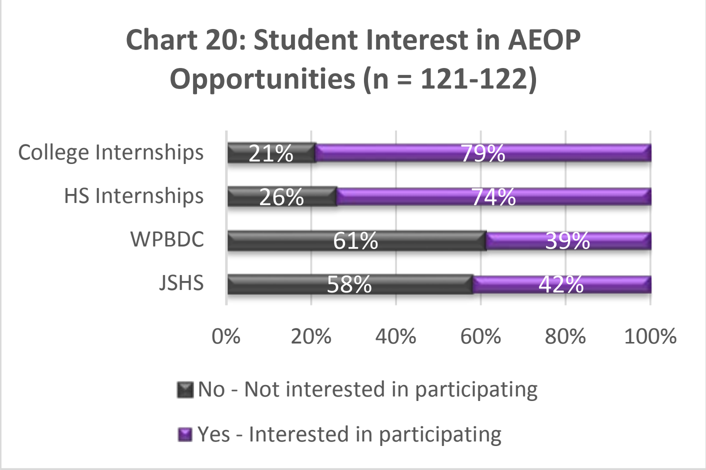


Chart 20 summarizes students' post-UNITE interest in other AEOP opportunities, given brief descriptions of each opportunity in the questionnaire item. A majority of students were not interested in participating in competition programs (61% WPBDC, 58% JSHS), but a substantial number of students still expressed interest. Most students expressed interest in high school apprenticeship programs (74%)—REAP, SEAP, and HSAP—and in college apprenticeship programs (79%)—CQL and URAP. Of 119 respondents, 83% expressed interest in participating in a REAP apprenticeship at the UNITE host site.

Focus groups and past participation rates suggest that students may be largely unaware of other AEOP initiatives. Focus groups with students and mentors also suggest that students may not be consistently learning about the full array of future AEOP opportunities from their mentors. Yet, substantial student interest exists in AEOP opportunities.

Army/DoD STEM jobs and careers. Two items in the post-UNITE questionnaire measured the extent to which participants perceive they learned about STEM jobs in general, and specifically, STEM careers within Army/DoD. Chart 21 summarizes students' learning about STEM and Army/DoD STEM jobs during UNITE. Charts 22 and 23 summarize students' pre- and post-UNITE intent to pursue STEM and Army/DoD STEM jobs.

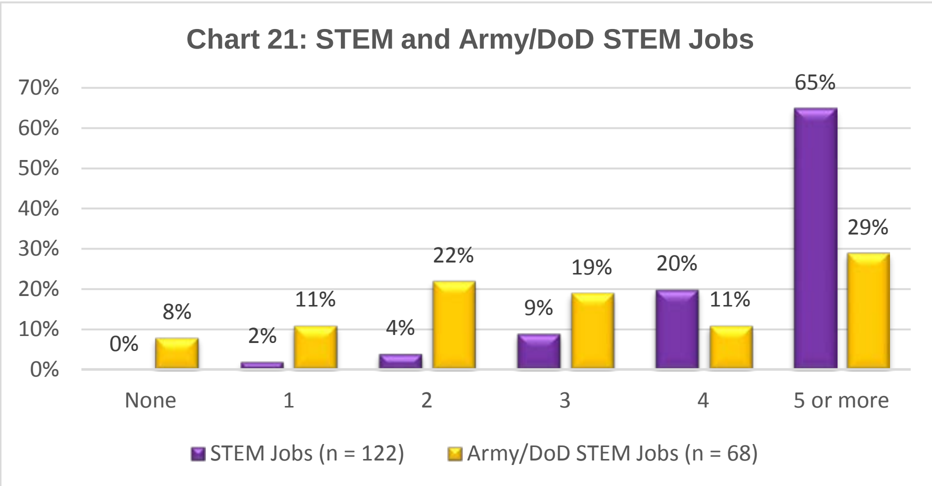
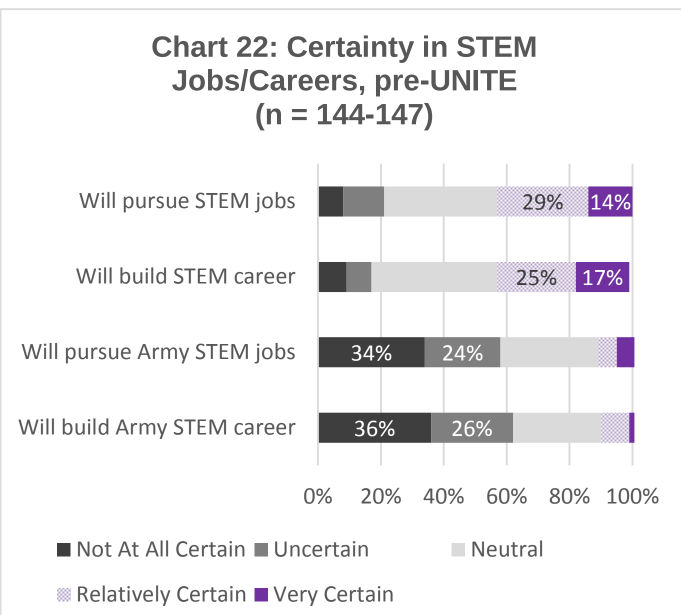


Chart 21 illustrates that all students have opportunities to learn about STEM jobs during UNITE. Most students learned about multiple STEM jobs. However, Army/DoD STM jobs received less attention that STEM jobs, and a small proportion of students reported no exposure to Army/DoD STEM jobs. The data suggest that on average, Army/DoD STEM jobs represent less than one half of the STEM jobs to which students are exposed.

Additional questions asked students about their level of certainty that they will pursue STEM and Army/DoD STEM jobs or careers. Charts 22 and 23 summarize students' pre- and post-UNITE responses, respectively. Table 20 provides the pre-to post-UNITE comparison of matched cases. Charts 22 and 23 suggest that the proportion of students that are certain about STEM careers and Army STEM careers increased from pre- to post-UNITE. The number of students who are uncertain declined from 60% pre-UNITE to nearly 40% post-UNITE.



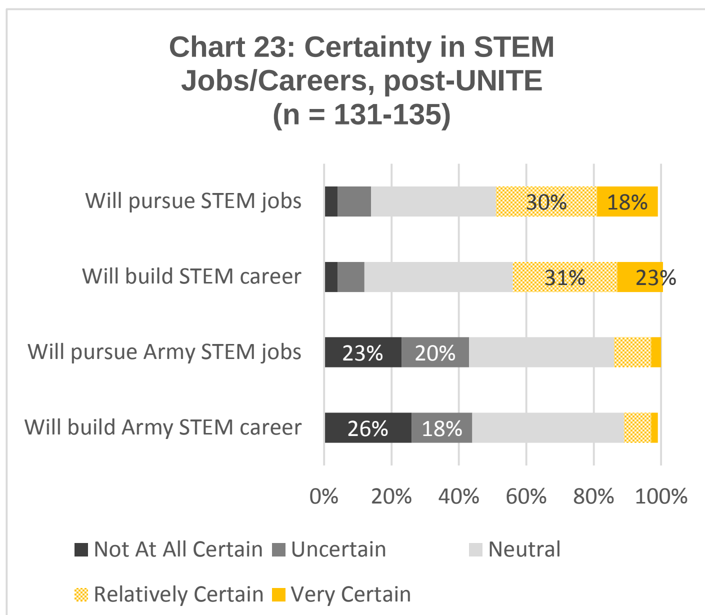


Table 20. STEM Jobs/Careers, matched cases pre- to post-UNITE							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	**Sig.**	***d***
I will apply for jobs in a STEM-related field	4.22 (1.45)	4.31 (1.30)	97	**.093**	.990	.358	.094
I will get a job in a STEM field	4.03 (1.46)	4.23 (1.33)	95	**.200***	.963	.046	.208
I will build a career around my STEM skills	4.29 (1.44)	4.43 (1.32)	93	**.140**	1.079	.216	.130
I will pursue STEM jobs within the Army	2.31 (1.39)	2.70 (1.36)	93	**.387***	1.368	.008	.283
I will build a STEM career within the Army	2.19 (1.31)	2.63 (1.34)	94	**.436***	1.160	.000	.376

Table 20 reveals that certainty to get a job in STEM significantly increased, but is very weak. Students' certainty to both pursue STEM jobs and build STEM careers with the Army increase significantly, with weak but substantive effects. Growth in ASU[41] and CCNY[42] students' certainty contributes to this finding. Table 20 suggests that UNITE's greater impact is, perhaps, in sustaining participants' existing intent to pursue and obtain STEM jobs/careers more than it inspires new interest in STEM careers, except where Army careers are concerned. Interest and intent to pursue Army STEM careers increased significantly through participation in UNITE. In order of ascending effect, ASU, TSU, JSU, CCNY, and MTU students all showed significant gains ranging from weak (e.g., at ASU)[43] to very strong (e.g., at MTU)[44] effects on students' certainty to pursue Army STEM jobs and build Army STEM careers. Appendix D provides a full summary of these site-level data.

In summary, most students learned about multiple STEM jobs during UNITE (94% learned about 3 or more jobs), but Army STEM careers get less attention (59% learned about 3 or more). However, students' interest and intent to pursue Army STEM careers showed large, significant growth through participation in UNITE (program, ASU, CCNY, JSU, MTU, and TSU), while there is more limited change (program, ASU and, CCNY) evident in students' intent to pursue STEM jobs and careers generally.

[41] $p < 0.05$ with paired samples t test (two tailed); Mean Diff = ..667, p = .025, d = .751, moderate effect
[42] $p < 0.05$ with paired samples t test (two tailed); Mean Diff: .571, p = .030, d = 1.067, strong effect
[43] $p < 0.05$ with paired samples t test (two tailed); Army jobs: Mean Diff = .387, p = .008, d = .283, weak effect; Army career: Mean Diff: .436, p = .000, d = .376, weak effect
[44] $p < 0.05$ with paired samples t test (two tailed); Army jobs: Mean Diff = .500, p = .015, d = .949 strong effect; Army career: Mean Diff = .700, p = .001, d = 1.449 very strong effect

What Participants are Saying

An overwhelming majority of students and mentors surveyed and interviewed spoke highly of their UNITE experiences. Many students and mentors encouraged expansion of UNITE to address perceived unmet local need and suggested more and better marketing for both recruitment (especially of underserved/underrepresented students in urban schools) and greater public awareness of AEOP's role in STEM education. The following quotations provide illustration of overall participant satisfaction:

Students choose to participate in UNITE:

- "I chose to participate in the STEM program at the City College of New York this summer because I enjoyed my experience with the program last year. The STEM community is very welcoming and I learned a great deal of information last year."
- "This year, I sought to participate in this educational program regarding the various STEM fields in order to further gain insight on career options and an in depth view of the types of degrees required to obtain the position. Since I am approaching the last year in high school, I want to be sure that I will be fully committed to a specific profession in the medical field and go into a field where my strength and passion lies."
- "Going into Engineering. Hope to assimilate into the type of conditioning here at city College and the work overall to develop skills before the start of freshman year of college."
- "I was interested in the robotics course since robots are playing an increasingly important role in our lives."
- "I knew that this was going to be a big start to my life and a step closer in pursuing my dream in the engineering field. I also heard that we would receive college credits for the classes and we would not have to pay anything. It was an amazing experience and if I could do it again, I definitely would."
- "I chose UNITE because I knew that it would get me ahead of the game before I enter the 10th grade."

UNITE Students would participate again if given the chance:

- "Given the chance, I would most definitely co me back to the UNITE program because it gives you a feel for what you like and don't like, the different options you have, and gives you opportunities for others to help you."
- "Yes, so far, it has been a great learning environment and very informative. When it's time to be attentive, everyone in the class listens and we work together with our groups. Thank you for the opportunity to participate."
- "YES, I would because it prepares me for college and gets keeps my mind stayed focus on the goals I need to maintain."
- "Yes, I would. It was a nice experience to learn more about the STEM field and other careers I didn't know, helped me also interact more with people, work in groups and meet great people who have surely impacted my future."
- "Yes, I would because I had an AMAZING time here while learning a lot of new things."
- "Yes, I really enjoyed my time and it was a great opportunity for me to possibly know more about a career I may want to be pursuing."
- "Given the chance, I will participate in this UNITE program again. I enjoyed it and learned so much that I did not even want it to end this soon."
- "I would because it gave me a great opportunity to meet new people and learn more about careers in STEM."
- "Yes! It's so fun and I've learned so much, and met so many interesting people. It's an honor being in this program. I honestly can say this program will take me somewhere in life."
- "Yes, I loved learning more about stuff I didn't know and getting ahead of my peers."

UNITE Mentors value what UNITE provides youth participants:

- "I think that this population that we serve that is very unique. South Dakota has a very large Native population and they have a lot of problems, including poverty, and this is a program where if we can just get them excited and get them motivated to go to college in general – hopefully we can get them involved in STEM, that would be great, but if we could JUST get them excited about the education process, and that knowledge really is powerful – and that there is a lot of good that can come of that. To that extent – this is a very successful program. That we are able to reach this traditionally hard to reach demographic and bring about some real change. Hopefully over the years this will be really impactful for them."
- "…because it's an all-female group… the ladies aren't shy to go out there and be a scientist. They are not shying away from the possibility of having a STEM career. I think the program inspires them to go forth because there aren't a lot of women with STEM careers. When we went to Picatinny, there was one woman who was giving a presentation, and it was nice to see a woman. Most of the presentations were from men. It was nice for them to see that women can do exactly what a man can do. They can do the same thing on the same level in the same structure and area. You don't have to be a teacher just because people think it's a women's job. You can go above and beyond. Break the glass ceiling. It's nice that there is a program that caters to just females."
- "We need to have programs that help kids discover engineering. They are not getting exposure to engineering in popular culture the same way they are familiar with what a doctor does, or what a lawyer does. Popular culture says that math is really hard, and that all you get to do is to be a crazy professor. We need to have more programs like these and more presentations that show the kids that it is fun, and that they could be doing this for a living. Thanks to the Army for setting the standard on that."
- "This is a group that makes up a significant portion of our population in our state, and they make up less than 2% of scientists and engineers here. Anything that encourages them to look at it and say 'you are capable of doing this. This is not outside the realm of things you can do'. 'We need you'. We need the voices of women, we need the voices of natives, and we need the voices of young people in these disciplines. The world isn't compartmentalized into little countries anymore. It's a big interconnected place and we need more voices to make the harmony sound right."
- "After they completed the program and presented their career aspirations… I thought to myself, 'this is such a diverse group, these people are going to make this world great'. They have such advanced goals for being so young. It was so exciting to hear them explain, you can see the excitement on some of their faces. You could see the passion when they spoke about what they wanted to do."
- "When we went to Picatinny, a lot of them never knew that there were so many engineering jobs to do in the Army. A lot of them were told 'you're a soldier' and didn't know there is a lot of background stuff. When I was reading their thank-you notes they were saying it was a real eye-opener because they really didn't think there were that many engineering jobs, and to see everyone have a different job, and have a specific place, and the structure… it was really nice."
- "I think the biggest thing is that they are more comfortable with pursuing different things now that they have a fundamental base. Anything they want to do now they know which pathway it is. When they came in, some of them had never played with LEGOs and so they were totally lost, but now, if they want to do something they know the tools of how to do it."

Summary of Findings

The FY13 evaluation of UNITE collected data about participants; participants' perceptions of program processes, resources, and activities; and indicators of achievement in outcomes related to AEOP and program objectives. A summary of findings is provided in Table 21.

Table 21. 2013 UNITE Evaluation Findings	
Participant Profiles	
UNITE student participation in evaluation yields high level of confidence in the findings.	• The statistical reliability achieved for the pre- and post-UNITE student questionnaires, as well as the pre- to post-UNITE matched cases, allow us to sufficiently generalize findings of the evaluation sample to the population. Additional evaluation data contribute to the overall narrative of UNITE's efforts and impact, and highlight areas for future exploration in programming and evaluation, though findings from these data are not intended to be generalized to all UNITE sites and participants.
UNITE serves students of historically underrepresented and underserved populations.	• UNITE was successful in attracting participation from female students—a population that is historically underrepresented in engineering fields. Student questionnaire respondents included more females (61%) than males (37%).
	• UNITE had success in providing outreach to students from historically underserved minority race/ethnicity and low-income groups. Student questionnaire respondents included minority students identifying as Black or African American (47%), American Indian or Alaskan Native (19%), and Hispanic or Latino (15%). Respondents most frequently reported qualifying for free or reduced lunch (47%).
	• UNITE served students across a range of school contexts. Most student questionnaire respondents attended public schools (85%) and schools in urban (36%) and rural (28%) settings, which tend to have higher numbers or proportions of underserved groups.
UNITE engages a diverse group of adult participants as STEM mentors.	• In total, 167 adults, including university faculty (39), high school and university students (84), local teachers (32), and industry STEM professionals (2), served as program mentors. Additional STEM professionals from a range of business sectors participated in career day activities.
	• At two of the sites visited by evaluators, students had access to mentors belonging to the same gender (female) and/or race/ethnicity group. In program reports, additional UNITE sites described efforts to achieve gender and race/ethnicity group diversity among program and career day mentors.
Actionable Program Evaluation	
UNITE is strongly marketed to schools and teachers serving historically underserved groups.	• Many UNITE sites employed multi-pronged efforts to market programs to and recruit students from schools and school networks identified as serving large populations of traditionally underserved students. Most frequently, UNITE sites sent a combination of email communications, printed promotional materials, and application packages to target schools, as well as participated in a variety of at-school events directed to students, parents, and STEM teachers.
	• Students most frequently learned about the local UNITE program from parents and family members (more than 28%) and from teachers and guidance counselors at

