Army Educational Outreach Program

Junior Solar Sprint

FY13 Annual Program Evaluation Report

ARMY EDUCATIONAL OUTREACH PROGRAM

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Executive Summary

Junior Solar Sprint (JSS) is a science, technology, engineering, and mathematics (STEM) education activity where 4th- 8th grade students apply scientific understanding, creativity, experimentation, and teamwork to design, build, and race a model solar car. Junior Solar Sprint activities occur nationwide, in classrooms and schools, through extracurricular clubs and student associations, and as community-based events that are independently hosted and sponsored. The Army Educational Outreach Program's (AEOP's) investment in JSS-based programming is managed by Technology Student Association (TSA). The AEOP's JSS programming (herein called AEOP's JSS) is intended to complement, support, and extend existing classroom, extracurricular, and community-based JSS activities that occur nationwide. In FY13 AEOP's JSS included the management of a JSS online resource center, consisting of a repository of JSS-related material for students, educators, and local event hosts (herein called hosts), as well as an online national competition for students. A dedicated website (jrsolarsprint.org) provided educators and hosts with access to course syllabi, lesson plans, alignment of JSS curricula to established STEM standards, guidelines and resources for hosting local race events, and fundraising information for local race events. AEOP's JSS also provided free advertising for non-AEOP sponsored local events through the jrsolarsprint.org Calendar of Events; for this service event hosts registered their event with the jrsolarsprint.org website. In 2013, AEOP's JSS provided students without access to local race events an opportunity to design, build, and test their model solar cars at home, then register their designs and time trials in an online national competition through the jrsolarsprint.org website.

The AEOP's JSS investment has experienced substantial transition over the last three years; this report documents the developmental evaluation of the AEOP's JSS online resource center and the national online competition. The evaluation focused on the usefulness and potential impact of the JSS online resources and national competition, and established a baseline and limited feedback to inform future programming and evaluation. Evaluators used website analytics in an attempt to capture current levels of use for the AEOP's JSS online resource center and online national competition, and to identify areas of possible improvement for the jrsolarsprint.org website. Evaluators gathered information from local event hosts and educators who registered at jrsolarsprint.org about their use and perceived effectiveness of AEOP's JSS online resource center and online national competition. These data informed recommendations about the AEOP's JSS online resources and online national competition, and AEOP's JSS- programming more broadly (e.g., marketing, partnerships, formats).

Table 1. 2013 JSS Fast Facts

AEOP Element	Junior Solar Sprint
Major Participant Groups	4th – 8th grade students, educators, and local event hosts registered with the AEOP at jrsolarsprint.org
Students	20
Teachers	80
Event Hosts and Volunteers	21 event hosts, 19 volunteers
Local Events	17 local events (1 local TSA chapter event)
Total Cost	$70,736.63
Total Awards	$150.00 (1 student competitor awarded)

Summary of Findings

The FY13 evaluation collected data that is useful for a developmental evaluation of AEOP's JSS online resource center and online competition. The findings contained in Table 2 are meant to assess developmental milestones and inform future iterations of AEOP's JSS program.

Table 2. 2013 JSS Evaluation Findings	
Study Sample	
Evaluation data inform further development of AEOP's JSS online resource center and provide a baseline for measuring the impact of any future programming that aims to incorporate the JSS resource center.	• A small number of hosts and educators within a restricted geographic distribution of the local JSS events responded to evaluation surveys. It is not appropriate to generalize findings to the larger population of individuals and organizations that host local JSS events or educators that currently use JSS resources. Respondents provided information about their use and perceived effectiveness of AEOP's JSS online resource center and the online national competition, and whether, through the use of these resources, they successfully identified with the AEOP and contributed to the achievement of AEOP goals.
Actionable Program Evaluation	
AEOP's efforts to establish a nationwide network of JSS events and educators may benefit from and be challenged by hosts' and educators' longstanding relationships with local, independently organized JSS programming.	• When hosts and educators were asked to report how many years they have been involved in JSS, most hosts (57%) reported more than five years of involvement and approximately 10 years on average while half of educators (50%) reported more than five years of involvement and approximately 9 years on average.
AEOP may benefit from partnerships with non-profit organizations currently hosting and/or sponsoring JSS events.	• Six of seven hosts (86%) and two of seven educators (29%) reported that they became involved in JSS through an affiliation with a non-profit organization. Five of eight educators (63%) reported working with students in other STEM competitions, all of which are sponsored by non-profit organizations.
AEOP is poised to provide a strong model for JSS programming that reaches populations that are historically underserved and underrepresented in STEM.	• Hosts estimated that very small number of Title-I schools (less than one per event) are served by their JSS events; no educators reported serving Title-I schools. Small proportions of female students (37%) participate in their local events as compared to male participants.
AEOP's JSS online resource center currently attracts limited web-traffic, considering the nationwide reach of other non-AEOP JSS programming in communities and schools.	• In FY13, a total of 140 individuals registered with AEOP's JSS online resource center; the majority of whom are educators (80%). A total of 17 hosts registered and posted their competition on AEOP's Calendar of Events, most of which were located in the North East region of the United States. • The jrsolarsprint.org website received a total of 3740 unique visitors in FY13. Most of whom viewed, explored, or downloaded content from the Educational Resources and Build a Car levels including lesson plans and video tutorials.

AEOP's JSS online resources have the potential to be useful and valuable resources for hosts and educators; future efforts to align with the Next Generation Science Standards and attention to user feedback may facilitate greater integration in classroom and school settings.	• 60% of event hosts and 67% of educators report that AEOP's lesson plans and course syllabi are "Useful" or "Very Useful." Educators also report that JSS terminology and video tutorials were useful (87% and 87%, respectively). Large proportions of hosts and educators report that they did not use fundraising information (80% and 83%, respectively).
	• Hosts and educators reported that AEOP's JSS online resources are valuable. 67% of hosts agreed that their students responded well to the material from JSS's online resources and that these resources helped them become a better teacher. 50% of educators believe that their students responded well to the material from JSS's online resources while 100% of educators reported that they are valuable teaching and learning resources.
	• Hosts and educators suggested that including related content from NASA would improve the online JSS content offered by AEOP as well as alignment with Next Generation Science Standards. Hosts and educators requested more information and resources to help procure sponsorship for local events.
AEOP's JSS online national competition received limited interest in 2013; hosts, educators, and students were largely unaware of its existence.	• The online national competition received 161 page views, 5 letters of intent, and 1 submission during FY13. 57% of educators were unaware of the online national competition.
AEOP's JSS online resource center is not currently raising Army STEM and AEOP awareness but is likely to do so with strategic improvements to the website and broader JSS programming.	• Although hosts were aware of the AEOP (86%), only 29% were aware of eCYBERMISSION, and very few encouraged their students to participate in AEOP programming. • Only 25% of educators reported that they were aware of the AEOP but 50% reported that they were aware of eCYBERMISSION meaning that they do not associate the two together. Very few educators reported encouraging their students to participate in AEOP programming.
	• AEOP's JSS online resource center attempts to raise awareness of Army STEM and AEOP: AEOP logo is visible and provides an outbound like to www.usaeop.com; dedicated AEOP page in About JSS level; Army link in the STEM careers page; and outbound link to an AEOP .pdf flyer. • Only the usaeop.com outbound link was used with any frequency in FY13 (85 links).

Recommendations

1. Motivating and recruiting existing event hosts and educators to use AEOP's JSS resource center will require significant interaction and integration with very well-established implementers of JSS. If AEOP's JSS-related efforts are to be successful moving forward, non-profit organizations that host local events may be important points of contact and/or potential partners. In order to reach educators, AEOP will need to clearly demonstrate the value of JSS as a teaching tool, and the value of AEOP's JSS online resources for supporting educators in integrating JSS with school STEM curriculum. Alignment of JSS educational resources to the three dimensions of the Next Generation Science Standards—core disciplinary ideas, cross-cutting themes, and science and engineering practices--and robust professional development (e.g., online webinars, face-to-face professional development offerings at local events) will ensure resources are both relevant and feasible for integration with school STEM education nationwide. AEOP JSS might consider whether and how to leverage lessons learned and promising practices of AEOP's eCYBERMISSION (eCM) in improving use of the JSS online resource center to support broader uptake of resources by local events and by educators in schools. eCM managers, ambassadors and event hosts, and team advisors (mostly educators) could provide valuable insight regarding a range of issues unique to AEOP's competition programs, including: maximizing potential use of online resources, marketing to existing users and potential event hosts, and initiating teacher and school partnerships to expand and study the participation of underserved populations.