	school (more than 22%). UNITE generally found students, rather than students finding UNITE.
UNITE students are motivated by opportunities to clarify and advance their STEM pathways.	• Students were most frequently motivated to participate in UNITE to clarify and advance their STEM pathways, including: to expand understanding of a STEM field or a potential career, to develop STEM skills or gain experience with processes and tools of a STEM field, to clarify future STEM education or career goals, and to prepare for college.
UNITE mentors engage students in meaningful STEM learning, through team-based and hands-on activities.	• Mentors used a variety of mentor and/or instructional activities for productively engaging students in STEM learning.
	• Most students (61-87%) had opportunities to engage in collaborative or team-based activities at least 2-3 times per week. Differences in students' perceptions of these opportunities were detectable across the sites and plausibly relate to differences in key mentor and/or instructional activities identified from program reports.
	• Students contrasted "theoretical" and textbook-focused school STEM learning with opportunities to learn by "touching," "seeing," or "applying" STEM to real world contexts in UNITE. Students suggested that hands-on activities during UNITE provided positive experiences to learn about working on teams.
UNITE promotes Army STEM careers but can improve marketing of other AEOP opportunities.	• Most mentors had no awareness of or past participation in an AEOP initiative beyond UNITE or the AEOP's Research and Engineering Apprenticeship Program on their campus. Subsequently, students reported limited exposure and encouragement to pursue AEOP opportunities by mentors.
	• UNITE sites offered a variety of activities for promoting STEM careers, including interactive expert panels, off- and on-campus STEM expos, and field trips to Army, university, and other research labs and facilities. Six of the nine UNITE sites engaged Army engineers and/or Army research facilities in career day events.
	• Mentors described efforts to educate students about STEM majors, STEM programs, and funding sources for their educational pursuits, but suggested that more resources are necessary to allow them to comfortably educate students about STEM careers and Army/DoD STEM careers, in particular.
UNITE benefits participants over typical school STEM offerings.	• Students and mentors perceived that UNITE benefits students by clarifying and advancing their STEM pathways and providing learning opportunities (e.g., environments, resources, and activities) not available typical school settings. Mentors also perceived benefit to themselves and to students' communities.
	• Students offered a range of recommendations for improvement, focused on mentorship and instructional activities, differentiating learning to better accommodate students' readiness, and expanding opportunities for students to engage with STEM professionals.
Outcomes Evaluation	
UNITE's limited effect on students' already high confidence in STEM competencies appears specific to site program activities.	• Students entered and left UNITE with high levels of confidence in their skills and abilities, with limited evidence of significant growth across the UNITE program. Significant growth was evident for each of six different confidence items for at no more than one or two sites: ability to apply engineering principles to solve real world problems (ASU and CCNY); identifying, formulating, and solving engineering problems (across program, CCNY); sketching/drafting skills (across program, ASU);

	computer programming skills (ASU and CCNY); social abilities (program, TSU); and abilities to work on teams (CCNY). Most often, this change appeared to relate to a major feature of sites' specific program activities that targets that particular skill or ability.
UNITE generally maintains students' already positive attitudes toward engineering. After UNITE some students perceive less importance in their mathematics and science abilities.	• Students started UNITE with positive attitudes toward engineering and, while some students' exhibited growth and others decline on certain items, generally students' motivation, perceptions of importance, and engagement were maintained across the UNITE program. Students at JSU showed moderately large to very large significant growth in motivations to pursue engineering and in perceived importance of working on teams. Some students showed moderately large to very large decline in their perceptions of the importance of mathematics abilities (NJIT), science abilities (MTU, NJIT, and SDSMT), and applying science and mathematics to solving real work problems (across program, SDSMT).
UNITE exposes students to engineering pathways, but students' aspirations for future pursuit of STEM education and careers show limited change.	• UNITE exposed students to engineering pathways, with significant improvement in some students' knowledge of engineering students (JSU and MTU), professionals (across program, JSU and TSU), majors (across program, CCNY), and professional societies (across program, ASU) and intent to join a professional engineering society (ASU and JSU) and work in engineering (ASU and MTU).
	• Students began and ended UNITE with relatively high educational goals and confidence to achieve those goals. High percentages of UNITE students intend to pursue and achieve STEM-related degrees, and their intentions were sustained throughout the UNITE program (64.8% pre, 68.4% post). Students entered UNITE with an idea of the field that they intend to pursue, and UNITE served to sustain existing interests rather than inspiring interest in new fields about which they have learned. Most frequently, students had interest in engineering (33.6% pre, 34.4% post) and medicine (29.5% pre, 25.4% post).
UNITE students are largely unaware of AEOP initiatives, but students show substantial interest in future AEOP opportunities.	• Student and mentors were largely unaware of other AEOP initiatives. Yet, substantial student interest exists in AEOP opportunities. 39-42% of students were interested in competition programs, 74-79% of students were interested in high school and college apprenticeship programs. In particular, 83% of students would pursue a REAP apprenticeship at the UNITE host site.
UNITE increases students' intent to pursue Army STEM careers.	• Most students learned about multiple STEM jobs during UNITE (94% learn about 3 or more jobs), but Army STEM careers received less attention (59% learn about 3 or more jobs). Despite this, students' interest and intent to pursue Army STEM careers showed large, significant growth through participation in UNITE (program, ASU, CCNY, JSU, MTU, and TSU), while more limited change (across program, ASU and, CCNY) were evident in students' intent to pursue STEM jobs and careers generally.

Recommendations

1. Mentors play important roles in UNITE. Mentors design and facilitate learning activities, deliver content through instruction, supervise and support collaboration and teamwork, provide one-on-one support to students, chaperone students, advise students on educational and career paths, and generally serve as STEM role models for UNITE students. The FY13 mentor focus groups served as a baseline effort to collect information from this participant group, but a more systemic assessment of mentors is required to evaluate their engagement as STEM-Savvy Educators in AEOPs. Any future survey of mentors should at a minimum gather information how mentors become aware of UNITE, motivating factors for participation in UNITE, satisfaction with and suggestions for improving UNITE programs, perceived benefits to participants, and mentor activities, including those relating to exposing students to AEOP opportunities and Army STEM careers.

2. As a whole, students began and ended UNITE with high levels of confidence in their STEM competencies, positive attitudes about STEM, and ambitious education and career aspirations, with limited evidence of growth across the UNITE program. Lack of significant growth, and even observations of decline, should not be regarded as UNITE having no or negative effect on students. Sustaining students' high levels of confidence, positive attitudes, and ambitious aspirations during rigorous programs should be considered a success of UNITE. Particular to students' confidence around STEM competencies, these observations could suggest that students become less confident (though arguably more competent) during UNITE as they are challenged to use their STEM skills and abilities in ways that go beyond what is typically expected of them in school activities. In other words, perhaps through their UNITE experience students realize the limitations of their skills and abilities, that they have much to learn, and for that reason become less confident. Employing a retrospective pre-post evaluation design in subsequent evaluations may help to determine if this is the case, by allowing students to reflect on pre- and post-UNITE status with the same internal standard. In addition, site-based efforts to employ objective measures of learning would provide even clearer understanding of site programs' effects on students' STEM competencies.

3. Students at several UNITE sites showed moderately large to very large decline in their perceptions of the importance of mathematics and science principles and their application to solving problems. UNITE sites should consider the extent to which students are learning and applying science and mathematics principles in service of to their engineering-focused learning in an effort to further explore these findings. If opportunities to learn and apply scientific and mathematics principles and skills are relatively disconnected from the engineering-focused learning, we might expect such declines in perceptions of importance of mathematics and science. In this case, helping students see the underlying necessity and contributions of scientific and mathematic principles in engineering disciplines and in the engineering design process would be an area of potential improvement for programs. For example, the mathematics portion of NJIT's curriculum appears to

focus more on reinforcing and extending ability to do school math—learning concepts, solving problems, and test preparation—rather than connecting math to the site's biomedical engineering focus or to other real world problems. NJIT might consider how key concepts learned in the math course could be applied to solving problems in the biomedical engineering course, or at a minimum, highlighted in vignettes of STEM professionals who have used these or similar mathematical concepts to solve engineering problems.

4. Mentor and student interviewees across the focus group samples reported limited or no awareness of any given AEOP initiative, except for the pipeline initiative, Research in Engineering Apprenticeship Program (REAP), being piloted at the UNITE sites. Mentor interviewees reported spending little or no time educating students about AEOP initiatives for which students qualify during daily program activities, aside from distributing AEOP brochures. Student interviewees received AEOP promotional materials, such as the AEOP brochure or the Rite in the Rain notebooks, but generally could not name, or recognize when named, AEOP initiatives. Yet, from what little students know about AEOP initiatives substantial student interest exists in AEOP opportunities when broadly described. This interest, especially from students of underserved populations, would benefit from more robust attention by program coordinators and mentors during UNITE program activities. Continued guidance by TSA is needed for educating UNITE site coordinators and staff to AEOP opportunities, including the possible provision of TSA-led information sessions.

5. Most UNITE sites were successful in exposing students to Army STEM careers through career day activities in meaningful ways that generated significant interest in Army STEM jobs and careers. Creative solutions and continued collaboration among TSA, Army Cooperative Agreement Managers, and UNITE sites may be necessary for providing and expanding engagement of Army STEM professionals and research facilities at each UNITE site. UNITE sites that are unable to benefit from proximity of Army research facilities might consider other alternatives that would provide for direct interactions between students and Army STEM professionals, such as videoconferencing and/or virtual tours of research facilities. Furthermore, deliberate connections of UNITE sites' curricula to related Army STEM research and careers may provide alternative or additional exposure; these connections could be made by Army STEM professionals or by UNITE mentors. Some GEMS sites have formalized efforts to educate students about Army/DoD STEM careers through their curricular materials, which make explicit connections between subject matter or skills being learned in GEMS and the Army/DoD STEM jobs or careers that apply those subject matter or skills. GEMS mentors, many of whom are university students and local teachers, reported that these curricular materials are helpful in their work to expose students to Army/DoD STEM careers, especially given the mentors' own limited awareness of Army/DoD STEM careers. UNITE programs may benefit from similar efforts to connect UNITE curricula with Army/DoD STEM careers.

Appendices

Appendix A:
FY13 UNITE Evaluation Plan

Key Evaluation Questions

The UNITE evaluation gathered information from UNITE student and mentor participants, and site program coordinators (through site program reports) about UNITE processes, resources, activities, and their potential effects in order to address key evaluation questions related to program strengths and challenges, benefits to participants, and overall effectiveness in meeting AEOP and program objectives:

- What aspects of UNITE programs motivate participation?
- What aspects of UNITE program structure and processes are working well?
- What aspects of UNITE programs could be improved?
- Did participation in UNITE programs:
    - Increase students' STEM competencies?
    - Increase students' positive attitudes toward STEM?
    - Increase students' interest in future STEM learning?
    - Increase students' awareness of and interest in other AEOP opportunities?
    - Increase students' awareness of and interest in Army/DoD STEM careers?

Methods and Instruments

The FY2013 evaluation used a mixed methods approach[1] to allow for broad generalization and for deeper focusing of the evaluation. This mixed methods approach employed quantitative measures to assess level of agreement or satisfaction, as well as qualitative measures, such as open or constructed-response items in surveys and focus groups that provided less structured items assessing perceived value, satisfaction, or suggestions for improvement.

The assessment strategy for UNITE included pre- and post-UNITE student questionnaires, onsite focus groups with student and mentor participants at three sites, and site program reports collected by TSA from sites, which were provided to Virginia Tech.

Data Collection and Sampling

Data collection efforts for 2013 occurred from June to August, during UNITE program activities. On-site focus groups were conducted with students and mentors at three of the nine UNITE sites. Evaluators provided program staff with guidelines for purposive sampling of students—equal representation of males and females and a range of age/grade levels, race/ethnicity demographics, and STEM interests—when assembling focus groups where large numbers of students were available. Convenience sampling was employed for mentor focus groups—any mentor participants providing appropriate permissions were invited to join the focus group, without regard to diversity represented by the group—to maximize participation in focus groups. Program staff administered pre- and post-program surveys to students in paper and pencil form on the first and last days of program activities. Alternatively, students could complete the same surveys in an online format. Student questionnaires also employed convenience sampling. Online questionnaires were opened for data collection for a minimum of 10 days after program activities concluded. Site coordinators were required to submit final program reports to TSA after their program concluded.

[1] Creswell, 2003; Quinn 2001; Greene & Caracelli, 1997

Appendix A:
FY13 UNITE Evaluation Plan

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.

All pre- and post-UNITE data collected from students are summarized in Appendices B and C. Charts used within this report narrative provide visual representations and comparisons of these data, unless otherwise noted. This allows the reviewer to easily apply the determined margin of error for each participant groups' questionnaire responses. For visual simplicity of charts, "Somewhat Disagree" and "Somewhat Agree" (and similar categories) are aggregated as "Neutral" responses.

Evaluators conducted inferential statistics on matched cases to study any changes in participants or participant groups (e.g., at the site level) that could demonstrate the potential effect of their participation in UNITE. Matched cases refers to students completing both pre- and post-UNITE questionnaires and with sufficient information to match their pre- and post- data. Pre- to post-UNITE comparisons of matched are summarized in Appendix D—at the program level and at the site level. Tables used within the report narrative generally summarize program level matched cases comparisons and report the results of significance testing[2] for identifing statistically and practically significant changes.

Statistical significance indicates whether a result is different than chance alone. Statistical significance is determined with t, McNemar, ANOVA, or Tukey's tests, 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, such as at the site level. Practical significance, also known as effect size, indicates how weak or strong an effect is and is usually studied in relation to statistical significance. Practical significance is determined with Cohen's *d* or Pearson's *r*, with *d* or *r* of .250, which is considered weak but "substantively important" at $p < 0.05$.[3] Statistically and/or practically significant findings are noted as "statistical" or "significant" in the report narrative with footnotes providing details about results of statistical tests. Significant site-level findings contributing to program-level findings are described, as are site-level structures, processes, and activities that may relate to these findings. However, given the small number of respondents at any given site (7-26) and the complexity of UNITE programs, these findings should be taken as potential indicators of effect and potentially promising activities for sites to explore in more depth; they should not be taken as a rigorous measure of the effectiveness of any one programs' structures, processes, or activities.

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[2] 2012 evaluation reports did not conduct significance testing on changes. The word "significant" was used incorrectly to describe changes that were perceived to be large. However, without significance testing, we cannot be sure which changes were real or due to chance, nor can we assess the strength of the effect causing the real changes.
[3] U.S. Department of Education, What Work's Clearinghouse Procedures and Standards Handbook, accessed June 30 http://ies.ed.gov/ncee/wwc/pdf/reference_resources/wwc_procedures_v3_0_draft_standards_handbook.pdf

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

The AEOP is composed of a catalog of Army-funded Science, Technology, Engineering and Mathematics (STEM) educational outreach programs including UNITE. As you participate in UNITE, you will also participate in an evaluation/research process. We use the evaluation/research program to gauge the effectiveness of our program and we use it to create reports to the organizations that fund our program. Sometimes, we use the evaluation/research program to create scholarly publications as well.

About this survey:

- It is CONFIDENTIAL; no one will be able to tell who said what, so your comments cannot be held against you.
- It is completely VOLUNTARY; you are not required to participate and you can withdraw at any time
- If you provide your email address, the AEOP may contact you in the future to ask about your academic and career success. Your personal information will never be distributed outside of the AEOP and will be kept in secure servers.
- We do hope that you will finish the survey because your responses will give UNITE valuable information for improvement.

*****By choosing to complete this survey, you are providing your assent to participate in this study*****

If you have any questions or concerns regarding the survey instrument that follows, please contact your UNITE instructor/administrator or one of the following personnel:

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

Hillary Lee, UNITE
Program Administrator, Technology Student Association
hlee@tsaweb.org (703)860-9000

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Please fill out the personal information below:

First Name: ____

Last Name: ____

Email Address: ____

How old are you? (in years) ____________________________, years.

What grade will you start this fall (e.g., 9th, 10th, 11th, 12th, College Freshman)? ________________, grade.

At which of the following sites are you participating in the UNITE program?

- ❍ Alabama State University
- ❍ City College of New York
- ❍ Jackson State University
- ❍ Miami-Dade College - Wolfson
- ❍ Michigan Tech
- ❍ New Jersey Institute of Technology
- ❍ South Dakota School of Mines
- ❍ Texas Southern University
- ❍ University of Colorado Colorado Springs

Which of the following best describes you?

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

Which of the following best describes your race/ethnicity?

- ❍ American Indian or Alaskan Native
- ❍ Asian or Pacific Islander
- ❍ Black or African American
- ❍ Hispanic or Latino
- ❍ White / Caucasian
- ❍ Some other ethnicity / race: ____________________
- ❍ Choose not to report

What kind of school do you attend?

- ❍ Public
- ❍ Private
- ❍ Home School
- ❍ Other (please specify) ____________________

Which of the following best describes your REGULAR SCHOOL?

- ❍ It is in a RURAL setting
- ❍ It is in a SUBURBAN setting
- ❍ It is in an URBAN setting
- ❍ Other (please specify) ____________________

Do you qualify for free/reduced lunch at school?

- ❍ No
- ❍ Yes
- ❍ I don't know / choose not to answer

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

What is the highest level of education that you plan to pursue? STEM stands for Science, Technology, Engineering, and/or Mathematics

- ❍ I plan to enter college and complete a 2-year/Associate's degree in a science, technology, engineering, and/or mathematics (STEM) related field.
- ❍ I plan to enter college and complete a 2-year/Associate's degree in something other than a STEM-related field.
- ❍ I plan to enter college and complete a bachelor's degree in a science, technology, engineering, and/or mathematics (STEM) related field.
- ❍ I plan to enter college and complete a bachelor's degree in something other than a STEM-related field.
- ❍ I plan to pursue a master's degree in a STEM-related field.
- ❍ I plan to pursue a master's degree in something other than a STEM-related field.
- ❍ I plan to pursue a doctoral degree in a STEM-related field.
- ❍ I plan to pursue a doctoral degree in something other than a STEM-related field.
- ❍ I do not plan to attend college.

Which of the following categories best describes the STEM field you want to pursue?

- ❍ Engineering (e.g., technology, robotics, computers, etc.)
- ❍ Environmental Science (e.g., pollution, ecosystems, bioremediation, climatology, meteorology, etc.)
- ❍ Physical Science (e.g., physics, astronomy, etc.)
- ❍ Chemistry (e.g., geochemistry, material science, alternative fuels, etc.)
- ❍ Life Science (e.g., biology, animal science, ecology, etc.)
- ❍ Medicine / Health (e.g., behavioral science, medicine, public health, etc.)
- ❍ Mathematics / Computer Science
- ❍ Social Science (e.g., sociology, psychology, economics, etc.)
- ❍ Other STEM field
- ❍ A field unrelated to STEM

Thinking about your educational goals, use the scale provided to tell us how certain you are that you will be able to do each of the following?

	Not at all Certain	Uncertain	Relatively Uncertain	Relatively Certain	Certain	Very Certain
I will be admitted to my college and program of choice	❍	❍	❍	❍	❍	❍
I will attend college to pursue this educational degree	❍	❍	❍	❍	❍	❍
I will get good grades in my classes	❍	❍	❍	❍	❍	❍
I will be able to overcome any obstacle between me and this educational degree	❍	❍	❍	❍	❍	❍
I will finish this degree	❍	❍	❍	❍	❍	❍

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Use the scale provided to tell us how certain you are that you will do the following activities in the future?

	Not at all Certain	Uncertain	Relatively Uncertain	Relatively Certain	Certain	Very Certain
I will apply for jobs in a STEM-related field	❍	❍	❍	❍	❍	❍
I will get a job in a STEM field	❍	❍	❍	❍	❍	❍
I will build a career around my STEM skills	❍	❍	❍	❍	❍	❍
I will pursue STEM jobs within the Army	❍	❍	❍	❍	❍	❍
I will build a STEM career within the Army	❍	❍	❍	❍	❍	❍

How accurately do each of the following statements DESCRIBE YOU?