2. AEOP should remain cognizant that attempts to perform outreach primarily through the jrsolarsprint.org website and existing school- and community-based JSS programming may constrain the diversity of the population that it attracts, according to data we collected from hosts and educators. We acknowledge that outreach to underserved and underrepresented populations may not be a key objective of JSS hosts and educators nationwide. However, outreach to these populations is an Army priority, and therefore AEOP's JSS programming in FY14 should incorporate explicit efforts to market to and recruit these populations, and to support them in successfully participating in JSS. In an effort to engage underserved and underrepresented populations, AEOP's JSS may need to identify and directly engage educators and students that have not been exposed to JSS-based programming to date. For example, these efforts might include a) promoting JSS to TSA's nationwide and diverse membership base, support and volunteer network, and local chapters, and supporting TSA-affiliated local and national competition options for students; b) initiating unique partnerships with educators at Title 1 schools, including the provision of low or no-cost kits for students, professional development for educators, and support for school-based communities of practice to help educator teams integrate JSS activities with their classroom STEM curricula; and c) strategically cross-promoting and forging initiating partnerships with Army and university sites that host other AEOP pipelines (e.g., GEMS-SEAP-CQL and UNITE-REAP) to expand outreach to diverse populations when they are younger, and prepare them for future engagement in GEMS and UNITE.

3. AEOP's JSS online resource center currently attracts limited web traffic and registrants considering the nationwide reach of other non-AEOP JSS programming. In FY13, a total of 140 teachers, hosts, students, and volunteers registered with AEOP's JSS online resource center while only 17 local events registered with AEOP's system (most in the North East region of the US). We expect that efforts to expand the number and geographic representation of events that register with the JSS resource center, and further development of relationships with those events that have already

registered with the resource center will necessarily increase traffic at and use of the website moving forward. Continued efforts to promote existing local events in areas outside of the North East US, may also help establish a national network for JSS information sharing and generate additional registrants and website traffic. The previous recommendations (1 and 2) will undoubtedly increase website traffic and expand the use of the JSS online resource center as well. Ongoing study of website traffic and registration numbers will be critical moving forward to provide information about the use of jrsolarsprint.org in FY14.

4. Hosts and educators that used the online resources provide by AEOP indicated that they are valuable for teaching and learning. Website analytics support these findings; lesson plans and video tutorials were the most viewed content in AEOP's JSS online resource center. Suggestions for improving these resources include the following: additional content such as information from NASA, virtual simulations, and providing variations on the base car model for younger students. Evaluators would like to highlight and recommend one respondents' suggestion to align educational resources with the Next Generation Science Standards. This suggestion aligns with both the AEOP objective and the national call for shared standards across formal and informal education settings. Evaluators also advise improving the visibility of existing resources and adding new resources to meet current and potential users' needs, as reported from the evaluation assessments. Examples from the current study include a list of resources that local hosts would need to start a new event as well as a list of companies that may be contacted to sponsor local events.

5. AEOP's online JSS competition showed limited efficacy in FY13. The information contained in AEOP's online national competition web page received very limited traffic and extremely limited participation (5 letters of intent and 1 official submission). When event hosts and educators that registered with AEOP's JSS online resource center were asked how the online competition could be improved, most stated that they were unaware of the competition entirely. Strategic promotion of the online competition to TSA's membership base may be needed for the success of this programming component. If such promotion is unlikely to produce the desired interest, and/or provide outreach to underserved populations, AEOP should consider live event programming for a JSS national competition, consistent with the format of other successful AEOP national competitions (e.g., eCYBERMISSION, WPBDC, JSHS).

6. Currently, AEOP's JSS online resource center has limited, if any, success at raising AEOP and Army STEM awareness. It has the capacity to do so with strategic changes to the website and to other AEOP JSS marketing. The visibility of information related to AEOP and Army STEM will, in part, determine the extent to which this program successfully raises awareness through the website. AEOP's JSS online resource center has dedicated content to AEOP, and analytics from outbound links demonstrate that they are used by those who visit the website. Additionally, AEOP's JSS resource center has dedicated a page to STEM careers, including Army STEM careers. However, this page is difficult to find (embedded in About JSS) and only contains external links to resources and information. Placement of STEM career information at a location in the website with higher traffic (e.g., placing a button or tab on the main page) and providing short text descriptions of each linked resource may improve the use of and awareness generated by these resources. Other suggestions for improving the visibility of AEOP and Army STEM offerings through TSA's other JSS-related efforts include offering AEOP and Army STEM career promotional materials to local event hosts and educators registered with the jrsolarsprint.org website, to schools, educators, and other AEOP program sites with which TSA partners, and to educators who participate in JSS-related professional development at TSA conferences. These strategic website

revisions and marketing efforts are likely to strengthen the visibility and participant awareness of Army STEM and the AEOP.

7. AEOP's investment in JSS is likely to see another year of transition, in FY2014. Most of the recommendations provided are likely to necessitate greater investment to support costs associated accomplishing them. In addition, the LO evaluators, Army, and TSA will need to prioritize evaluation to reflect where the most resources and effort are being expended in FY14, and thus, where the most impact is likely to be detected. To the extent possible, evaluation should include continued monitoring of the jrsolarsprint.org website as a measure of nationwide reach, but evaluation assessments should primarily focus on experiences of and potential impact on educators and students who are *directly* engaged by AEOP's JSS programming.

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, the online Junior Solar Sprint (JSS) resource center administered on behalf of the Army by the Technology Student Association (TSA). The evaluation of AEOP's JSS 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

Junior Solar Sprint (JSS) is a science, technology, engineering, and mathematics (STEM) education activity where 4th- 8th grade students apply scientific understanding, creativity, experimentation, and teamwork to design, build, and race a model solar car. Junior Solar Sprint activities occur nationwide, in classrooms and schools, through extracurricular clubs and student associations, and as community-based events that are independently hosted and sponsored. The Army Educational Outreach Program's (AEOP's) investment in JSS-based programming is managed by Technology Student Association (TSA). The AEOP's JSS programming (herein called AEOP's JSS) is intended to complement, support, and extend existing classroom, extracurricular, and community-based JSS activities that occur nationwide. In FY13 AEOP's JSS included the management of a JSS online resource center, consisting of a repository of JSS-related material for students, educators, and local event hosts (herein called hosts), as well as an online national competition for students. A dedicated website (jrsolarsprint.org) provided educators and hosts with access to course syllabi, lesson plans, alignment of JSS curricula to established STEM standards, guidelines and resources for hosting local race events, and fundraising information for local race events. AEOP's JSS also provided free advertising for non-AEOP sponsored local events through the jrsolarsprint.org Calendar of Events; for this service event hosts registered their event with the jrsolarsprint.org website. In 2013, AEOP's

JSS provided students without access to local race events an opportunity to design, build, and test their model solar cars at home, then register their designs and time trials in an online national competition through the jrsolarsprint.org website. In 2013, the AEOP's contributions to JSS programming were guided by the following priorities:

- Build interest in STEM through JSS for students and offer a national resource for teachers and mentors.
- Create an online competition and teaching tools aligned with educational standards.
- Market, administer, and evaluate JSS as part of a collaborative portfolio of Army sponsored STEM outreach programs.

Evidence Based Program Change

Since its inception, the AEOP's investment in JSS-based programming has changed significantly from year to year in response to guidance from the JSS-designated Army Cooperative Agreement Manager and Army Subject Matter Expert. In 2012 the AEOP CA invested in an honorarium process administered by the Virginia Tech for local event races in the northeast region. In FY13, the AEOP changed the scope of their investment to JSS-based resources to reach and impact participants on a national level.

TSA's FY13 efforts are summarized in Table 3. In brief, TSA populated the jrsolarspring.org website with static content for educators and hosts who deliver JSS-based experiences to students (e.g., teach JSS modules in class and host local race events that may or may not be affiliated with TSA). TSA created a national online competition for students, through which competitors design, build, and test their car at home, and then submit their results which are judged virtually. TSA also launched a campaign to raise awareness for "jrsolarsprint.org" with students, educators, and local event hosts and connect it to the overall AEOP catalog of programs. TSA worked the LO to conduct a developmental evaluation of the JSS online resource center and competition including assessment of their current use and potential impact; this included an educator survey, host survey, and study of website analytics.