	Very UNTRUE of me	UNTRUE of me	Somewhat UNTRUE of me	Somewhat TRUE of me	TRUE of me	Very TRUE of me
I am confident in my intellectual abilities.	❍	❍	❍	❍	❍	❍
I am confident in my social abilities.	❍	❍	❍	❍	❍	❍
I am confident in my ability to lead teams.	❍	❍	❍	❍	❍	❍
I am confident in my ability to apply Mathematics to solve real world problems.	❍	❍	❍	❍	❍	❍
I am confident in my ability to apply Science to solve real world problems.	❍	❍	❍	❍	❍	❍
I am confident in my ability to apply Engineering principles to solve real world problems.	❍	❍	❍	❍	❍	❍
I am confident when I communicate my ideas to other people.	❍	❍	❍	❍	❍	❍

How accurately do each of the following statements DESCRIBE YOU?

	Very UNTRUE of me	UNTRUE of me	Somewhat UNTRUE of me	Somewhat TRUE of me	TRUE of me	Very TRUE of me
I am confident in my critical thinking skills.	❍	❍	❍	❍	❍	❍
I am confident that I can find creative solutions to problems.	❍	❍	❍	❍	❍	❍
I am confident that I can identify, formulate, and solve engineering problems.	❍	❍	❍	❍	❍	❍
I am confident that I can design and conduct meaningful experiments.	❍	❍	❍	❍	❍	❍
I am confident in my sketching / drafting skills.	❍	❍	❍	❍	❍	❍
I am confident that I can effectively analyze and interpret data.	❍	❍	❍	❍	❍	❍
I am confident in my computer programming skills.	❍	❍	❍	❍	❍	❍

Appendix B:

2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Please select the response that best describes how strongly you disagree or agree with the following statements:

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
I personally know at least one college student who is majoring in engineering.	❍	❍	❍	❍	❍	❍
I personally know at least one working engineer.	❍	❍	❍	❍	❍	❍
I want to work with a teacher in my high school that can help me become an engineer.	❍	❍	❍	❍	❍	❍
I know what high school classes I need to take so I am ready to be an engineering major in college.	❍	❍	❍	❍	❍	❍
I am going to major in engineering in college.	❍	❍	❍	❍	❍	❍
I am aware of several kinds of engineering majors that are available to me.	❍	❍	❍	❍	❍	❍
I am going to work in engineering for my career.	❍	❍	❍	❍	❍	❍
I am aware of several professional engineering societies.	❍	❍	❍	❍	❍	❍
I think that I will become a member of a professional engineering society someday.	❍	❍	❍	❍	❍	❍

Please indicate how strongly you agree or disagree with the following statements:

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
My parents want me to become an engineer.	❍	❍	❍	❍	❍	❍
Technology can help solve society's problems.	❍	❍	❍	❍	❍	❍
Engineers can help fix many of the world's problems.	❍	❍	❍	❍	❍	❍
An engineering degree will guarantee me a job when I graduate.	❍	❍	❍	❍	❍	❍
Having strong Mathematics abilities is very important to me.	❍	❍	❍	❍	❍	❍
Sometimes I skip math, science, or engineering classes.	❍	❍	❍	❍	❍	❍
My Science abilities are very important to my success.	❍	❍	❍	❍	❍	❍
I am often late to math, science, or engineering classes.	❍	❍	❍	❍	❍	❍
It is very important that I can apply Science and Math to solve real-world problems.	❍	❍	❍	❍	❍	❍
I think math, science, and engineering classes are boring.	❍	❍	❍	❍	❍	❍
It is important that I can effectively perform as part of a team.	❍	❍	❍	❍	❍	❍

Thank you for your input and remember that your responses are completely confidential.

If you have any questions or concerns, please email:

Rebecca Kruse – rkruse75@vt.edu or Tanner Bateman – tbateman@vt.edu

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

How old are you? (in years)		
	Freq.	**%**
13 years	9	8%
14 years	27	23%
15 years	26	22%
16 years	38	33%
17 years	12	10%
18 years	4	3%
Total	**116**	**100%**

Note. Average age = 15.6 years

What grade will you start this fall (e.g., 9th, 10th, 11th, 12th, College Freshman)?		
	Freq.	**%**
9th Grade	32	28%
10th Grade	21	18%
11th Grade	37	32%
12th Grade	23	20%
College Freshman	2	2%
Total	**115**	**100%**

At which of the following sites are you participating in the UNITE program?		
	Freq.	**%**
Alabama State University	13	10%
City College of New York	17	13%
Jackson State University	14	10%
Miami-Dade College – Wolfson	0	0%
Michigan Tech	10	7%
New Jersey Institute of Technology	23	17%
South Dakota School of Mines	25	19%
Texas Southern University	29	21%
University of Colorado Colorado Springs	4	3%
Total	**135**	**100%**

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Which of the following best describes you?		
	Freq.	**%**
Male	49	37%
Female	80	61%
Choose not to report	3	2%
Total	**132**	**100%**

Which of the following best describes your race/ethnicity?		
	Freq.	**%**
American Indian or Alaskan Native	25	19%
Asian or Pacific Islander	9	7%
Black or African American	61	47%
Hispanic or Latino	19	15%
White/Caucasian	10	8%
Some other ethnicity / race:	3	2%
Choose not to report	4	3%
Total	**131**	**100%**

Note. Other = *"Korean American", "West Indian", "Hispanic + American Indian"*

Which kind of school do you attend?		
	Freq.	**%**
Public	111	85%
Private	13	10%
Home School	1	1%
Other	5	4%
Total	**130**	**100%**

Note. Other = *"Charter"* (n = 3), *"Catholic", & "Public Magnet"*.

Which of the following best describes your REGULAR SCHOOL?		
	Freq.	**%**
Rural	36	28%
Suburban	44	34%
Urban	46	36%
Other (please specify)	2	2%
Total	**128**	**100%**

Note. Other = "*The reservation*" (n = 2).

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Do you qualify for free/reduced lunch at school?		
	Freq.	**%**
No	55	42%
Yes	61	47%
I don't know / choose not to answer	15	11%
Total	**131**	**100%**

How did you hear about UNITE?		
	Freq.	**%**
Parent	42	28%
Teacher	33	22%
Friend	14	9%
Email	3	2%
Web-Search	6	4%
Other (specify):	54	36%
Total	**152**	**100%**

Note. Other = *"NJIT"* (n = 7)*, "Gear up program"* (n = 7)*, "pre-collegiate program at UCCS"* (n = 3)*, "TSU talent search", "STEM", "Program coordinator", "Aunt", "Carter", "Parent and counselor", "sister", "Family member/TSU employee", "event at school", "School counselor", "1+2+3"*

Have you ever participated in UNITE before?		
	Freq.	**%**
No	137	90%
Yes- this is my 2nd UNITE program	10	7%
Yes- this is my 3rd+ UNITE program	6	4%
Total	**153**	**100%**

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

If you have participated in UNITE before, why did you decide to participate again this summer? (n = 18)			
Broad Theme	**Narrow Theme**	**Freq.**	**Example Response(s)**
Academic Research Activities		**11**	
	Learned from UNITE	8	• "I enjoy expanding my knowledge."
	Personal Development	3	• "I enjoy expanding my knowledge and finding out new abilities of mine."
General Satisfaction		**8**	
	Previously enjoyed the program	4	• "I liked the educational opportunity UNITE gave me."
	Had fun with the program	3	• "It was very fun and interesting."
	Good community	1	• "The STEM community is very welcoming and I learned a great deal of information last year."
STEM Pathway		**4**	
	STEM Pathway	3	• "I decided to participate again because the UNITE program gives me great information in my future career."
	It was required	1	• "I did not my mom made me."

Have you ever participated in Junior Solar Sprint race?		
	Freq.	**%**
No	152	99%
Yes	1	1%
Total	**153**	**100%**

Have you ever participated in eCYBERMISSON?		
	Freq.	**%**
No	153	99%
Yes	2	1%
Total	**155**	**100%**

Have you ever participated in West Point Bridge Design Contest?		
	Freq.	**%**
No	151	97%
Yes	4	3%
Total	155	100%

Appendix B:

2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

What is the highest level of education that you plan to pursue? STEM stands for Science, Technology, Engineering, and/or Mathematics?		
	Freq.	**%**
I plan to enter college and complete a 2-year/Associate's degree in a science, technology, engineering, and/or mathematics (STEM) related field.	11	8%
I plan to enter college and complete a 2-year/Associate's degree in something other than a STEM-related field.	3	2%
I plan to enter college and complete a bachelor's degree in a science, technology, engineering, and/or mathematics (STEM) related field.	23	16%
I plan to enter college and complete a bachelor's degree in something other than a STEM-related field.	18	13%
I plan to pursue a master's degree in a STEM-related field.	35	24%
I plan to pursue a master's degree in something other than a STEM-related field.	12	8%
I plan to pursue a doctoral degree in a STEM-related field.	23	16%
I plan to pursue a doctoral degree in something other than a STEM-related field.	18	13%
I do not plan to attend college.	0	0%
Total	**143**	**100%**

Thinking about your educational goals, use the scale provided to tell us how certain you are that you will be able to do each of the following:									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
I will be admitted to my college and program of choice	3 (2%)	5 (3%)	5 (3%)	43 (29%)	48 (33%)	43 (29%)	147	**4.77**	1.14
I will attend college to pursue this educational degree	2 (1%)	4 (3%)	9 (6%)	21 (14%)	43 (29%)	68 (46%)	147	**5.06**	1.15
I will get good grades in my classes	1 (1%)	0 (0%)	4 (3%)	17 (12%)	59 (40%)	65 (45%)	146	**5.24**	0.85
I will be able to overcome any obstacle between me and this educational degree	1 (1%)	0 (0%)	7 (5%)	34 (23%)	54 (37%)	51 (35%)	147	**5.00**	0.94
I will finish this degree	1 (1%)	2 (1%)	5 (3%)	12 (8%)	48 (33%)	79 (54%)	147	**5.32**	0.94

Note. Response scale: **1** = "*Not at all certain*," **2** = "*Uncertain*," **3** = "*Relatively uncertain*," **4** = "*Relatively Certain*," **5** = "*Certain*," **6** = "*Very Certain*".

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Which of the following categories best describes the STEM field you want to pursue?		
	Freq.	**%**
Engineering (e.g., technology, robotics, computers, etc.)	42	34%
Environmental Science (e.g., pollution, ecosystems, bioremediation, climatology, meteorology, etc.)	1	1%
Physical Science (e.g., physics, astronomy, etc.)	1	1%
Chemistry (e.g., geochemistry, material science, alternative fuels, etc.)	2	2%
Life Science (e.g., biology, animal science, ecology, etc.)	3	2%
Medicine / Health (e.g., behavioral science, medicine, public health, etc.)	36	30%
Mathematics / Computer Science	10	8%
Social Science (e.g., sociology, psychology, economics, etc.)	6	5%
Other STEM Field	5	4%
A field unrelated to STEM	16	13%
Total	**122**	**100%**

Use the scale provided to tell us how certain you are that you will do the following activities in the future:									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
I will apply for jobs in a STEM-related field	12 (8%)	19 (13%)	17 (12%)	35 (24%)	43 (29%)	21 (14%)	147	**3.97**	1.49
I will get a job in a STEM field	16 (11%)	18 (12%)	18 (12%)	40 (27%)	39 (27%)	15 (10%)	146	**3.80**	1.50
I will build a career around my STEM skills	13 (9%)	12 (8%)	19 (13%)	40 (27%)	37 (25%)	25 (17%)	146	**4.05**	1.49
I will pursue STEM jobs within the Army	49 (34%)	34 (24%)	33 (23%)	12 (8%)	8 (6%)	8 (6%)	144	**2.45**	1.45
I will build a STEM career within the Army	52 (36%)	38 (26%)	30 (21%)	10 (7%)	9 (6%)	6 (4%)	145	**2.35**	1.40

Note. Response scale: **1** = "*Not at all certain,*" **2** = "*Uncertain,*" **3** = *"Relatively uncertain,"* **4** = "*Relatively Certain,*" **5** = "*Certain,*" **6** = "*Very Certain*".

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Why did you decide to participate in a summer STEM program this year? (n = 139)			
Broad Theme	**Narrow Theme**	**Freq.**	**Example Response(s)**
STEM Pathway		**58**	
	It is beneficial for the future	21	• "To get myself ready for the future and to achieve my goals."
	Prepare for college/school	17	• "I wanted to get the feel of being a college student, so I can adjust to it easily in the future."
	Help towards intended career	15	• "…it is related to my dream job, which is to be a pediatrician." • "I am thinking about pursuing a career in engineering and I felt that the best way to see if I actually enjoy engineering was to participate."
	Great opportunity	4	• "Because it's an opportunity we can't and don't want to pass up."
	Prepare for the army	1	• "Because of the NJIT program and I want to go to the army."
Academic Research Activities		**52**	
	Interested in learning specific field(s)	26	• "I wanted to be able to get a better understanding of engineering and it would be nice to get some hands on knowledge to use in the real world." • "I was interested in the robotics course since robots are playing an increasingly important role in our lives."
	General desire to learn	24	• "Because I wanted to enhance my learning during the summer."
	Networking	2	• "I like meeting new people."
School associations		**23**	
	UNITE was required	18	• "I was told to participate in STEM by a teacher."
	Part of the Gear Up program	5	• "Because of SD Gear up."
General Satisfaction		**12**	
	General Satisfaction	11	• "Because I heard it was very fun to participate in."
	Monetary influence	1	• "I heard they give you money."
Effective Mentorship		**4**	
	Encouraged/suggested by others	4	• "My parents and teacher convinced me to try it since it could be beneficial to me down the road."

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Why, specifically, did you choose UNITE? (n = 132)			
Broad Theme	**Narrow Theme**	**Freq.**	**Example Response(s)**
Logistics		**25**	
	It was the best option	11	• "UNITE offered one of the best programs with the most opportunities in learning more science, math, technology, and engineering all together."
	UNITE was the most feasible	8	• "I choose UNITE because it is located in area that I get to easily without getting lost."
	Could not participate in other programs	6	• "The other program I planned to attend was unavailable."
School Associations		**22**	
	UNITE was required or part of a program I was in	22	• "I did not choose UNITE, it came with my summer program."
Academic Research Activities		**15**	
	Academic Research Activities	9	• "I chose UNITE because I thought it would be an opportunity to expand my horizons in the science fields."
	Desire to gain novel experiences	3	• "To try something different."
	Networking	3	• "…there aren't that many people in the classes, so that you can get to know them."
Recommended by other		**15**	
	A friend or family member suggested it	13	• "Because I heard from a friend that is fun and a great learning experience."
	Sponsored by others	2	• "UNITE is what sponsors the robotics program at this STEM program."
Characteristics of UNITE		**12**	
	UNITE seemed interesting	9	• "This program seemed interesting and I liked the experience it had to offer."
	UNITE has diversity	2	• "…there is a lot of diversity possible."
	Hands on experience at UNITE	1	• "I wanted to build something."
STEM Pathway		**10**	
	Gain experience	4	• "To help me build my future up."
	Preparation for future classes/career	4	• "I chose UNITW because it is the closest program to the curriculum I want to pursue."
	STEM Pathway	2	• "I chose specifically to be in UNITE because I might want to pursue a career in the STEM field."

Previous Participation		**5**	
	Previously participated and wanted to do it again	5	• "…it helped me a lot last year, it helped me understand engineering."
Unsure		**5**	
	Unsure	5	• "I'm not sure."

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

How accurately do each of the following statements DESCRIBE you?									
	1	2	3	4	5	6	n	Avg.	SD
I am confident in my intellectual abilities.	0 (0%)	0 (0%)	3 (2%)	33 (22%)	74 (50%)	38 (26%)	148	**5.00**	0.75
I am confident in my social abilities.	4 (3%)	3 (2%)	7 (5%)	45 (30%)	52 (35%)	38 (26%)	149	**4.69**	1.12
I am confident in my ability to lead teams.	2 (1%)	3 (2%)	17 (11%)	43 (29%)	38 (26%)	46 (31%)	149	**4.69**	1.16
I am confident in my ability to apply Mathematics to solve real world problems.	0 (0%)	1 (1%)	14 (9%)	37 (25%)	55 (37%)	42 (28%)	149	**4.83**	0.97
I am confident in my ability to apply Science to solve real world problems.	1 (1%)	3 (2%)	13 (9%)	53 (36%)	56 (38%)	22 (15%)	148	**4.52**	0.99
I am confident in my ability to apply Engineering principles to solve real world problems.	2 (1%)	6 (4%)	20 (13%)	54 (36%)	44 (30%)	23 (15%)	149	**4.36**	1.10
I am confident when I communicate my ideas to other people.	2 (1%)	1 (1%)	13 (9%)	40 (27%)	54 (36%)	39 (26%)	149	**4.75**	1.05
I am confident in my abilities to work on teams.	1 (1%)	0 (0%)	5 (4%)	17 (15%)	53 (46%)	40 (34%)	116	**5.08**	0.90
I am confident in my critical thinking skills.	0 (0%)	0 (0%)	5 (3%)	53 (36%)	49 (33%)	41 (28%)	148	**4.86**	0.87
I am confident that I can find creative solutions to problems.	1 (1%)	0 (0%)	7 (5%)	37 (25%)	63 (43%)	40 (27%)	148	**4.91**	0.90
I am confident that I can identify, formulate, and solve engineering problems.	2 (1%)	5 (3%)	22 (15%)	53 (36%)	46 (31%)	19 (13%)	147	**4.30**	1.07
I am confident that I can design and conduct meaningful experiments.	4 (3%)	5 (3%)	17 (11%)	51 (34%)	39 (26%)	32 (22%)	148	**4.44**	1.20
I am confident in my sketching / drafting skills.	7 (5%)	20 (14%)	18 (12%)	44 (30%)	34 (23%)	25 (17%)	148	**4.04**	1.42
I am confident that I can effectively analyze and interpret data.	3 (2%)	2 (1%)	12 (8%)	45 (31%)	57 (39%)	28 (19%)	147	**4.60**	1.06
I am confident in my computer programming skills.	11 (7%)	7 (5%)	25 (17%)	52 (35%)	31 (21%)	21 (14%)	147	**3.99**	1.35

Note. Response scale: **1** = "*Very untrue of me,*" **2** = "*Untrue of me,*" **3** = "*Somewhat untrue of me,*" **4** = "*Somewhat true of me*," **5** = "*True of me*," **6** = "*Very true of me*".

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Please select the response that best describes how strongly you disagree or agree with the following:									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
I personally know at least one college student who is majoring in engineering.	19 (13%)	17 (11%)	12 (8%)	30 (20%)	35 (23%)	36 (24%)	149	**4.03**	1.70
I personally know at least one working engineer.	17 (11%)	16 (11%)	14 (9%)	28 (19%)	30 (20%)	43 (29%)	148	**4.11**	1.71
I want to work with a teacher in my high school that can help me become an engineer.	14 (10%)	20 (14%)	24 (16%)	39 (27%)	28 (19%)	22 (15%)	147	**3.79**	1.52
I know what high school classes I need to take so I am ready to be an engineering major in college.	14 (9%)	13 (9%)	15 (10%)	42 (28%)	42 (28%)	22 (15%)	148	**4.02**	1.49
I am going to major in engineering in college.	23 (16%)	20 (14%)	25 (17%)	34 (23%)	22 (15%)	24 (16%)	148	**3.59**	1.66
I am aware of several kinds of engineering majors that are available to me.	12 (8%)	15 (10%)	16 (11%)	29 (20%)	37 (25%)	39 (26%)	148	**4.25**	1.59
I am going to work in engineering for my career.	22 (15%)	23 (16%)	22 (15%)	37 (25%)	26 (18%)	17 (12%)	147	**3.52**	1.59
I am aware of several professional engineering societies.	14 (9%)	26 (18%)	16 (11%)	45 (30%)	26 (18%)	21 (14%)	148	**3.72**	1.54
I think that I will become a member of a professional engineering society someday.	25 (17%)	26 (18%)	15 (10%)	43 (29%)	22 (15%)	17 (11%)	148	**3.43**	1.61

Note. Response scale **1** = "*Strongly Disagree,*" **2** = "*Disagree,*" **3** = *"Somewhat Disagree,*" **4** = "*Somewhat Agree*," **5** = "*Agree*," **6** = "*Strongly Agree*".

Appendix B:
2013 UNITE Pre-UNITE Student Questionnaire and Data Summary

Please indicate how strongly you agree or disagree with the following statements:

	1	2	3	4	5	6	n	Avg.	SD
My parents want me to become an engineer.	23 (16%)	27 (19%)	15 (10%)	38 (26%)	29 (20%)	13 (9%)	145	**3.44**	1.58
Technology can help solve society's problems.	2 (1%)	3 (2%)	12 (8%)	36 (25%)	44 (30%)	49 (34%)	146	**4.81**	1.13
Engineers can help fix many of the world's problems.	2 (1%)	3 (2%)	6 (4%)	39 (27%)	46 (32%)	50 (34%)	146	**4.88**	1.08
An engineering degree with guarantee me a job when I graduate.	9 (6%)	12 (8%)	17 (12%)	47 (32%)	36 (24%)	26 (18%)	147	**4.13**	1.39
Having strong mathematics abilities is very important to me.	1 (1%)	4 (3%)	5 (3%)	24 (16%)	46 (31%)	67 (46%)	147	**5.12**	1.05
Sometimes I skip math, science, or engineering classes.	90 (61%)	24 (16%)	9 (6%)	13 (9%)	7 (5%)	4 (3%)	147	**1.88**	1.37
My Science abilities are very important to my success.	2 (1%)	7 (5%)	6 (4%)	39 (27%)	44 (30%)	48 (33%)	146	**4.78**	1.17
I am often late to math, science, or engineering classes.	83 (56%)	29 (20%)	8 (5%)	11 (7%)	13 (9%)	4 (3%)	148	**2.01**	1.46
It is very important that I can apply science and math to solve real-world problems.	2 (1%)	4 (3%)	9 (6%)	30 (20%)	47 (32%)	55 (37%)	147	**4.91**	1.14
I think math, science, and engineering classes are boring.	47 (32%)	44 (30%)	23 (16%)	20 (14%)	9 (6%)	5 (3%)	148	**2.42**	1.39
It is important that I can effectively perform as part of a team.	2 (1%)	0 (0%)	7 (5%)	26 (18%)	50 (34%)	62 (42%)	147	**5.10**	1.00

Note. Response scale: **1** = "*Strongly Disagree*," **2** = "*Disagree*," **3** = "*Somewhat Disagree*," **4** = "*Somewhat Agree*," **5** = "*Agree*," **6** = "*Strongly Agree*".

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

The AEOP is composed of a catalog of Army-funded Science, Technology, Engineering and Mathematics (STEM) educational outreach programs including UNITE. As you participate in UNITE, you will also participate in an evaluation/research process. We use the evaluation/research program to gauge the effectiveness of our program and we use it to create reports to the organizations that fund our program. Sometimes, we use the evaluation/research program to create scholarly publications as well.

About this survey:

- It is CONFIDENTIAL; no one will be able to tell who said what, so your comments cannot be held against you.
- It is completely VOLUNTARY; you are not required to participate and you can withdraw at any time
- If you provide your email address, the AEOP may contact you in the future to ask about your academic and career success. Your personal information will never be distributed outside of the AEOP and will be kept in secure servers.
- We do hope that you will finish the survey because your responses will give UNITE valuable information for improvement.

*****By choosing to complete this survey, you are providing your assent to participate in this study*****

Contacts: If you have any questions or concerns regarding the survey instrument that follows, please contact your UNITE instructor/administrator or one of the following personnel:

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

Hillary Lee, UNITE
Program Administrator, Technology Student Association
hlee@tsaweb.org (703)860-9000

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Please fill out the personal information below:

First Name: ____

Last Name: ____

Email Address: ____

How old are you? (in years) ____________________________, years.

What grade will you start this fall (e.g., 9th, 10th, 11th, 12th, College Freshman)? ________________, grade.

At which of the following sites are you participating in the UNITE program?
- ❍ Alabama State University
- ❍ City College of New York
- ❍ Jackson State University
- ❍ Miami-Dade College - Wolfson
- ❍ Michigan Tech
- ❍ New Jersey Institute of Technology
- ❍ South Dakota School of Mines
- ❍ Texas Southern University
- ❍ University of Colorado Colorado Springs

Which of the following best describes you?
- ❍ Male
- ❍ Female
- ❍ Choose not to report

Which of the following best describes your race/ethnicity?
- ❍ American Indian or Alaskan Native
- ❍ Asian or Pacific Islander
- ❍ Black or African American
- ❍ Hispanic or Latino
- ❍ White / Caucasian
- ❍ Some other ethnicity / race: ____________________
- ❍ Choose not to report

What kind of school do you attend?
- ❍ Public
- ❍ Private
- ❍ Home School
- ❍ Other (please specify) ____________________

Which of the following best describes your REGULAR SCHOOL?
- ❍ It is in a RURAL setting
- ❍ It is in a SUBURBAN setting
- ❍ It is in an URBAN setting
- ❍ Other (please specify) ____________________

Do you qualify for free/reduced lunch at school?
- ❍ No
- ❍ Yes

I don't know / choose not to answer

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

How did you hear about UNITE?
- ❍ Parent
- ❍ Teacher
- ❍ Friend
- ❍ Email
- ❍ Web-Search
- ❍ Other (specify): ____________________

Have you ever participated in UNITE before?
- ❍ No
- ❍ Yes - this is my 2nd UNITE program
- ❍ Yes - this is my ____ UNITE program ____________________

Why did you decide to participate in UNITE again this summer?

Have you ever participated in a Junior Solar Sprint race?
- ❍ No
- ❍ Yes

Have you ever participated in eCYBERMISSION?
- ❍ No
- ❍ Yes

Have you ever participated in the West Point Bridge Design contest?
- ❍ No
- ❍ Yes

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

What is the highest level of education that you plan to pursue? STEM stands for Science, Technology, Engineering, and/or Mathematics

- ❍ I plan to enter college and complete a 2-year/Associate's degree in a science, technology, engineering, and/or mathematics (STEM) related field.
- ❍ I plan to enter college and complete a 2-year/Associate's degree in something other than a STEM-related field.
- ❍ I plan to enter college and complete a bachelor's degree in a science, technology, engineering, and/or mathematics (STEM) related field.
- ❍ I plan to enter college and complete a bachelor's degree in something other than a STEM-related field.
- ❍ I plan to pursue a master's degree in a STEM-related field.
- ❍ I plan to pursue a master's degree in something other than a STEM-related field.
- ❍ I plan to pursue a doctoral degree in a STEM-related field.
- ❍ I plan to pursue a doctoral degree in something other than a STEM-related field.
- ❍ I do not plan to attend college.

Which of the following categories best describes the STEM field you want to pursue?

- ❍ Engineering (e.g., technology, robotics, computers, etc.)
- ❍ Environmental Science (e.g., pollution, ecosystems, bioremediation, climatology, meteorology, etc.)
- ❍ Physical Science (e.g., physics, astronomy, etc.)
- ❍ Chemistry (e.g., geochemistry, material science, alternative fuels, etc.)
- ❍ Life Science (e.g., biology, animal science, ecology, etc.)
- ❍ Medicine / Health (e.g., behavioral science, medicine, public health, etc.)
- ❍ Mathematics / Computer Science
- ❍ Social Science (e.g., sociology, psychology, economics, etc.)
- ❍ Other STEM field
- ❍ A field unrelated to STEM

Thinking about your educational goals, use the scale provided to tell us how certain you are that you will be able to do each of the following?

	Not at all Certain	Uncertain	Relatively Uncertain	Relatively Certain	Certain	Very Certain
I will be admitted to my college and program of choice	❍	❍	❍	❍	❍	❍
I will attend college to pursue this educational degree	❍	❍	❍	❍	❍	❍
I will get good grades in my classes	❍	❍	❍	❍	❍	❍
I will be able to overcome any obstacle between me and this educational degree	❍	❍	❍	❍	❍	❍
I will finish this degree	❍	❍	❍	❍	❍	❍

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Use the scale provided to tell us how certain you are that you will do the following activities in the future?

	Not at all Certain	Uncertain	Relatively Uncertain	Relatively Certain	Certain	Very Certain
I will apply for jobs in a STEM-related field	❍	❍	❍	❍	❍	❍
I will get a job in a STEM field	❍	❍	❍	❍	❍	❍
I will build a career around my STEM skills	❍	❍	❍	❍	❍	❍
I will pursue STEM jobs within the Army	❍	❍	❍	❍	❍	❍
I will build a STEM career within the Army	❍	❍	❍	❍	❍	❍

Why did you decide to participate in a summer STEM program this year?

Why, specifically, did you choose UNITE?

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

How accurately do each of the following statements DESCRIBE YOU?

	Very UNTRUE of me	UNTRUE of me	Somewhat UNTRUE of me	Somewhat TRUE of me	TRUE of me	Very TRUE of me
I am confident in my intellectual abilities.	❍	❍	❍	❍	❍	❍
I am confident in my social abilities.	❍	❍	❍	❍	❍	❍
I am confident in my ability to lead teams.	❍	❍	❍	❍	❍	❍
I am confident in my ability to apply Mathematics to solve real world problems.	❍	❍	❍	❍	❍	❍
I am confident in my ability to apply Science to solve real world problems.	❍	❍	❍	❍	❍	❍
I am confident in my ability to apply Engineering principles to solve real world problems.	❍	❍	❍	❍	❍	❍
I am confident when I communicate my ideas to other people.	❍	❍	❍	❍	❍	❍

How accurately do each of the following statements DESCRIBE YOU?

	Very UNTRUE of me	UNTRUE of me	Somewhat UNTRUE of me	Somewhat TRUE of me	TRUE of me	Very TRUE of me
I am confident in my critical thinking skills.	❍	❍	❍	❍	❍	❍
I am confident that I can find creative solutions to problems.	❍	❍	❍	❍	❍	❍
I am confident that I can identify, formulate, and solve engineering problems.	❍	❍	❍	❍	❍	❍
I am confident that I can design and conduct meaningful experiments.	❍	❍	❍	❍	❍	❍
I am confident in my sketching / drafting skills.	❍	❍	❍	❍	❍	❍
I am confident that I can effectively analyze and interpret data.	❍	❍	❍	❍	❍	❍
I am confident in my computer programming skills.	❍	❍	❍	❍	❍	❍

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Please select the response that best describes how strongly you disagree or agree with the following statements:

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
I personally know at least one college student who is majoring in engineering.	❍	❍	❍	❍	❍	❍
I personally know at least one working engineer.	❍	❍	❍	❍	❍	❍
I want to work with a teacher in my high school that can help me become an engineer.	❍	❍	❍	❍	❍	❍
I know what high school classes I need to take so I am ready to be an engineering major in college.	❍	❍	❍	❍	❍	❍
I am going to major in engineering in college.	❍	❍	❍	❍	❍	❍
I am aware of several kinds of engineering majors that are available to me.	❍	❍	❍	❍	❍	❍
I am going to work in engineering for my career.	❍	❍	❍	❍	❍	❍
I am aware of several professional engineering societies.	❍	❍	❍	❍	❍	❍
I think that I will become a member of a professional engineering society someday.	❍	❍	❍	❍	❍	❍

Please indicate how strongly you agree or disagree with the following statements:

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
My parents want me to become an engineer.	❍	❍	❍	❍	❍	❍
Technology can help solve society's problems.	❍	❍	❍	❍	❍	❍
Engineers can help fix many of the world's problems.	❍	❍	❍	❍	❍	❍
An engineering degree will guarantee me a job when I graduate.	❍	❍	❍	❍	❍	❍
Having strong Mathematics abilities is very important to me.	❍	❍	❍	❍	❍	❍
Sometimes I skip math, science, or engineering classes.	❍	❍	❍	❍	❍	❍
My Science abilities are very important to my success.	❍	❍	❍	❍	❍	❍
I am often late to math, science, or engineering classes.	❍	❍	❍	❍	❍	❍
It is very important that I can apply Science and Math to solve real-world problems.	❍	❍	❍	❍	❍	❍
I think math, science, and engineering classes are boring.	❍	❍	❍	❍	❍	❍
It is important that I can effectively perform as part of a team.	❍	❍	❍	❍	❍	❍

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Please tell us how often you performed each of the following activities during your UNITE experience?

	NEVER	Once per MONTH	Once per WEEK	2 - 3 times per WEEK	Every DAY	Multiple times per DAY
Worked collaboratively on a project(s) in team(s)	❍	❍	❍	❍	❍	❍
Shared alternative ideas with a team during group projects	❍	❍	❍	❍	❍	❍
Actively listened to teammates during group discussion	❍	❍	❍	❍	❍	❍
Used the ideas of teammates to find a creative solution to a problem	❍	❍	❍	❍	❍	❍
Arranged or synthesized a team's ideas into a cohesive set	❍	❍	❍	❍	❍	❍
Led a group discussion amongst the members of a team	❍	❍	❍	❍	❍	❍
Finished my work early and then helped team-members with their task(s)	❍	❍	❍	❍	❍	❍
Shared the answer to a problem with my team	❍	❍	❍	❍	❍	❍

During UNITE, how many jobs in Science, Technology, Engineering or Math (STEM) did you learn about?

❍ None
❍ 1
❍ 2
❍ 3
❍ 4
❍ 5 or more

During UNITE, how many Army or Department of Defense jobs in STEM did you learn about?

❍ None
❍ 1
❍ 2
❍ 3
❍ 4
❍ 5 or more

What job are you most interested in pursuing? (What job do you want when you grow up?)

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

What was the MOST INTERESTING STEM topic that you learned about in UNITE? Why?

What was the LEAST INTERESTING STEM topic that you learned about in UNITE? Why?

What can we do to improve UNITE and make it even better at preparing students to be successful in STEM?

Given the chance, would you participate in this UNITE program again? Why or why not?

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Are you interested in participating in any of the following Army Education Outreach Programs?

	Yes - I am interested in participating	No - I am not interested in participating
Junior Science and Humanities Symposium (JSHS): A high school STEM research competition.	❍	❍
West Point Bridge Contest: A computer-based engineering design competition for 6th - 12th grade.	❍	❍
High School Internships: Internships in laboratories at colleges throughout the country with the Research & Engineering Apprenticeship Program (REAP) or the High School Apprenticeship Program (HSAP) or in Army laboratories through the Science & Engineering Apprenticeship Program (SEAP).	❍	❍
College Internships: Internshis in laboratories at colleges throughout the country with the Undergraduate Research Apprenticeship Program (URAP) or in Army laboratories through College Qualified Leaders (CQL).	❍	❍

This summer, several students from last year's UNITE group were offered internships at college and university STEM laboratories through the REAP program. Did you know about this?

❍ No
❍ Yes

Do you think there is a benefit to having an internship after you experience UNITE? How do you think that an internship might help you prepare for college and a STEM career?

If the opportunity to have a REAP internship near where you live exists in the future, are you interested in applying for it? (note that you can even participate if it is the summer between high school and college).

❍ No
❍ Yes

Thank you for your input and remember that your responses are completely confidential.

If you have any questions or concerns, please email:

Rebecca Kruse – rkruse75@vt.edu or Tanner Bateman – tbateman@vt.edu

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

What is the highest level of education that you plan to pursue? STEM stands for Science, Technology, Engineering, and/or Mathematics?		
	Freq.	**%**
I plan to enter college and complete a 2-year/Associate's degree in a science, technology, engineering, and/or mathematics (STEM) related field.	12	9%
I plan to enter college and complete a 2-year/Associate's degree in something other than a STEM-related field.	8	6%
I plan to enter college and complete a bachelor's degree in a science, technology, engineering, and/or mathematics (STEM) related field.	19	14%
I plan to enter college and complete a bachelor's degree in something other than a STEM-related field.	7	5%
I plan to pursue a master's degree in a STEM-related field.	29	22%
I plan to pursue a master's degree in something other than a STEM-related field.	13	10%
I plan to pursue a doctoral degree in a STEM-related field.	31	23%
I plan to pursue a doctoral degree in something other than a STEM-related field.	14	11%
I do not plan to attend college.	0	0%
Total	**133**	**100%**

Thinking about your educational goals, use the scale provided to tell us how certain you are that you will be able to do each of the following?									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
I will be admitted to my college and program of choice	0 (0%)	6 (4%)	10 (7%)	33 (24%)	42 (31%)	44 (33%)	135	**4.80**	1.11
I will attend college to pursue this educational degree	0 (0%)	6 (4%)	5 (4%)	19 (14%)	38 (28%)	66 (49%)	134	**5.14**	1.08
I will get good grades in my classes	0 (0%)	1 (1%)	5 (4%)	12 (9%)	54 (40%)	62 (46%)	134	**5.28**	0.84
I will be able to overcome any obstacle between me and this educational degree	0 (0%)	1 (1%)	3 (2%)	23 (17%)	49 (37%)	58 (43%)	134	**5.19**	0.85
I will finish this degree	0 (0%)	1 (1%)	5 (4%)	11 (8%)	42 (31%)	75 (56%)	134	**5.38**	0.85

Note. Response scale: **1** = "*Not at all certain,*" **2** = "*Uncertain,*" **3** = *"Relatively uncertain,"* **4** = "*Relatively Certain,*" **5** = "*Certain*," **6** = "*Very Certain*".