Table 3. 2013 JSS Administrative Milestones

Category	Description
Website Educator and Host Resources	• **Established and finalized static content for host and educator resources:** o **"Local Competition"** resources: Includes local event rules, instructions, and fundraising resources. o **"Educational Resources"**: Includes course outlines and syllabi, lesson plans, mapping of JSS to existing STEM standards, and video-tutorials. o **"Build a Car"** resources: Includes car specifications, build instructions, and video tutorials.
Online Race Event	• **Established the capability to host an online national competition:** o Solicited volunteers to judge, created race rules and guidelines, established recognition awards, registered students, and carried out an online race competition.
Marketing and Recruitment	• **Online marketing:** o Initiate recognition program to enhance online JSS community o Branding jrsolarspring.org with AEOP content and live-links. o Established a social media presence including Facebook and Twitter. o Free advertising for JSS local events through the jrsolarsprint.org Calendar of Events • **Traditional Marketing:** o Outreach and recognition program with veteran JSS programs (including printed promotional materials). o Establish a presence at relevant educational conferences (e.g., National TSA Conference – Orlando, Florida).
Evaluation	• **Developmental Evaluation:** o Host and Educator surveys o Website analytics

FY13 Evaluation At-A-Glance

Virginia Tech, in collaboration with TSA, conducted a developmental evaluation study of TSA's JSS platform. The logic model below presents a summary of the inputs, outputs, and outcomes we might anticipate for TSA's JSS program when it reaches maturity. These are strongly aligned with AEOP priorities. This logic model provided guidance for the overall JSS evaluation strategy, even though participant outcomes are not a significant focus of the 2013 evaluation effort.

Inputs	Activities	Outputs	Outcomes (Short term)	Impact (Long Term)
• Army sponsorship • TSA providing —capacity to establish national network of JSS participants —online JSS educational and event resources —online national JSS competition • JSS Participants, inclusive of local event hosts, educators, and students seeking resources and event information • Awards for student winner(s) of online national JSS competition • Centralized branding and comprehensive marketing of AEOP • Centralized evaluation	• Event hosts, educators, and students access and use JSS educational and event resources • Students (possibly guided by educator) build, test, and register solar car in online national JSS competition • TSA-selected judges evaluate solar cars registered for online national JSS competition and select winner(s)	• Number of event hosts, educators, and students using online JSS educational and event resources • Number and diversity of student participating in online national JSS competition • Number of and Title 1 status of schools served through event host, educator, or student engagement • Event hosts, educators, students, others, and TSA contributing to evaluation	• Increased student knowledge, skills and abilities, and confidence in STEM • Increased student interest in future STEM engagement • Increased "participant" awareness of and interest in other AEOP opportunities • Increased "participant" awareness of and interest in Army/DoD STEM research and careers • Implementation of evidence-based recommendations to improve TSA's JSS offerings	• Increased "participant" engagement in other AEOP opportunities and Army/DoD-sponsored 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 JSS

The JSS evaluation attempted to gather information from non-AEOP-sponsored local event hosts and educators about the effectiveness of AEOP's JSS online resources and activities offered (i.e., online resources, online competition). The evaluation focused on the usefulness and potential impact of the JSS online resources and national competition, and established a baseline and limited feedback to inform future programming and evaluation.

Key Evaluation Questions

- To what extent did JSS successfully outreach to existing JSS events, schools, and educators?
- What aspects of the JSS online presence are working well? Which could be improved?
- To what extent was the JSS online competition successfully implemented?
- To what extent are TSA's JSS online resources capable of and currently accomplishing:
  - Facilitating AEOP partnerships with existing JSS events, schools and/or educators?
  - Incentivizing and promoting educator participation in the AEOP?
  - Exposing educators to Army STEM and the offerings of the AEOP?

Detailed information about methods and instrumentation, data collection, and analysis are described in the Evaluation Plan (Appendix A.). Initially, the AEOP JSS evaluation strategy included surveys of students participating in the online national JSS competition, hosts of non-AEOP sponsored local JSS events, and non-AEOP sponsored JSS educators. However, due to lack of participation in the online competition, the JSS assessment strategy was adjusted to include only the survey of local event hosts (Appendix B) and the survey of educators (Appendix C) who voluntary registered with the jrsolarsprint.org website. Surveys were electronically distributed to local event hosts and educators by TSA using contact information gathered during the registration process. Full data summaries are provided for questionnaires in Appendices B and C. Table 4 outlines the information collected from JSS local event host and educator assessments, Table 5 outlines the information gathered from the JSS website. Evaluators did not survey students directly so all data pertaining to students is derived from registration data collected at the jrsolarspint.org website or indirectly through the surveys of registered educators and hosts about their non-AEOP sponsored JSS activities.

Table 4. 2013 JSS Local Event Host and Educator Assessments	
Category	**Description**
Profile	Past participation, occupation, grade taught, and subject(s) taught.
Satisfaction and Suggestions	Satisfaction with and suggestions for improving JSS's online resources and the online competition.
AEOP Goal 1 Program efforts	**Reaching underserved populations:** Host and educator suggestions for improving online competition (feasibility); school type; title-1 status; gender of participants; age of participants; (CR) ideas for attracting more participants.
AEOP Goal 2 Program efforts	**Partnering with teachers and schools:** Integration of JSS into curricula at schools; integration of JSS into classes.
	Online resources for educators: Host and educator perceived usefulness of online resources; Host and educator perceived value of curricular resources; Host and educator suggestions for improving online resources.
	AEOP awareness: Host and educator awareness of AEOP and eCYBERMISSION.

Table 5. Website content and google analytics	
Category	**Description**
AEOP Goal 1 Program efforts	**Program data:** Registered students, hosts, and educators.
	AEOP and Army STEM awareness: Online competition participation; website content; website analytics (page views, outbound links to AEOP).
AEOP Goal 2 Program efforts	**Online resources for educators:** Website content; website analytics (tutorial views, solar car guideline views, lesson plan and other resource downloads.

Study Sample

The host and educator survey instruments were hosted by Virginia Tech via Qualtrics® survey software and distributed by TSA using host and educator contact information (i.e., email addresses) provided during voluntary registration at the jrsolarsprint.org website. Seven event hosts and eight educators completed an online survey. From Table 6, five of the seven host respondents identified themselves as a non-profit employee. The remaining two hosts specified that they worked as a "*State government coordinator"* and an "*SAE member"*, which both represent non-profit organizations. Seven of the eight educator respondents identified themselves as teachers; the remaining respondent specified that they worked as a "*State Advisor, NYS"*.

Table 6. JSS event host and educator occupation.

Occupation	Event Hosts (n = 7)		Educators (n = 8)	
	Freq.	%	Freq.	%
Teacher	0	0%	7	88%
Non-profit employee (which organization?)	5	71%	0	0%
Other (please specify)	2	29%	1	13%

Note. Event Hosts: Other = "*State government coordinator*" and "*SAE member (mechanical engineer)".* Educators: Other = *"State Advisor, NYSTSA".*

The seven respondents to the host survey report that they administer local JSS race events in six different US states, five of which lie within the Northeast region of the United States (NY, DE, NH, and MA; Table 7).

Table 7. JSS events represented.

Event Site	City	State
Buffalo Museum of Science	Buffalo	NY
Cradle of Aviation Museum hosted by TSA	Garden City	NY
Dover International Speedway	Dover	DE
EnergyWhiz Olympics at the Florida Solar Energy Center	Cocoa	FL
Columbus Christian School	Columbus	IN
Gilbert H Hood middle school	Derry	NH
Cape Cod Community College – was canceled due to lack of interest	Barnstable	MA

Given the low number of event host and educator respondents, as well as the limited geographic distribution of the local JSS events represented in this data, it is not appropriate to generalize the findings herein to the larger population of individuals or organizations that host local JSS events, or to educators that may be using these and other JSS-resources. However, respondents do provide valuable data that informed recommendations about the AEOP's JSS online resources and the online national competition, and AEOP's JSS- programming more broadly (e.g., marketing, partnerships, formats). These data also provide evidence of the potential of whether hosts, educators, and their JSS programming identify with the AEOP and contribute to the achievement of AEOP goals.