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Which of the following categories best describes the STEM field you want to pursue?		
	Freq.	**%**
Engineering (e.g., technology, robotics, computers, etc.)	37	34%
Environmental Science (e.g., pollution, ecosystems, bioremediation, climatology, meteorology, etc.)	3	3%
Physical Science (e.g., physics, astronomy, etc.)	2	2%
Chemistry (e.g., geochemistry, material science, alternative fuels, etc.)	0	0%
Life Science (e.g., biology, animal science, ecology, etc.)	6	5%
Medicine / Health (e.g., behavioral science, medicine, public health, etc.)	28	25%
Mathematics / Computer Science	9	8%
Social Science (e.g., sociology, psychology, economics, etc.)	6	5%
Other STEM Field	2	2%
A field unrelated to STEM	17	15%
Total	110	100%

Use the scale provided to tell us how certain you are that you will do the following activities in the future:									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
I will apply for jobs in a STEM-related field	6 (4%)	14 (10%)	17 (13%)	33 (24%)	41 (30%)	24 (18%)	135	**4.19**	1.39
I will get a job in a STEM field	8 (6%)	11 (8%)	20 (15%)	35 (26%)	37 (28%)	23 (17%)	134	**4.13**	1.41
I will build a career around my STEM skills	5 (4%)	10 (8%)	15 (11%)	30 (23%)	41 (31%)	31 (23%)	132	**4.40**	1.36
I will pursue STEM jobs within the Army	31 (23%)	26 (20%)	44 (33%)	13 (10%)	14 (11%)	4 (3%)	132	**2.73**	1.37
I will build a STEM career within the Army	34 (26%)	24 (18%)	43 (33%)	16 (12%)	11 (8%)	3 (2%)	131	**2.66**	1.33

Note. Response scale: **1** = "*Not at all certain*," **2** = "*Uncertain*," **3** = *"Relatively uncertain*," **4** = "*Relatively Certain*," **5** = "*Certain*," **6** = "*Very Certain*".

Appendix C:

2013 UNITE Post-UNITE Student Questionnaire and Data Summary

How accurately does each of the following statements DESCRIBE you?									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
I am confident in my intellectual abilities.	0 (0%)	0 (0%)	4 (3%)	22 (16%)	65 (48%)	44 (33%)	135	**5.10**	0.78
I am confident in my social abilities.	0 (0%)	1 (1%)	9 (7%)	27 (20%)	59 (44%)	38 (28%)	134	**4.93**	0.91
I am confident in my ability to lead teams.	1 (1%)	2 (1%)	8 (6%)	31 (23%)	53 (40%)	39 (29%)	134	**4.87**	1.00
I am confident in my ability to apply Mathematics to solve real world problems.	0 (0%)	1 (1%)	8 (6%)	37 (27%)	55 (41%)	34 (25%)	135	**4.84**	0.90
I am confident in my ability to apply Science to solve real world problems.	0 (0%)	1 (1%)	12 (9%)	37 (28%)	54 (40%)	30 (22%)	134	**4.75**	0.93
I am confident in my ability to apply Engineering principles to solve real world problems.	0 (0%)	1 (1%)	17 (13%)	38 (28%)	50 (37%)	29 (21%)	135	**4.66**	0.98
I am confident when I communicate my ideas to other people.	0 (0%)	2 (1%)	6 (4%)	35 (26%)	49 (36%)	43 (32%)	135	**4.93**	0.94
I am confident in my abilities to work on teams.	0 (0%)	0 (0%)	6 (5%)	19 (16%)	51 (43%)	42 (36%)	118	**5.09**	0.85
I am confident in my critical thinking skills.	0 (0%)	1 (1%)	2 (1%)	39 (29%)	58 (43%)	35 (26%)	135	**4.92**	0.82
I am confident that I can find creative solutions to problems.	0 (0%)	0 (0%)	4 (3%)	33 (25%)	56 (42%)	41 (31%)	134	**5.00**	0.82
I am confident that I can identify, formulate, and solve engineering problems.	0 (0%)	3 (2%)	14 (10%)	37 (27%)	55 (41%)	26 (19%)	135	**4.64**	0.98
I am confident that I can design and conduct meaningful experiments.	2 (1%)	2 (1%)	9 (7%)	41 (30%)	56 (41%)	25 (19%)	135	**4.64**	1.00
I am confident in my sketching / drafting skills.	2 (1%)	14 (10%)	15 (11%)	32 (24%)	47 (35%)	25 (19%)	135	**4.36**	1.28
I am confident that I can effectively analyze and interpret data.	0 (0%)	3 (2%)	8 (6%)	36 (27%)	58 (43%)	30 (22%)	135	**4.77**	0.94
I am confident in my computer programming skills.	5 (4%)	9 (7%)	16 (12%)	42 (31%)	37 (27%)	26 (19%)	135	**4.30**	1.30

Note. Response scale: **1** = "*Very untrue of me,*" **2** = "*Untrue of me,*" **3** = "*Somewhat untrue of me,*" **4** = "*Somewhat true of me*," **5** = "*True of me*," **6** = "*Very true of me*".

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Please select the response that best describes how strongly you disagree or agree with the following:									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
I personally know at least one college student who is majoring in engineering.	7 (5%)	16 (12%)	13 (10%)	23 (17%)	35 (26%)	40 (30%)	134	**4.37**	1.54
I personally know at least one working engineer.	8 (6%)	15 (11%)	13 (10%)	19 (14%)	33 (25%)	45 (34%)	133	**4.42**	1.59
I want to work with a teacher in my high school that can help me become an engineer.	11 (8%)	16 (12%)	26 (19%)	39 (29%)	27 (20%)	15 (11%)	134	**3.75**	1.42
I know what high school classes I need to take so I am ready to be an engineering major in college.	7 (5%)	15 (11%)	17 (13%)	30 (22%)	51 (38%)	15 (11%)	135	**4.10**	1.37
I am going to major in engineering in college.	16 (12%)	16 (12%)	22 (17%)	26 (20%)	33 (25%)	20 (15%)	133	**3.78**	1.60
I am aware of several kinds of engineering majors that are available to me.	7 (5%)	6 (5%)	10 (8%)	20 (15%)	45 (34%)	45 (34%)	133	**4.69**	1.40
I am going to work in engineering for my career.	14 (11%)	18 (14%)	20 (15%)	31 (23%)	32 (24%)	18 (14%)	133	**3.77**	1.55
I am aware of several professional engineering societies.	9 (7%)	19 (14%)	16 (12%)	33 (25%)	33 (25%)	24 (18%)	134	**4.00**	1.51
I think that I will become a member of a professional engineering society someday.	17 (13%)	18 (14%)	23 (17%)	36 (27%)	28 (21%)	11 (8%)	133	**3.55**	1.49

Note. Response scale: **1** = "*Strongly Disagree,*" **2** = "*Disagree,*" **3** = *"Somewhat Disagree,"* **4** = "*Somewhat Agree*," **5** = "*Agree*," **6** = "*Strongly Agree*".

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Please indicate how strongly you agree or disagree with the following statements:	1	2	3	4	5	6	n	Avg.	SD
My parents want me to become an engineer.	17 (13%)	15 (11%)	21 (16%)	35 (26%)	30 (23%)	15 (11%)	133	**3.68**	1.53
Technology can help solve society's problems.	1 (1%)	0 (0%)	8 (6%)	36 (27%)	36 (27%)	52 (39%)	133	**4.97**	1.01
Engineers can help fix many of the world's problems.	2 (1%)	1 (1%)	5 (4%)	30 (22%)	43 (32%)	53 (40%)	134	**5.01**	1.04
An engineering degree with guarantee me a job when I graduate.	6 (5%)	7 (5%)	18 (14%)	35 (26%)	38 (29%)	29 (22%)	133	**4.35**	1.34
Having strong mathematics abilities is very important to me.	0 (0%)	2 (1%)	6 (4%)	20 (15%)	51 (38%)	55 (41%)	134	**5.13**	0.93
Sometimes I skip math, science, or engineering classes.	87 (65%)	24 (18%)	6 (5%)	8 (6%)	6 (5%)	2 (2%)	133	**1.71**	1.23
My Science abilities are very important to my success.	2 (1%)	4 (3%)	12 (9%)	29 (21%)	44 (33%)	44 (33%)	135	**4.79**	1.17
I am often late to math, science, or engineering classes.	84 (62%)	24 (18%)	10 (7%)	8 (6%)	7 (5%)	2 (1%)	135	**1.79**	1.27
It is very important that I can apply science and math to solve real-world problems.	2 (1%)	2 (1%)	7 (5%)	33 (24%)	45 (33%)	46 (34%)	135	**4.89**	1.08
I think math, science, and engineering classes are boring.	54 (40%)	30 (22%)	19 (14%)	20 (15%)	7 (5%)	4 (3%)	134	**2.31**	1.42
It is important that I can effectively perform as part of a team.	0 (0%)	2 (1%)	3 (2%)	15 (11%)	49 (36%)	66 (49%)	135	**5.29**	0.86

Note. Response scale: **1** = "*Strongly Disagree*," **2** = "*Disagree*," **3** = "*Somewhat Disagree*," **4** = "*Somewhat Agree*," **5** = "*Agree*," **6** = "*Strongly Agree*".

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2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Please tell us how often you performed each of the following activities during your UNITE experience:									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
Worked collaboratively on a project(s) in team(s)	0 (0%)	9 (7%)	12 (10%)	33 (27%)	30 (25%)	37 (31%)	121	**4.61**	1.23
Shared alternative ideas with a team during group projects	3 (3%)	7 (6%)	15 (13%)	29 (24%)	33 (28%)	33 (28%)	120	**4.51**	1.31
Actively listened to teammates during group discussion	1 (1%)	4 (3%)	10 (8%)	23 (19%)	44 (37%)	37 (31%)	119	**4.82**	1.12
Used the ideas of teammates to find a creative solution to a problem	3 (3%)	4 (3%)	12 (10%)	29 (24%)	39 (33%)	32 (27%)	119	**4.62**	1.22
Arranged or synthesized a team's ideas into a cohesive set	6 (5%)	5 (4%)	19 (16%)	27 (23%)	38 (32%)	24 (20%)	119	**4.33**	1.35
Led a group discussion amongst the members of a team	13 (11%)	6 (5%)	26 (22%)	29 (24%)	24 (20%)	21 (18%)	119	**3.91**	1.52
Finished my work early and then helped team-members with their task(s)	12 (10%)	5 (4%)	29 (24%)	25 (21%)	30 (25%)	18 (15%)	119	**3.92**	1.48
Shared the answer to a problem with my team	7 (6%)	5 (4%)	14 (12%)	23 (19%)	34 (29%)	35 (30%)	118	**4.50**	1.44

Note. Response scale: **1** = "*Never,*" **2** = "*Once per month,*" **3** = *"One per week,"* **4** = "*2-3 times per week,*" **5** = "*Every day*," **6** = "*Multiple times per day*".

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

During UNITE, how many jobs in Science, Technology, Engineering, or Math (STEM) did you learn about?

	Freq.	%
None	0	0%
1	2	2%
2	5	4%
3	11	9%
4	25	20%
5 or more	79	65%
Total	122	100%

During UNITE, how many Army or Department of Defense jobs in STEM did you learn about?

	Freq.	%
None	10	8%
1	14	11%
2	27	22%
3	23	19%
4	13	11%
5 or more	35	29%
Total	68	100%

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

What job are you most interested in pursuing? (n = 55 valid responses)						
List	**Freq.**	**%**		**List**	**Freq.**	**%**
Computer engineer / Computer science	12	22%		Aerospace engineer	1	2%
Engineering (general)	9	16%		Agricultural engineer	1	2%
Biomedical engineer	8	15%		American Indian studies	1	2%
Veterinarian	7	13%		Anesthesiologist	1	2%
Civil engineer	6	11%		Animal biology researcher	1	2%
Mechanical engineer	6	11%		Animator	1	2%
Electrical engineer	5	9%		Army Chemist	1	2%
Environmental engineer	5	9%		Army Dentist	1	2%
Pediatrician	5	9%		Arts (photography/film)	1	2%
Psychologist	5	9%		Biomechanical engineer	1	2%
Unsure/Undecided	5	9%		Business manager / CEO	1	2%
Doctor (general)	4	7%		Detective	1	2%
Lawyer	4	7%		Economics	1	2%
Nurse	4	7%		Fire fighter	1	2%
Pharmacist	4	7%		Food engineer	1	2%
Architect/Architectural engineer	3	5%		Game designer	1	2%
Chemical engineer	3	5%		interior designer	1	2%
OB/GYN	3	5%		Inventor	1	2%
Physical therapist	3	5%		Judge	1	2%
Physician	3	5%		Mathematics (general)	1	2%
Teacher	3	5%		Military engineer	1	2%
Air traffic control	2	4%		Occupational therapist	1	2%
Basketball player	2	4%		Oncologist	1	2%
FBI Agent	2	4%		Paramedic	1	2%
Medicine (general)	2	4%		Robotics engineer	1	2%
Pilot	2	4%		Sports medicine	1	2%
Police officer	2	4%		Weapons engineer	1	2%
Surgeon	2	4%				

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2013 UNITE Post-UNITE Student Questionnaire and Data Summary

What was the most interesting STEM topic that you learned about in UNITE? (n = 105 valid responses)						
List	**Freq.**	**%**		**List**	**Freq.**	**%**
Aviation	14	13%		Chemistry	2	2%
Mathematics	14	13%		Civil Engineering	2	2%
Engineering (general)	11	10%		Environmental engineering	2	2%
Robotic engineering	11	10%		Measuring the immeasurable	2	2%
ALL	7	7%		Aeronautics	1	1%
Medicine	5	5%		Army programs	1	1%
Programming	5	5%		Binary	1	1%
Project Manager	5	5%		Electrical engineering	1	1%
Computer engineering	4	4%		Landfills	1	1%
UAV	4	4%		Maritime	1	1%
Biomedical engineering	3	3%		Material Science	1	1%
Physics	3	3%		Social Science	1	1%
Biology	2	2%		Unsure	1	1%

What was the least interesting STEM topic that you learned about in UNITE? (n = 109 valid responses)						
List	**Freq.**	**%**		**List**	**Freq.**	**%**
None	39	36%		UAV/Aviation	3	3%
Mathematics	9	8%		Binary numbers	2	2%
Computer science	6	6%		Aquatic ecology	1	1%
Measuring the immeasurable	5	5%		Biomedical engineering	1	1%
Unsure	5	5%		Bridge building	1	1%
Chemistry	4	4%		Engineering (general)	1	1%
Electrical engineering	4	4%		Material science	1	1%
Maritime	4	4%		Modern engineering	1	1%
Medicine failure	4	4%		NASA	1	1%
Science (general)	4	4%		Physics	1	1%
Technology advancements	4	4%		Transportation engineer	1	1%
Project management	3	3%		Weather	1	1%
Robotic engineering	3	3%				

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What can we do to improve UNITE and make it even better at preparing students to be successful in STEM?(n = 108)		
List	**Freq.**	
More hands-on activities	26	• "Have more medical explorations." • "More hands on activities like maybe building or designing a city on the computer."
No recommendations	18	• "I really think you guys have it all together and there aren't any areas that need improvement that I can see."
More field trips	10	• "[Have] a trip to offices that engineers would normally be at."
Improve teacher quality/quantity	9	• "I believe we need engineering teacher who can engage us into learning and better prepare us for a role in engineering."
Better quality/handling of food	6	• "Serve lunch, or at least make sure we can have lunch." • "Provide snack every day."
Make it more fun	6	• "Having something fun to do every day."
Teach on different topics	5	• "…this program can be better if it made its curriculum more fast-paced with a more difficult range of topics."
Provide better supplies	4	• "Having better robot equipment so we will know it's our coding or building that's malfunctioning."
Let students choose classes to take	3	• "It would be nice if we could choose our own classes."
More about STEM knowledge	3	• "Have students explore the different choices for STEM programs and then join the program."
Have more speakers	3	• "[Have] more interactive speakers." • "…invite actual engineer groups."
Have less lecture	2	• "Cut the lecture, be straight up with them."
Social activities	2	• "To show each job and having games or outside activities to get interested."
Have classes based on abilities	1	• "Cater classes towards student ability."
Different levels of classes	1	• "Maybe access the classes we take by what we know, our age and our grade."
Improve lectures	1	• "Know how the students learn. Visuals may help some more than others."
Increase Discussion	1	• "Let students participate more during the discussion."
Make it a longer program	1	• "Make the program longer."
Provide more money	1	• "Get paid."
More about Army	1	• "Maybe a further look into the Army for those that might be interested in the future. In the sense of seeing what being an army engineer/doctor could be like."
Provide more difficult material	1	• "Some of the experiments we conducted were not very enlightening and I think having a more difficult pace and material would improve the program."
Create more individualized tasks	1	• "More 1-on-1 tasks."

More balanced program	1	• "…find a balance between the fun competition and the actual learning."
More programs	1	• "More programs/classes."
More time for projects	1	• "Spend more time working on projects."
Selection of individuals	1	• "Make sure that they considering engineering because if they aren't interested, then they most likely won't pay attention."
Allow students to take home robots	1	• "…allowing them to take their robots with them would be mighty nice."

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Given the chance, would you participate in this UNITE program again? (n = 112)			
Broad Theme	**Narrow Theme**	**Freq.**	**Example Response(s)**
Yes		**107**	
	Academic research activities	39	• "…it taught me engineering skills." • "I learned a lot of things here. It made me use my critical thinking skills."
	General satisfaction	29	• "Overall, I liked the program." • "Yes, because I had fun learning this summer."
	STEM pathway	14	• "…it's a great experience and exposes you to the world of STEM."
	Networking	9	• "I loved meeting and interacting with new people."
	General	6	• "Yes, of course."
	Experience	3	• "…it has been a great experience."
	Interesting	3	• "I find it very interesting!"
	Hands on research activities	2	• "The program was hands on."
	Challenging	1	• "Yes, because it is challenging"
	Money	1	• "Yes, because we get money."
Conditional yes		**5**	
	Not eligible to return	3	• "If they would allow me to come back after I graduate I would because it is a good exposure to different things."
	Different topics	2	• "I would participate in a UNITE program again, but not this one."
No		**4**	
	No benefits or interests in STEM	3	• "No, I'm not as interested in Biomedical engineering."
	Too advanced for UNITE material	1	• "No, it was a waste of time for me because I've known about the various things presented and I was denied intellectual challenge."
Maybe		**2**	
	May do other programs	1	• "…it was very rewarding to be accepting in this program but I might do other programs."
	With more robotics	1	• "Maybe, depending if there is a Robotics II class."
Unsure		**1**	• "I'm not really sure."