Actionable Evaluation Findings

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 and Suggestion, Goal 1, and Goal 2 sections of Table 4 as well as the Goal 1 and Goal 2 sections of Table 5.

Actionable Program Evaluation focuses on efforts impacting the long-term goal of JSS and the AEOP; to increase the future pool of talent capable of contributing to the nation's scientific and technology progress.

AEOP's JSS Marketing Efforts

AEOP's JSS has attempted to reach new and existing populations of students, teachers, and schools by creating an online resource center (jrsolarsprint.org) complete with local JSS event host resources, JSS-related educational resources, and by hosting an online national JSS competition.

As described in Table 3, TSA launched a campaign to raise awareness for the AEOP's JSS online resource center and online national competition consisting of traditional and electronic marketing, including: print advertising, a presence at educational conferences, electronic and social media, and cross-promotion of local events; all endeavor to connect the resource center to the larger AEOP catalog of programming. These efforts resulted in cross-promotion of 17 local JSS events that registered at jrsolarsprint.org. For more details about marketing efforts and outcomes, please contact the JSS program manager from TSA.

Host and Educator Participation in local JSS Activities

Hosts and educators engage in a variety JSS-related activities in classrooms or schools and at hosted community-based events. Hosts and educators may provide AEOP with valuable information about what motivates them to use JSS-related material as well overall reach of their events and activities (in terms of the number and diversity of students, teachers, and schools reached). Although AEOP is not the sponsor of the activities and events described herein, these data are likely to inform an effective marketing and outreach strategy allowing AEOP to recruit local event hosts, educators, and students, to use the AEOP's JSS resource center and participate in the national online competition.

Recruiting Hosts and Educators. The questionnaires asked event hosts and educators to describe the longevity of JSS events in their region and the longevity of their personal involvement with JSS. Open-ended responses were summarized using 5 year increments from "0-5 years" to "21 or more years" and are presented in Tables 8 and 9.

JSS has a long history in hosts' and educators' regions. When hosts were asked to report how long JSS has been held in their region, most reported that their event had been hosted in the same region for more than five years (83%) and for 14 years on average (Table 8). JSS event hosts and educators have long-term relationships with JSS. When hosts and educators were asked to report how many years they have been involved in JSS, most hosts (57%) reported more than five years of involvement and approximately 10 years on average while half of educators (50%) reported more than five years of involvement and approximately 9 years on average (Table 9). AEOP's efforts to establish a nationwide network

of JSS events and educators may both benefit from and be challenged by hosts' and educators' longstanding relationships with local, independently organized JSS programming.

Table 8. JSS event hosts: How long has JSS been held in your region?		
	Freq.	**%**
0-5 years	1	17%
6-10 years	1	17%
11-15 years	1	17%
16-20 years	2	33%
21 or more years	1	17%
Total	**6**	**100%**

Note. Avg. = 14.00 years (SD = 8.20)

Table 9. JSS event host and educator involvement with JSS-programming.				
Years of Involvement	**Event Hosts**		**Educators**	
	Freq.	**%**	**Freq.**	**%**
0-5 years	3	43%	4	50%
6-10 years	2	29%	0	0%
11-15 years	0	0%	2	25%
16-20 years	1	14%	2	25%
21 or more years	1	14%	0	0%
Total	**7**	**100%**	**8**	**100%**

Note. Host Avg. = 10.14 years (SD = 8.49); Educator Avg. = 9.13 years (SD = 8.01).

To understand how event hosts and educators ultimately come to participate in JSS activities and events, questionnaires asked them to describe how they learned of and became involved in JSS. Event hosts and educators learn about and become involved in JSS in a variety of ways. Six out of seven hosts (86%) reported that they became involved through the non- profit organizations with which they work, for example, *"In 1991, Indiana SAE organized a JSS event and I helped organize the inaugural event."* Two educators (29%) reported that they became involved through an affiliation with a non-profit organization; "*My son was in his local TSA chapter during which they conducted JSS races*." One host (14%) and two educators (29%) reported that they heard about JSS on the internet while two educators (29%) reported that they heard about JSS through an advertisement, "…*NH Tech College ran it in the beginning and I think they sent something to science teachers in the region*." Finally, one educator (14%) reported that they heard about JSS from a colleague, "*Way back when, 1998 my colleague introduced me to it*."