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2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Are you interested in participating in any of the following Army Education Outreach Programs?			
	Yes – I am interested in participating	**No – I am not interested in participating**	**n**
Junior Science and Humanities Symposium (JSHS): A high school STEM research competition	51 (42%)	71 (58%)	122
West Point Bridge Contest: A computer-based engineering design competition for 6th - 12th grade	47 (39%)	74 (61%)	121
High School Internships: Internships in laboratories at colleges throughout the country with the Research & Engineering Apprenticeship Program (REAP) or the High School Apprenticeship Program (HSAP) or in Army laboratories through the Science & Engineering Apprenticeship Program (SEAP)	90 (74%)	32 (26%)	122
College Internships: Internships in laboratories at colleges throughout the country with the Undergraduate Research Apprenticeship Program (URAP) or in Army laboratories through College Qualified Leaders (CQL)	96 (79%)	26 (21%)	122

This summer, several students from last year's UNITE group were offered internships at college and university STEM labs through the REAP program. Did you know about this?		
	Freq.	**%**
No	77	65%
Yes	42	35%
Total	**119**	**100%**

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2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Do you think there is a benefit to having an internship after you experience UNITE? How do you think that an internship might help you prepare for college and a STEM career? (n = 109)			
Broad Theme	**Narrow Theme**	**Freq.**	**Example Response(s)**
Yes		**107**	• "Yes, it would be very beneficial."
STEM Pathway		**72**	
	Provides information/experience with a career	33	• "…an internship will help me because I will figure out if I like that certain field and if I want to pursue a job in that field." • "After doing the internship you will now have an idea on how it is like to work in a STEM based career."
	Preparation for college	19	• "…it will prepare you for what you will face in college." • "It can get you prepared in that field, so when you are in college you can get your degree at a high GPA."
	Solid preparation for the future	16	• "…the internship would be able to prepare me for what to expect."
	Experience real world environments	5	• "An internship gives you a little taste of the real world"
Hands-On Research Activities		**12**	
	Provides hands-on experience	12	• "[It helps] by providing the chance to gain hands on experiences, and I tend to learn better with hands on activities."
Academic Research Activities		**10**	
	Provides opportunities for learning	5	• "I think internships like this could help me learn more about STEM."
	Allows for networking	4	• "…through UNITE you gain more connections."
	Provides a good environment	1	• "…it is a professional environment where everyone wants to be learning and studying in a STEM field."
Unsure		**4**	• "I don't know."
No		**1**	• "[I am] used to free decisions and work environment."
Maybe		**1**	• "Might help because I will already be prepared."

If the opportunity to have a REAP internship near where you live exists in the future, are you interested in applying for it? (note that you can even participate if it is the summer between high school and college)		
	Freq.	**%**
No	20	17%
Yes	98	83%
Total	**118**	**100%**

Appendix C:
2013 UNITE Post-UNITE Student Questionnaire and Data Summary

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Educational Goals

Table 1. Matched-cases comparison of pre-UNITE and post-UNITE education goal levels.

Pre-Post comparison	Pre-UNITE % (SD)	Post-UNITE % (SD)	n	Diff.	*p*
STEM-related degrees	64.8% (.479)	68.4% (.467)	95	**3.6%**	1.00
Associates Non-STEM	2.1% (.143)	6.0% (.239)	95	**3.9%***	.031
Associates in STEM	7.6% (.266)	9.0% (.286)	95	**1.4%**	1.00
Bachelors Non-STEM	12.4% (.331)	5.3% (.224)	95	**-7.2%***	.021
Bachelor in STEM	15.9% (.367)	14.3% (.351)	95	**-1.6%**	.454
Masters Non-STEM	8.3% (.276)	9.8% (.298)	95	**1.5%**	.289
Masters in STEM	24.8% (.434)	21.8% (.414)	95	**-3.0%**	1.00
Doctoral Non-STEM	12.4% (.331)	10.5% (.308)	95	**-1.9%**	1.00
Doctoral in STEM	16.6% (.373)	23.3% (.424)	95	**6.8%**	.581

Note. * = $p < .05$. ***p*** = McNemar binomial test of significance for matched cases (two-tailed).

Table 2. Matched-cases comparison of pre-UNITE and post-UNITE STEM fields.

Pre-Post comparison	Pre-UNITE % (SD)	Post-UNITE % (SD)	n	Diff.	*p*
Engineering (e.g., technology, robotics, computers, etc.)	33.6% (.475)	34.4% (.477)	68	**-0.8%**	.754
Environmental Science (e.g., pollution, ecosystems, bioremediation, climatology, meteorology, etc.)	2.7% (.163)	.8% (.090)	68	**-1.9%**	1.00
Physical Science (e.g., physics, astronomy, etc.)	1.8% (.134)	.8% (.090)	68	**-1.0%**	1.00
Chemistry (e.g., geochemistry, material science, alternative fuels, etc.)	0.0% (.000)	1.6% (.127)	68	**1.6%**	1.00
Life Science (e.g., biology, animal science, ecology, etc.)	5.5% (.228)	2.5% (.155)	68	**-3.0%**	1.00
Medicine / Health (e.g., behavioral science, medicine, public health, etc.)	25.4% (.438)	29.5% (.457)	68	**4.1%**	1.00
Mathematics / Computer Science	8.2% (.275)	8.2% (.275)	68	**0.0%**	1.00
Social Science (e.g., sociology, psychology, economics, etc.)	5.5% (.228)	4.9% (.217)	68	**0.6%**	.500
Other STEM Field	1.8% (.134)	4.1% (.199)	68	**2.3%**	1.00
A field unrelated to STEM	15.5% (.363)	13.1% (.338)	68	**-2.4%**	.754

Note. * = $p < .05$. ***p*** = McNemar binomial test of significance for matched cases (two-tailed).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Educational Goals Certainty

Table 3. Matched-cases comparison of pre-UNITE and post-UNITE educational goal certainty.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will be admitted to my college and program of choice	4.87 (1.12)	4.85 (1.06)	97	**-.021**	.946	.831	-.022
I will attend college to pursue this educational degree	5.07 (1.20)	5.17 (1.02)	96	**.094**	1.206	.448	.078
I will get good grades in my classes	5.38 (.79)	5.36 (.76)	96	**-.010**	.888	.909	-.011
I will be able to overcome any obstacle between me and this educational degree	5.11 (.94)	5.22 (.82)	96	**.104**	1.021	.320	.102
I will finish this degree	5.38 (.93)	5.38 (.81)	96	**.000**	1.066	1.00	.000

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 3a. ASU: Matched-cases comparison of pre-UNITE and post-UNITE educational goal certainty.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will be admitted to my college and program of choice	5.33 (1.23)	5.17 (1.34)	12	**-.167**	1.337	.674	-.125
I will attend college to pursue this educational degree	5.25 (1.48)	5.25 (1.14)	12	**.000**	1.809	1.00	.000
I will get good grades in my classes	5.58 (0.67)	5.75 (0.45)	12	**.167**	.389	.166	.429
I will be able to overcome any obstacle between me and this educational degree	5.25 (0.75)	5.58 (0.67)	12	**.333**	.778	.166	.428
I will finish this degree	5.67 (0.49)	5.58 (0.67)	12	**-.083**	.669	.674	-.124

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 3b. CCNY: Matched-cases comparison of pre-UNITE and post-UNITE educational goal certainty.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will be admitted to my college and program of choice	4.50 (1.69)	4.88 (1.25)	8	**.375**	.744	.197	.504
I will attend college to pursue this educational degree	5.00 (.93)	5.25 (.71)	8	**.250**	.707	.351	.354
I will get good grades in my classes	5.50 (.53)	5.25 (.71)	8	**-.250**	.463	.170	-.540
I will be able to overcome any obstacle between me and this educational degree	5.00 (1.07)	5.38 (.74)	8	**.375**	.916	.285	.409
I will finish this degree	5.38 (.74)	5.63 (.52)	8	**.250**	.463	.170	.540

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 3c. JSU: Matched-cases comparison of pre-UNITE and post-UNITE educational goal certainty.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will be admitted to my college and program of choice	4.85 (0.69)	5.23 (1.01)	13	**.385**	.870	.137	.443
I will attend college to pursue this educational degree	4.77 (1.24)	5.23 (0.93)	13	**.462**	1.198	.190	.386
I will get good grades in my classes	5.31 (0.85)	5.62 (0.65)	13	**.308**	.751	.165	.410
I will be able to overcome any obstacle between me and this educational degree	4.92 (0.95)	5.31 (0.85)	13	**.385**	1.044	.209	.369
I will finish this degree	5.31 (0.63)	5.23 (1.01)	13	**-.077**	.760	.721	-.101

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 3d. MTU: Matched-cases comparison of pre-UNITE and post-UNITE educational goal certainty.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will be admitted to my college and program of choice	4.40 (.70)	4.70 (.82)	10	**.300**	.823	.279	.365
I will attend college to pursue this educational degree	5.10 (.88)	5.00 (.82)	10	**-.100**	.316	.343	-.316
I will get good grades in my classes	5.30 (.67)	5.20 (.63)	10	**-.100**	.568	.591	-.176
I will be able to overcome any obstacle between me and this educational degree	5.10 (.74)	4.80 (.79)	10	**-.300**	.483	.081	-.621
I will finish this degree	5.30 (.82)	5.00 (.67)	10	**-.300**	.675	.193	-.444

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p***= paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 3e. NJIT: Matched-cases comparison of pre-UNITE and post-UNITE educational goal certainty.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will be admitted to my college and program of choice	5.25 (.62)	5.08 (.79)	12	**-.167**	.577	.339	-.289
I will attend college to pursue this educational degree	5.58 (.67)	5.67 (.65)	12	**.083**	.900	.754	.092
I will get good grades in my classes	5.42 (.51)	5.50 (.52)	12	**.083**	.289	.339	.287
I will be able to overcome any obstacle between me and this educational degree	5.25 (.62)	5.42 (.51)	12	**.167**	.577	.339	.289
I will finish this degree	5.75 (.45)	5.25 (.75)	12	**-.500**	.905	.082	-.552

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

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2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 3f. SDSMT: Matched-cases comparison of pre-UNITE and post-UNITE educational goal certainty.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***P***	***d***
I will be admitted to my college and program of choice	4.29 (1.20)	4.21 (1.05)	14	**-.071**	1.385	.850	-.051
I will attend college to pursue this educational degree	4.71 (1.27)	4.29 (1.33)	14	**-.429**	1.785	.385	-.240
I will get good grades in my classes	5.21 (.70)	4.71 (1.20)	14	**-.500**	1.286	.169	-.389
I will be able to overcome any obstacle between me and this educational degree	5.29 (1.07)	4.86 (1.10)	14	**-.429**	1.785	.385	-.240
I will finish this degree	5.36 (.63)	5.07 (1.21)	14	**-.286**	1.541	.500	-.186

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 3g. TSU: Matched-cases comparison of pre-UNITE and post-UNITE educational goal certainty.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***P***	***d***
I will be admitted to my college and program of choice	5.07 (1.15)	4.79 (1.03)	28	**-.286***	.659	.030	-.434
I will attend college to pursue this educational degree	5.11 (1.37)	5.37 (.93)	27	**.259**	.944	.166	.274
I will get good grades in my classes	5.37 (1.04)	5.44 (.58)	27	**.074**	1.141	.739	.065
I will be able to overcome any obstacle between me and this educational degree	5.04 (1.13)	5.22 (.80)	27	**.185**	.834	.259	.222
I will finish this degree	5.15 (1.43)	5.63 (.56)	27	**.481**	1.221	.051	.394

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

STEM Jobs/Careers Certainty

Table 4. Matched-cases comparison of pre-UNITE and post-UNITE intentions to pursue STEM Jobs/careers.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
I will apply for jobs in a STEM-related field	4.22 (1.45)	4.31 (1.30)	97	**.093**	.990	.358	.094
I will get a job in a STEM field	4.03 (1.46)	4.23 (1.33)	95	**.200***	.963	.046	.208
I will build a career around my STEM skills	4.29 (1.44)	4.43 (1.32)	93	**.140**	1.079	.216	.130
I will pursue STEM jobs within the Army	2.31 (1.39)	2.70 (1.36)	93	**.387***	1.368	.008	.283
I will build a STEM career within the Army	2.19 (1.31)	2.63 (1.34)	94	**.436***	1.160	.000	.376

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 4a. ASU: Matched-cases comparison of pre-UNITE and post-UNITE intentions to pursue STEM Jobs/careers.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
I will apply for jobs in a STEM-related field	4.08 (1.83)	4.25 (1.82)	12	**.167**	1.267	.658	.132
I will get a job in a STEM field	3.67 (1.78)	4.33 (1.83)	12	**.667***	.888	.025	.751
I will build a career around my STEM skills	4.00 (1.86)	4.17 (1.85)	12	**.167**	.888	.615	.188
I will pursue STEM jobs within the Army	2.00 (1.21)	2.67 (1.44)	12	**.667***	.888	.025	.751
I will build a STEM career within the Army	1.82 (1.25)	2.55 (1.44)	12	**.727***	.905	.024	.803

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 4b. CCNY: Matched-cases comparison of pre-UNITE and post-UNITE intentions to pursue STEM Jobs/careers.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
I will apply for jobs in a STEM-related field	4.71 (.95)	5.29 (.49)	7	**.571**	.787	.103	.726
I will get a job in a STEM field	4.43 (.98)	5.00 (.82)	7	**.571***	.535	.030	1.067
I will build a career around my STEM skills	4.67 (.82)	5.17 (.75)	6	**.500**	.548	.076	.912
I will pursue STEM jobs within the Army	2.57 (1.40)	2.43 (1.40)	7	**-.143**	.900	.689	-.159
I will build a STEM career within the Army	2.71 (1.38)	2.43 (1.38)	7	**-.286**	.951	.457	-.301

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 4c. JSU: Matched-cases comparison of pre-UNITE and post-UNITE intentions to pursue STEM Jobs/careers.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
I will apply for jobs in a STEM-related field	4.00 (1.35)	4.15 (1.21)	13	**.154**	1.144	.636	.135
I will get a job in a STEM field	3.54 (1.45)	4.46 (1.27)	13	**.385**	1.193	.268	.323
I will build a career around my STEM skills	4.15 (1.35)	4.46 (1.27)	13	**.308**	1.377	.436	.224
I will pursue STEM jobs within the Army	1.46 (.78)	2.31 (.95)	13	**.846***	1.345	.043	.629
I will build a STEM career within the Army	1.23 (.44)	2.08 (1.04)	13	**.846***	.987	.009	.857

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:

2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 4d. MTU: Matched-cases comparison of pre-UNITE and post-UNITE intentions to pursue STEM Jobs/careers.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will apply for jobs in a STEM-related field	3.90 (1.29)	4.20 (.92)	10	**.300**	.675	.193	.444
I will get a job in a STEM field	4.00 (1.25)	4.30 (1.06)	10	**.300**	.949	.343	.316
I will build a career around my STEM skills	4.30 (1.42)	4.50 (1.08)	10	**.200**	1.135	.591	.176
I will pursue STEM jobs within the Army	2.20 (.92)	2.70 (.48)	10	**.500***	.527	.015	.949
I will build a STEM career within the Army	2.10 (.88)	2.80 (.63)	10	**.700***	.483	.001	1.44 9

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p***= paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 4e. NJIT: Matched-cases comparison of pre-UNITE and post-UNITE intentions to pursue STEM Jobs/careers.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will apply for jobs in a STEM-related field	3.92 (1.68)	4.00 (1.48)	12	**.083**	1.311	.830	.063
I will get a job in a STEM field	3.82 (1.60)	3.91 (1.45)	12	**.091**	.944	.756	.096
I will build a career around my STEM skills	3.64 (1.75)	4.00 (1.61)	11	**.364**	1.433	.420	.254
I will pursue STEM jobs within the Army	2.58 (1.68)	2.67 (1.44)	12	**.083**	1.621	.862	.051
I will build a STEM career within the Army	2.58 (1.68)	2.67 (1.44)	12	**.083**	1.621	.862	.051

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 4f. SDSMT: Matched-cases comparison of pre-UNITE and post-UNITE intentions to pursue STEM Jobs/careers.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I will apply for jobs in a STEM-related field	3.93 (1.33)	3.57 (1.16)	14	**-.357**	.929	.174	-.384
I will get a job in a STEM field	3.79 (1.25)	3.43 (1.22)	14	**-.357**	.842	.136	-.424
I will build a career around my STEM skills	3.71 (1.33)	3.79 (1.19)	14	**.071**	.829	.752	.086
I will pursue STEM jobs within the Army	3.62 (1.71)	3.46 (1.45)	13	**-.154**	1.951	.781	-.079
I will build a STEM career within the Army	3.14 (1.51)	3.36 (1.22)	14	**.214**	1.311	.551	.163

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 4g. TSU: Matched-cases comparison of pre-UNITE and post-UNITE intentions to pursue STEM Jobs/careers.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
I will apply for jobs in a STEM-related field	4.62 (1.45)	4.69 (1.17)	29	**.069**	.799	.646	.086
I will get a job in a STEM field	4.54 (1.48)	4.64 (1.19)	28	**.107**	.956	.558	.112
I will build a career around my STEM skills	4.96 (1.13)	4.85 (1.06)	27	**-.111**	.974	.558	-.114
I will pursue STEM jobs within the Army	2.08 (1.20)	2.62 (1.60)	26	**.538**	1.392	.060	.386
I will build a STEM career within the Army	2.04 (1.13)	2.52 (1.55)	27	**.481***	1.189	.045	.405

Note. * = p < .05; **n** = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Confidence (collaboration skills and abilities, abilities to apply STEM)

Table 5. Matched-cases comparison of pre-UNITE and post-UNITE confidence.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
I am confident in my intellectual abilities	5.10 (.71)	5.14 (.80)	97	**.041**	.789	.608	.052
I am confident in my social abilities	4.74 (1.15)	4.98 (.91)	97	**.237***	.899	.012	.264
I am confident in my ability to lead teams	4.80 (1.17)	4.93 (1.00)	97	**.124**	.869	.164	.143
I am confident in my abilities to work on teams	5.12 (.84)	5.15 (.82)	78	**-.038**	.829	.684	-.046
I am confident in my ability to apply Mathematics to solve real world problems.	4.90 (.90)	4.81 (.96)	98	**-.092**	.953	.344	-.097
I am confident in my ability to apply Science to solve real world problems.	4.64 (.96)	4.75 (.86)	96	**.115**	.893	.212	.129
I am confident in my ability to apply Engineering principles to solve real world problems.	4.49 (1.04)	4.68 (.97)	98	**.194**	1.109	.088	.175
I am confident when I communicate my ideas to other people	4.82 (1.10)	4.92 (.98)	98	**.102**	.914	.272	.112

Note. * = p < .05; **n** = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 5a. ASU: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my intellectual abilities	5.25 (.87)	5.50 (.90)	12	**.250**	.754	.275	.332
I am confident in my social abilities	5.00 (.95)	5.42 (.79)	12	**.417**	.793	.096	.526
I am confident in my ability to lead teams	5.25 (1.42)	5.25 (1.14)	12	**.000**	.853	1.00	.000
I am confident in my abilities to work on teams	5.58 (.67)	5.33 (.89)	12	**-.250**	.622	.191	-.402
I am confident in my ability to apply Mathematics to solve real world problems.	5.08 (1.00)	5.00 (1.04)	12	**-.083**	1.165	.809	-.071
I am confident in my ability to apply Science to solve real world problems.	4.64 (.67)	5.00 (1.00)	11	**.364**	.924	.221	.394
I am confident in my ability to apply Engineering principles to solve real world problems.	4.33 (1.15)	4.92 (1.44)	12	**.583***	.900	.046	.648
I am confident when I communicate my ideas to other people	5.58 (.67)	5.33 (.89)	12	**-.250**	.622	.191	-.402

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 5b. CCNY: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my intellectual abilities	5.13 (.64)	5.13 (.83)	8	**.000**	.535	1.00	.000
I am confident in my social abilities	4.25 (1.49)	4.63 (.92)	8	**.375**	.916	.285	.409
I am confident in my ability to lead teams	4.25 (1.16)	4.50 (1.07)	8	**.250**	.463	.170	.540
I am confident in my abilities to work on teams	4.13 (.99)	4.75 (1.04)	8	**.625***	.744	.049	.840
I am confident in my ability to apply Mathematics to solve real world problems.	4.88 (.64)	4.88 (.64)	7	**.000**	.756	1.00	.000
I am confident in my ability to apply Science to solve real world problems.	4.50 (.93)	4.75 (.89)	7	**.250**	.463	.170	.540
I am confident in my ability to apply Engineering principles to solve real world problems.	4.50 (.76)	5.00 (.53)	7	**.500***	.535	.033	.935
I am confident when I communicate my ideas to other people	4.13 (.99)	4.75 (1.04)	8	**.625***	.744	.049	.840

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 5c. JSU: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my intellectual abilities	5.31 (.63)	5.46 (.78)	13	**.154**	.899	.549	.171
I am confident in my social abilities	4.85 (1.21)	5.00 (1.22)	13	**.154**	.801	.502	.192
I am confident in my ability to lead teams	4.23 (1.01)	4.69 (1.11)	13	**.462**	.877	.082	.527
I am confident in my abilities to work on teams	4.77 (1.17)	4.85 (1.28)	13	**.077**	.494	.584	.156
I am confident in my ability to apply Mathematics to solve real world problems.	4.85 (1.14)	5.23 (.93)	13	**.385**	1.261	.293	.305
I am confident in my ability to apply Science to solve real world problems.	4.23 (1.24)	4.62 (.77)	13	**.385**	1.502	.374	.256
I am confident in my ability to apply Engineering principles to solve real world problems.	4.15 (1.07)	4.69 (1.03)	13	**.538**	1.561	.237	.345
I am confident when I communicate my ideas to other people	5.00 (1.00)	5.15 (1.14)	13	**.154**	.987	.584	.156

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 5d. MTU: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my intellectual abilities	5.10 (.74)	5.00 (.67)	10	**-.100**	.568	.591	-.176
I am confident in my social abilities	4.50 (.97)	4.80 (.63)	10	**.300**	.675	.193	.444
I am confident in my ability to lead teams	5.10 (.88)	5.00 (.82)	10	**-.100**	.738	.678	-.136
I am confident in my abilities to work on teams	4.50 (1.18)	4.70 (.95)	10	**.200**	1.033	.555	.194
I am confident in my ability to apply Mathematics to solve real world problems.	5.10 (.74)	4.60 (.84)	10	**-.500**	.850	.096	-.588
I am confident in my ability to apply Science to solve real world problems.	5.22 (.83)	4.78 (.83)	9	**-.444**	.726	.104	-.612
I am confident in my ability to apply Engineering principles to solve real world problems.	4.60 (.84)	4.30 (.95)	10	**-.300**	1.337	.496	-.224
I am confident when I communicate my ideas to other people	5.00 (.94)	4.90 (.88)	10	**-.100**	.738	.678	-.136

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

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Table 5e. NJIT: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my intellectual abilities	5.33 (.49)	5.08 (.67)	12	**-.250**	.754	.275	-.332
I am confident in my social abilities	5.08 (.90)	5.17 (1.03)	12	**.083**	.900	.754	.092
I am confident in my ability to lead teams	5.55 (.52)	5.64 (.50)	11	**.091**	.701	.676	.130
I am confident in my abilities to work on teams	5.00 (.95)	5.33 (.89)	12	**.333**	.888	.220	.375
I am confident in my ability to apply Mathematics to solve real world problems.	5.08 (.79)	4.83 (.83)	12	**-.250**	.452	.082	-.553
I am confident in my ability to apply Science to solve real world problems.	4.75 (.97)	4.83 (.72)	12	**.083**	.515	.586	.161
I am confident in my ability to apply Engineering principles to solve real world problems.	4.58 (1.00)	4.58 (.67)	12	**.000**	.739	1.00	.000
I am confident when I communicate my ideas to other people	5.42 (.67)	5.25 (.45)	12	**-.167**	.835	.504	-.200

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p***= paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 5f. SDSMT: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my intellectual abilities	4.86 (.86)	4.86 (.95)	14	**.000**	1.109	1.00	.000
I am confident in my social abilities	5.14 (.66)	5.00 (.88)	14	**-.143**	1.167	.655	-.123
I am confident in my ability to lead teams	4.93 (1.27)	4.86 (1.03)	14	**-.071**	1.385	.850	-.051
I am confident in my abilities to work on teams	4.93 (1.49)	4.79 (1.19)	14	**-.143**	1.292	.686	-.111
I am confident in my ability to apply Mathematics to solve real world problems.	4.57 (1.16)	4.50 (1.22)	14	**-.071**	1.207	.828	-.059
I am confident in my ability to apply Science to solve real world problems.	4.50 (1.09)	4.43 (.94)	14	**-.071**	.829	.752	-.086
I am confident in my ability to apply Engineering principles to solve real world problems.	4.64 (1.28)	4.43 (1.02)	14	**-.214**	1.369	.568	-.156
I am confident when I communicate my ideas to other people	5.29 (.73)	5.07 (.92)	14	**-.214**	.802	.336	-.267

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:

2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 5g. TSU: Matched-cases comparison of pre-UNITE and post-UNITE confidence.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
I am confident in my intellectual abilities	4.96 (.69)	5.07 (.77)	28	**.107**	.737	.449	.145
I am confident in my social abilities	4.46 (1.37)	4.86 (.85)	28	**.393***	.916	.032	.429
I am confident in my ability to lead teams	4.59 (1.18)	4.76 (.99)	29	**.172**	.759	.232	.227
I am confident in my abilities to work on teams	4.69 (.93)	4.79 (.77)	29	**.103**	.939	.558	.110
I am confident in my ability to apply Mathematics to solve real world problems.	4.86 (0.79)	4.72 (0.96)	29	**-.138**	.789	.355	-.175
I am confident in my ability to apply Science to solve real world problems.	4.69 (0.89)	4.83 (0.89)	29	**.138**	.789	.355	.175
I am confident in my ability to apply Engineering principles to solve real world problems.	4.55 (1.06)	4.79 (0.9)	29	**.241**	.912	.165	.264
I am confident when I communicate my ideas to other people	5.10 (.82)	5.14 (.79)	29	**.034**	.823	.823	.041

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

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Confidence (engineering skills and abilities)

Table 6. Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my critical thinking skills.	4.93 (.84)	4.95 (.79)	98	**.020**	.812	.804	.025
I am confident that I can find creative solutions to problems.	5.01 (.82)	5.01 (.82)	97	**.000**	.854	1.00	.000
I am confident that I can identify, formulate, and solve engineering problems.	4.44 (1.06)	4.67 (.97)	97	**.227***	.984	.026	.231
I am confident that I can design and conduct meaningful experiments.	4.60 (1.12)	4.70 (.91)	98	**.102**	.902	.266	.113
I am confident that I can effectively analyze and interpret data.	4.68 (1.06)	4.77 (.95)	98	**.082**	1.002	.422	.082
I am confident in my computer programming skills.	4.21 (1.26)	4.39 (1.20)	97	**.186**	1.064	.090	.175

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 6a. ASU: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my critical thinking skills.	5.33 (.78)	5.50 (.80)	12	**.167**	.718	.438	.233
I am confident that I can find creative solutions to problems.	5.50 (.52)	5.58 (.52)	12	**.083**	.669	.674	.124
I am confident that I can identify, formulate, and solve engineering problems.	4.33 (1.44)	4.92 (1.38)	12	**.583**	1.165	.111	.500
I am confident that I can design and conduct meaningful experiments.	4.75 (1.42)	4.92 (1.51)	12	**.167**	1.030	.586	.162
I am confident that I can effectively analyze and interpret data.	4.50 (1.17)	5.08 (1.17)	12	**.583**	1.084	.089	.538
I am confident in my computer programming skills.	4.33 (1.56)	5.08 (1.38)	12	**.750**	1.215	.056	.617

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

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2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 6b. CCNY: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my critical thinking skills.	4.63 (.92)	4.75 (.89)	8	**.125**	.354	.351	.353
I am confident that I can find creative solutions to problems.	4.63 (.74)	5.00 (.54)	8	**.375**	.518	.080	.724
I am confident that I can identify, formulate, and solve engineering problems.	4.25 (.89)	4.88 (.64)	8	**.625***	.744	.049	.840
I am confident that I can design and conduct meaningful experiments.	4.25 (1.04)	4.75 (.71)	8	**.500**	.756	.104	.661
I am confident that I can effectively analyze and interpret data.	4.63 (1.06)	4.88 (.84)	8	**.250**	1.035	.516	.242
I am confident in my computer programming skills.	3.75 (.71)	4.38 (1.19)	8	**.625**	.916	.095	.682

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 6c. JSU: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my critical thinking skills.	5.00 (.91)	5.00 (.71)	13	**.000**	1.080	1.00	.000
I am confident that I can find creative solutions to problems.	4.77 (1.09)	4.77 (.83)	13	**.000**	.913	1.00	.000
I am confident that I can identify, formulate, and solve engineering problems.	4.08 (1.19)	4.69 (.86)	13	**.615**	1.325	.120	.464
I am confident that I can design and conduct meaningful experiments.	4.46 (1.13)	4.85 (.90)	13	**.385**	.961	.175	.401
I am confident that I can effectively analyze and interpret data.	4.85 (.69)	4.92 (.76)	13	**.077**	.954	.776	.081
I am confident in my computer programming skills.	4.38 (1.12)	4.69 (1.11)	13	**.308**	1.182	.367	.261

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 6d. MTU: Matched-cases comparison of pre-UNITE and post-UNITE confidence.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
I am confident in my critical thinking skills.	4.80 (.92)	4.90 (.57)	13	**.100**	.738	.678	.136
I am confident that I can find creative solutions to problems.	4.90 (.74)	5.00 (.82)	13	**.100**	.738	.678	.136
I am confident that I can identify, formulate, and solve engineering problems.	4.40 (.70)	4.60 (.84)	13	**.200**	.632	.343	.316
I am confident that I can design and conduct meaningful experiments.	4.20 (.79)	4.30 (.68)	13	**.100**	.738	.678	.136
I am confident that I can effectively analyze and interpret data.	4.30 (.82)	4.50 (.71)	13	**.200**	.699	.104	.286
I am confident in my computer programming skills.	3.44 (1.01)	3.89 (.78)	13	**.200**	.789	.443	.253

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 6e. NJIT: Matched-cases comparison of pre-UNITE and post-UNITE confidence.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***p***	***d***
I am confident in my critical thinking skills.	5.25 (.87)	5.00 (.85)	12	**-.250**	.866	.339	-.289
I am confident that I can find creative solutions to problems.	5.42 (.79)	5.08 (.90)	12	**-.333**	.888	.220	.375
I am confident that I can identify, formulate, and solve engineering problems.	4.82 (.87)	4.45 (.69)	11	**-.364**	.809	.167	-.450
I am confident that I can design and conduct meaningful experiments.	5.00 (.85)	4.58 (.51)	12	**-.417**	.793	.096	-.526
I am confident that I can effectively analyze and interpret data.	5.00 (.74)	4.75 (1.06)	12	**.333**	1.670	.504	.199
I am confident in my computer programming skills.	4.50 (1.09)	4.08 (1.38)	12	**-.250**	.866	.339	-.289

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

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Table 6f. SDSMT: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my critical thinking skills.	4.57 (.76)	4.64 (.84)	14	**.071**	.616	.671	.115
I am confident that I can find creative solutions to problems.	5.00 (.82)	4.62 (.96)	13	**-.385**	.768	.096	-.501
I am confident that I can identify, formulate, and solve engineering problems.	4.64 (1.01)	4.50 (1.22)	14	**-.143**	.864	.547	-.166
I am confident that I can design and conduct meaningful experiments.	4.50 (1.29)	4.57 (1.02)	14	**.071**	.829	.752	.086
I am confident that I can effectively analyze and interpret data.	4.43 (1.55)	4.36 (1.01)	14	**.214**	.975	.426	.219
I am confident in my computer programming skills.	4.43 (1.45)	4.21 (1.25)	14	**-.071**	1.269	.836	-.056

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 6g. TSU: Matched-cases comparison of pre-UNITE and post-UNITE confidence.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I am confident in my critical thinking skills.	4.90 (.77)	4.90 (.77)	29	**.000**	.926	1.00	.000
I am confident that I can find creative solutions to problems.	4.90 (.90)	5.03 (.82)	29	**.138**	.990	.459	.139
I am confident that I can identify, formulate, and solve engineering problems.	4.48 (1.09)	4.69 (.93)	29	**.207**	.902	.227	.229
I am confident that I can design and conduct meaningful experiments.	4.72 (1.13)	4.79 (.82)	29	**.069**	.961	.702	.072
I am confident that I can effectively analyze and interpret data.	4.83 (1.07)	4.83 (.97)	29	**.241**	.988	.199	.244
I am confident in my computer programming skills.	4.21 (1.32)	4.34 (1.14)	29	**.000**	.964	1.00	.000

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Engineering attitudes (exposure and intentions to pursue engineering)

Table 7. Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*p*	*d*
I personally know at least one college student who is majoring in engineering.	4.14 (1.61)	4.37 (1.52)	98	**.224**	1.396	.116	.160
I personally know at least one working engineer.	4.29 (1.65)	4.51 (1.59)	96	**.219***	1.078	.050	.203
I know what high school classes I need to take so I am ready to be an engineering major in college.	4.12 (1.47)	4.18 (1.31)	98	**.061**	1.299	.642	.047
I am going to major in engineering in college.	3.80 (1.60)	3.82 (1.52)	97	**.021**	1.207	.868	.017
I am aware of several kinds of engineering majors that are available to me.	4.49 (1.52)	4.77 (1.31)	97	**.278***	1.078	.014	.258
I am going to work in engineering for my career.	3.71 (1.54)	3.79 (1.46)	98	**.071**	1.254	.574	.057
I am aware of several professional engineering societies.	3.83 (1.59)	4.10 (1.43)	98	**.276***	1.266	.034	.218
I think that I will become a member of a professional engineering society someday.	3.60 (1.59)	3.57 (1.37)	97	**-.031**	1.303	.816	-.024

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***p*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 7a. ASU: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
I personally know at least one college student who is majoring in engineering.	3.50 (2.07)	3.58 (1.98)	12	**.083**	1.084	.795	.077
I personally know at least one working engineer.	4.00 (2.17)	4.25 (1.86)	12	**.250**	1.055	.429	.237
I know what high school classes I need to take so I am ready to be an engineering major in college.	3.75 (1.60)	4.25 (1.36)	12	**.500**	1.168	.166	.428
I am going to major in engineering in college.	2.67 (1.83)	3.33 (1.83)	12	**.667**	1.371	.120	.487
I am aware of several kinds of engineering majors that are available to me.	3.83 (2.12)	4.83 (1.40)	12	**1.000**	1.595	.053	.627
I am going to work in engineering for my career.	2.67 (1.67)	3.50 (1.73)	12	**.833***	.937	.010	.889
I am aware of several professional engineering societies.	3.42 (2.11)	4.33 (1.67)	12	**.917**	1.621	.076	.566
I think that I will become a member of a professional engineering society someday.	2.75 (1.96)	3.42 (1.68)	12	**.667**	1.231	.087	.542

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

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Table 7b. CCNY: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
I personally know at least one college student who is majoring in engineering.	4.25 (1.28)	4.75 (1.58)	8	**.500**	1.414	.351	.354
I personally know at least one working engineer.	3.88 (1.46)	4.13 (1.81)	8	**.250**	1.035	.516	.242
I know what high school classes I need to take so I am ready to be an engineering major in college.	4.88 (.64)	5.00 (.76)	8	**.125**	.641	.598	.195
I am going to major in engineering in college.	4.50 (.93)	5.00 (1.31)	8	**.500**	1.195	.275	.418
I am aware of several kinds of engineering majors that are available to me.	4.88 (1.13)	5.50 (.76)	8	**.625***	.744	.049	.840
I am going to work in engineering for my career.	4.50 (.93)	5.00 (.76)	8	**.500**	.756	.104	.661
I am aware of several professional engineering societies.	3.63 (1.77)	4.13 (1.46)	8	**.500**	1.069	.227	.468
I think that I will become a member of a professional engineering society someday.	4.25 (1.04)	4.25 (1.04)	8	**.000**	1.309	1.00	.000

Note. * = $p < .05$; **n** = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 7c. JSU: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
I personally know at least one college student who is majoring in engineering.	3.38 (1.66)	4.46 (1.27)	13	**1.077***	1.441	.020	.747
I personally know at least one working engineer.	3.92 (1.75)	4.69 (1.65)	13	**.769***	1.092	.026	.704
I know what high school classes I need to take so I am ready to be an engineering major in college.	4.00 (1.53)	4.54 (.97)	13	**.538**	2.066	.366	.260
I am going to major in engineering in college.	3.33 (1.72)	4.08 (1.38)	12	**.750**	1.357	.082	.553
I am aware of several kinds of engineering majors that are available to me.	4.38 (1.61)	4.92 (1.44)	13	**.538**	1.050	.089	.512
I am going to work in engineering for my career.	3.31 (1.70)	3.92 (1.19)	13	**.615**	1.660	.206	.370
I am aware of several professional engineering societies.	3.62 (1.50)	4.00 (1.78)	13	**.385**	1.261	.293	.305
I think that I will become a member of a professional engineering society someday.	2.92 (1.66)	3.62 (1.26)	13	**.692**	1.377	.095	.503

Note. * = $p < .05$; **n** = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

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2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 7d. MTU: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
I personally know at least one college student who is majoring in engineering.	4.30 (1.42)	5.10 (.99)	10	**.800***	1.033	.037	.774
I personally know at least one working engineer.	4.90 (1.37)	4.90 (.99)	10	**.000**	.816	1.00	.000
I know what high school classes I need to take so I am ready to be an engineering major in college.	3.50 (1.43)	3.80 (1.48)	10	**.300**	1.160	.434	.259
I am going to major in engineering in college.	3.30 (1.34)	3.10 (1.37)	10	**-.200**	.632	.343	-.316
I am aware of several kinds of engineering majors that are available to me.	4.11 (1.76)	4.56 (1.88)	9	**.444**	1.333	.347	.333
I am going to work in engineering for my career.	3.10 (1.20)	3.30 (1.49)	10	**.200**	.919	.509	.218
I am aware of several professional engineering societies.	3.90 (1.85)	3.80 (1.75)	10	**-.100**	1.287	.811	-.078
I think that I will become a member of a professional engineering society someday.	3.33 (1.32)	3.22 (1.48)	9	**-.111**	1.167	.782	-.095

Note. * = p < .05; **n** = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 7e. NJIT: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
I personally know at least one college student who is majoring in engineering.	4.67 (1.30)	3.83 (1.47)	12	**-.833**	1.586	.096	-.525
I personally know at least one working engineer.	4.27 (1.62)	3.82 (1.78)	11	**-.455**	.688	.053	-.661
I know what high school classes I need to take so I am ready to be an engineering major in college.	3.83 (1.59)	3.42 (1.62)	12	**-.417**	1.311	.295	-.318
I am going to major in engineering in college.	2.75 (1.60)	2.42 (1.24)	12	**-.333**	1.073	.305	-.310
I am aware of several kinds of engineering majors that are available to me.	4.00 (1.60)	3.92 (1.31)	12	**-.083**	.669	.674	-.124
I am going to work in engineering for my career.	2.83 (1.53)	2.50 (1.24)	12	**-.333**	1.073	.305	-.310
I am aware of several professional engineering societies.	3.50 (2.02)	3.42 (1.08)	12	**-.083**	1.311	.830	-.063
I think that I will become a member of a professional engineering society someday.	2.58 (1.73)	2.33 (0.89)	12	**-.250**	1.545	.586	-.162

Note. * = p < .05; **n** = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 7f. SDSMT: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
I personally know at least one college student who is majoring in engineering.	4.36 (1.65)	4.36 (1.45)	14	**.000**	1.754	1.00	.000
I personally know at least one working engineer.	4.07 (1.64)	3.93 (1.73)	14	**-.143**	1.460	.720	-.098
I know what high school classes I need to take so I am ready to be an engineering major in college.	4.00 (1.92)	3.57 (1.45)	14	**-.429**	1.222	.212	-.351
I am going to major in engineering in college.	4.50 (1.40)	3.71 (1.44)	14	**-.786**	1.672	.102	-.470
I am aware of several kinds of engineering majors that are available to me.	4.71 (1.20)	4.21 (1.12)	14	**-.500**	.941	.068	-.531
I am going to work in engineering for my career.	4.36 (1.45)	3.50 (1.40)	14	**-.857**	1.657	.075	-.517
I am aware of several professional engineering societies.	4.29 (1.14)	4.21 (1.25)	14	**-.071**	.997	.793	-.071
I think that I will become a member of a professional engineering society someday.	4.29 (1.49)	3.64 (1.50)	14	**-.643**	1.598	.156	-.402

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Table 7g. TSU: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
I personally know at least one college student who is majoring in engineering.	4.34 (1.59)	4.52 (1.53)	29	**.172**	1.071	.394	.161
I personally know at least one working engineer.	4.61 (1.55)	5.07 (1.27)	28	**.464***	.962	.017	.482
I know what high school classes I need to take so I am ready to be an engineering major in college.	4.52 (1.21)	4.52 (1.06)	29	**.000**	1.069	1.00	.000
I am going to major in engineering in college.	4.55 (1.18)	4.48 (1.12)	29	**-.069**	.651	.573	-.106
I am aware of several kinds of engineering majors that are available to me.	4.93 (1.22)	5.17 (1)	29	**.241**	.786	.109	.307
I am going to work in engineering for my career.	4.38 (1.21)	4.34 (1.26)	29	**-.034**	.906	.839	-.038
I am aware of several professional engineering societies.	4.03 (1.27)	4.38 (1.24)	29	**.345**	1.233	.143	.280
I think that I will become a member of a professional engineering society someday.	4.24 (1.12)	4 (1.16)	29	**-.241**	.872	.147	-.276

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Engineering attitudes (motivations to pursue engineering, disengagement with STEM)

Table 8. Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
My parents want me to become an engineer.	3.70 (1.64)	3.79 (1.45)	96	**.094**	1.067	.392	.088
Technology can help solve society's problems.	4.89 (1.12)	4.94 (.95)	96	**.052**	.977	.604	.053
Engineers can help fix many of the world's problems.	4.93 (1.15)	4.99 (1.02)	96	**.063**	1.113	.584	.057
An engineering degree will guarantee me a job when I graduate.	4.40 (1.24)	4.51 (1.24)	96	**.115**	1.213	.358	.095
Having strong Mathematics abilities is very important to me.	5.11 (1.08)	5.06 (.92)	96	**-.052**	.944	.590	-.055
Sometimes I skip math, science, or engineering classes.	1.62 (1.13)	1.63 (1.13)	95	**.011**	1.325	.938	.008
My Science abilities are very important to my success.	4.94 (1.07)	4.75 (1.14)	96	**-.188**	.955	.058	-.197
I am often late to math, science, or engineering classes.	1.79 (1.30)	1.68 (1.14)	97	**-.113**	1.554	.474	.073
It is very important that I can apply Science and Math to solve real-world problems.	5.01 (1.12)	4.84 (1.04)	97	**-.175***	.829	.040	-.211
I think math, science, and engineering classes are boring.	2.36 (1.36)	2.36 (1.42)	96	**.000**	1.407	1.00	.000
It is important that I can effectively perform as part of a team.	5.16 (.95)	5.27 (.81)	97	**.103**	.848	.234	.121

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 8a. ASU: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
My parents want me to become an engineer.	2.67 (1.87)	3.00 (1.76)	12	**.333**	.778	.166	.428
Technology can help solve society's problems.	4.75 (1.22)	5.17 (.94)	12	**.417**	.900	.137	.463
Engineers can help fix many of the world's problems.	4.50 (1.38)	4.83 (1.53)	12	**.333**	1.969	.570	.169
An engineering degree will guarantee me a job when I graduate.	4.00 (1.41)	4.27 (1.79)	11	**.273**	2.005	.661	.136
Having strong Mathematics abilities is very important to me.	5.00 (1.21)	5.25 (1.22)	12	**.250**	.452	.082	.553
Sometimes I skip math, science, or engineering classes.	1.42 (1.00)	1.25 (.87)	12	**-.167**	1.403	.689	-.119
My Science abilities are very important to my success.	4.83 (1.34)	5.08 (1.16)	12	**.250**	1.215	.491	.206
I am often late to math, science, or engineering classes.	1.08 (.29)	1.25 (.87)	12	**.167**	.937	.551	.178
It is very important that I can apply Science and Math to solve real-world problems.	5.25 (.87)	5.00 (1.04)	12	**-.250**	.622	.191	-.402
I think math, science, and engineering classes are boring.	2.42 (1.24)	2.67 (1.78)	12	**.250**	1.215	.491	.206
It is important that I can effectively perform as part of a team.	5.42 (.79)	5.67 (.49)	12	**.250**	.754	.275	.332

Note. * = $p < .05$; **n** = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 8b. CCNY: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
My parents want me to become an engineer.	5.00 (.76)	4.63 (1.30)	8	**-.375**	1.061	.351	-.353
Technology can help solve society's problems.	5.38 (.74)	5.75 (.46)	8	**.375**	.518	.080	.724
Engineers can help fix many of the world's problems.	5.38 (.74)	5.75 (.46)	8	**.375**	.518	.080	.724
An engineering degree will guarantee me a job when I graduate.	4.50 (.76)	5.00 (1.07)	8	**.500**	.756	.104	.661
Having strong Mathematics abilities is very important to me.	5.38 (1.06)	5.63 (.74)	8	**.250**	.463	.170	.540
Sometimes I skip math, science, or engineering classes.	1.25 (.46)	1.13 (.35)	8	**-.125**	.354	.351	-.353
My Science abilities are very important to my success.	5.25 (1.04)	5.38 (1.06)	8	**.125**	.354	.351	.353
I am often late to math, science, or engineering classes.	1.75 (1.39)	1.25 (.46)	8	**-.500**	1.414	.351	-.354
It is very important that I can apply Science and Math to solve real-world problems.	5.38 (.74)	5.50 (.76)	8	**.125**	.354	.351	.353
I think math, science, and engineering classes are boring.	1.38 (.74)	1.25 (.46)	8	**-.125**	.354	.351	-.353
It is important that I can effectively perform as part of a team.	5.38 (.52)	5.50 (.76)	8	**.125**	.641	.598	.195

Note. *** = $p < .05$; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 8c. JSU: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***P***	***d***
My parents want me to become an engineer.	3.42 (1.98)	3.83 (1.70)	12	**.417**	.996	.175	.419
Technology can help solve society's problems.	4.08 (1.44)	4.83 (.94)	12	**.750**	1.357	.082	.553
Engineers can help fix many of the world's problems.	4.17 (1.40)	5.17 (.94)	12	**1.00***	.853	.002	1.172
An engineering degree will guarantee me a job when I graduate.	3.92 (1.38)	4.75 (1.06)	12	**.833***	1.030	.017	.809
Having strong Mathematics abilities is very important to me.	4.92 (1.51)	5.42 (.67)	12	**.500**	1.314	.214	.381
Sometimes I skip math, science, or engineering classes.	1.36 (.67)	1.73 (1.42)	11	**.364**	1.027	.267	.354
My Science abilities are very important to my success.	4.58 (1.38)	4.58 (1.24)	12	**.000**	1.044	1.00	.000
I am often late to math, science, or engineering classes.	1.33 (.49)	1.42 (.90)	12	**.083**	.793	.723	.105
It is very important that I can apply Science and Math to solve real-world problems.	4.42 (1.73)	4.58 (1.44)	12	**.167**	1.115	.615	.150
I think math, science, and engineering classes are boring.	3.00 (1.86)	2.58 (1.62)	12	**-.417**	2.109	.508	-.198
It is important that I can effectively perform as part of a team.	4.92 (1.31)	5.50 (.67)	12	**.583***	.900	.046	.648

Note. * = $p < .05$; **n** = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 8d. MTU: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
My parents want me to become an engineer.	3.50 (1.27)	3.50 (.97)	10	**.000**	.943	1.00	.000
Technology can help solve society's problems.	4.89 (1.27)	5.00 (1.00)	9	**.111**	.928	.729	.120
Engineers can help fix many of the world's problems.	5.10 (.88)	5.00 (.82)	10	**-.100**	.876	.726	-.114
An engineering degree will guarantee me a job when I graduate.	4.20 (1.32)	4.70 (.95)	10	**.500**	1.354	.273	.369
Having strong Mathematics abilities is very important to me.	5.40 (.84)	5.20 (.92)	10	**-.200**	.919	.509	-.218
Sometimes I skip math, science, or engineering classes.	1.30 (.48)	1.20 (.42)	10	**-.100**	.568	.591	-.176
My Science abilities are very important to my success.	5.50 (.71)	4.90 (.88)	10	**-.600***	.516	.005	-1.163
I am often late to math, science, or engineering classes.	1.30 (.48)	1.20 (.42)	10	**-.100**	.568	.591	-.176
It is very important that I can apply Science and Math to solve real-world problems.	5.30 (.95)	4.90 (.74)	10	**-.400**	.699	.104	-.572
I think math, science, and engineering classes are boring.	1.80 (.63)	2.00 (1.25)	10	**.200**	1.135	.591	.176
It is important that I can effectively perform as part of a team.	5.60 (.70)	5.30 (.48)	10	**-.300**	.675	.193	-.444

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 8e. NJIT: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***P***	***d***
My parents want me to become an engineer.	2.92 (1.24)	3.33 (1.37)	12	**.417**	.900	.137	.463
Technology can help solve society's problems.	5.08 (.79)	4.92 (.79)	12	**-.167**	.718	.438	-.233
Engineers can help fix many of the world's problems.	4.92 (1.08)	4.50 (1.17)	12	**-.417**	.900	.137	-.463
An engineering degree will guarantee me a job when I graduate.	4.17 (1.40)	3.83 (1.59)	12	**-.333**	.651	.104	-.512
Having strong Mathematics abilities is very important to me.	5.17 (.94)	4.50 (1.09)	12	**-.667***	.651	.005	-1.025
Sometimes I skip math, science, or engineering classes.	1.75 (1.48)	1.42 (.51)	12	**-.333**	1.614	.489	-.206
My Science abilities are very important to my success.	5.08 (.9)	4.75 (1.14)	12	**-.333***	.492	.039	-.677
I am often late to math, science, or engineering classes.	2.00 (1.54)	1.58 (.79)	12	**-.417**	1.782	.435	-.234
It is very important that I can apply Science and Math to solve real-world problems.	4.75 (1.14)	4.50 (1.09)	12	**-.250**	.622	.191	-.402
I think math, science, and engineering classes are boring.	2.45 (1.44)	2.27 (1.27)	11	**-.182**	1.662	.724	-.110
It is important that I can effectively perform as part of a team.	4.58 (1.08)	5.00 (.95)	12	**.417**	.669	.054	.623

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 8f. SDSMT: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.

Item	Pre-UNITE Avg. (SD)	Post-UNITE Avg. (SD)	n	Mean Diff.	Std. Dev.	*P*	*d*
My parents want me to become an engineer.	3.86 (1.56)	3.50 (1.56)	14	**-.357**	1.692	.444	-0.211
Technology can help solve society's problems.	4.50 (1.40)	4.07 (.83)	14	**-.429**	1.222	.212	-0.351
Engineers can help fix many of the world's problems.	4.64 (1.34)	4.50 (.94)	14	**-.143**	1.167	.655	-0.123
An engineering degree will guarantee me a job when I graduate.	4.50 (1.34)	4.36 (.93)	14	**-.143**	1.292	.686	-0.111
Having strong Mathematics abilities is very important to me.	4.38 (1.26)	4.46 (.78)	13	**.077**	1.320	.837	0.058
Sometimes I skip math, science, or engineering classes.	2.86 (1.56)	2.71 (1.49)	14	**-.143**	2.179	.810	-0.066
My Science abilities are very important to my success.	4.64 (1.39)	4.00 (1.04)	14	**-.643***	1.082	.045	-0.594
I am often late to math, science, or engineering classes.	3.29 (1.73)	3.07 (1.49)	14	**-.214**	2.694	.771	-0.079
It is very important that I can apply Science and Math to solve real-world problems.	4.79 (1.42)	4.07 (.92)	14	**-.714***	1.069	.027	-0.668
I think math, science, and engineering classes are boring.	3.07 (1.69)	2.71 (1.49)	14	**-.357**	1.737	.455	-0.206
It is important that I can effectively perform as part of a team.	5.00 (.96)	4.64 (1.15)	14	**-.357**	1.008	.208	-0.354

Note. *** = $p < .05$; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix D:
2013 UNITE Pre-post UNITE Matched Cases Data Summary

Table 8g. TSU: Matched-cases comparison of pre-UNITE and post-UNITE engineering attitudes.							
Item	**Pre-UNITE Avg. (SD)**	**Post-UNITE Avg. (SD)**	**n**	**Mean Diff.**	**Std. Dev.**	***P***	***d***
My parents want me to become an engineer.	4.21 (1.52)	4.32 (1.16)	28	**.107**	.875	.523	.122
Technology can help solve society's problems.	5.24 (.74)	5.07 (.92)	29	**-.172**	.711	.202	-.242
Engineers can help fix many of the world's problems.	5.39 (.79)	5.21 (.79)	28	**-.179**	.723	.202	-.248
An engineering degree will guarantee me a job when I graduate.	4.83 (1.04)	4.66 (1.14)	29	**-.172**	.966	.345	-.178
Having strong Mathematics abilities is very important to me.	5.38 (.73)	5.14 (.74)	29	**-.241**	.786	.109	-.307
Sometimes I skip math, science, or engineering classes.	1.36 (.83)	1.61 (1.13)	28	**.250**	1.110	.244	.225
My Science abilities are very important to my success.	4.93 (.77)	4.82 (1.16)	28	**-.107**	1.031	.587	-.104
I am often late to math, science, or engineering classes.	1.66 (1.11)	1.62 (1.12)	29	**-.034**	1.523	.904	-.022
It is very important that I can apply Science and Math to solve real-world problems.	5.17 (.80)	5.17 (.80)	29	**.000**	.756	1.00	.000
I think math, science, and engineering classes are boring.	2.17 (1.07)	2.45 (1.38)	29	**.276**	1.131	.200	.244
It is important that I can effectively perform as part of a team.	5.28 (.88)	5.34 (.67)	29	**.069**	.842	.663	.082

Note. *** = p < .05; **n = number of matched cases; **Mean Diff.** = paired difference post-UNITE to pre-UNITE; **Std. Dev.** = paired standard deviation; ***P*** = paired samples t-test (two-tailed); ***d*** = Cohen's *d* (effect size).

Appendix E:

2013 UNITE Student Focus Group Protocol

1. Who has participated in the following AEOP programs: Junior Solar Sprint, Junior Science and Humanities Symposium, West Point Bridge Contest, eCybermission, summer programs (GEMS/UNITE), apprenticeship programs (SEAP, REAP, HSAP)?

2. Why did you want to participate in UNITE this summer?

3. How did the hands-on activities help you learn about STEM?

4. What other AEOP programs did you learn about during UNITE?
    - Which ones do you want to participate in?

5. What STEM jobs/careers did you learn about during UNITE?

6. What are your future education/career aspirations?
    - How did UNITE better prepare you for future STEM education/career aspirations?

7. Imagine that a friend is thinking about participating in UNITE. What is most important thing that you want your friend to know about UNITE?

Appendix F:
2013 UNITE Mentor Focus Group Protocol

1. Who has mentored in any of these AEOP programs before: Junior Solar Sprint, Junior Science and Humanities Symposium, West Point Bridge Contest, eCYBERMISSION, summer programs (GEMS/UNITE), apprenticeship programs (REAP, SEAP/CQL, HSAP/URAP), scholarship programs (SMART/NDSEG)?

2. Why did you choose to participate in the UNITE this year?
    - How did you learn about the program?

3. Think of a typical day in UNITE and tell me about the mentoring you provided?
    - What did you do to support students?
    - What kind(s) of feedback did you give to students?

4. What do you perceive as the value of UNITE?
    - How have you benefited from participating?
    - How do you think apprentices benefit from participating?

5. How did you educate your apprentice about AEOP initiatives?

6. How did you educate the students about STEM jobs/careers offered by the Army and Department of Defense agencies?
    - What resources do you need to educate students about STEM careers at Army/DoD agencies?

7. What impact do you think you had on your students' future STEM education/career aspirations?

8. If you had one minute to talk to an Army decision maker about UNITE, what would you say?