In all, eight of the 14 host and educator respondents (57%) report that they heard about JSS through a non-profit organization. AEOP's JSS programming may benefit from reciprocal partnerships with these and other non-profit organizations that currently host and/or sponsor local JSS events. Three of 14 (21%) report learning about JSS through the internet, and three of 14 (21%) report learning about JSS through traditional marketing or word-of-mouth advertising.

The questionnaire also asked event hosts and educators about other STEM competitions in which they participate, and what motivates them to participate in JSS in particular. Five educators (63%) reported that they work with students in other STEM competitions, and all five mentioned competitions sponsored by non-profit organizations such as FIRST® Lego® League and Future Cities. When asked what motivates them to participate in JSS in particular, 100% of educator respondents mentioned that they value the content of JSS as a teaching tool. For example, "*I see value in what kids learn, some engineering, some mechanical, some basic hand-tool usage and an introduction to a modern sustainable energy source*."

Reaching underserved populations. Title-I schools serve high numbers or proportions of students from low-income families. In Title-I schools, 40% or more of students qualify for free or reduced lunch or other federal assistance. Higher proportions of students from racial and ethnic minority groups are common among Title-I schools, especially those serving poor urban communities. Students from low-income and certain racial and ethnic minority groups (e.g., American Indian or Native Alaskan, Black or African American, Hispanic or Latino) are historically considered to be underserved in STEM education and outreach. To ascertain the extent to which low-income students (and possibly minority students) may be served by the JSS activities and events represented by the current sample of event hosts and educators, they were asked to describe schools served by their events (event hosts), or the schools in which they teach (educators). Tables 10, 11, and 12 summarize their responses.

One out of four JSS hosts reported that two Title-I schools were represented at their race event; the average estimate is less than one (Avg. = 0.50) Title-I school is represented at each JSS event. None (0%) of the educator respondents reported that they taught in a school that qualified for Title-I status. Further, a large proportion (43%) of JSS educators report that they work in private schools which are historically less likely to serve low-income populations.

Table 10. JSS event hosts: Event socio-economic indicators.

	n	Total #	Avg. #	SD
Title-I schools have a high percentage of students from low-income families and qualify for federal funding to improve the level of education provided at those schools. How many "TITLE-I" schools were represented at your competition?	4	2	**0.50**	1.00

Table 11. JSS educators: Does your school qualify for Title-I status?

	Freq.	%
No	6	100%
Yes	0	0%
Total	**6**	**100%**

Table 12. JSS educators: School Type.		
	Freq.	%
Public	4	57%
Private	3	43%
Home School	0	0%
Other	0	0%
Total	**7**	**100%**

Females are considered underrepresented in some STEM fields, including engineering (which closely relates to the concept of JSS). To ascertain the extent to which females may be served by the JSS activities and events in which these event hosts participate, they were also asked to estimate the number of male and female students that attended their local race event.

From those estimates (Table 13), hosts report that their events serve larger numbers of male students (Avg. = 43) than female students (Avg. = 26).

Table 13. JSS Hosts: Event gender proportion estimates.		
	Total # Students	Avg. # of Students per event
Male	218	**44**
Female	130	**26**

Generally, the JSS events and activities in which host and educator respondents are involved do not appear to involve students from demographic groups that are historically underserved and underrepresented in STEM outreach to a substantial degree. JSS events and educators tended not to serve schools that qualify for Title-I assistance. Further, local events represented in this sample serve fewer female students (as compared to males); females are a demographic that are historically underrepresented in some STEM disciplines. We have no evidence suggesting this is the case for all local JSS programming, and it is worth acknowledging that serving underserved or underrepresented populations may not be the explicit goal of non-AEOP sponsored JSS events and activities. Thus, AEOP is poised to provide to provide a strong model for JSS programming that reaches and supports the successful participation of populations that historically underserved and underrepresented in STEM.

Use and Perceptions of AEOP's JSS Resources

Hosts, educators, and students that engage in JSS activities or events at the classroom- or school-level or at the hosted local or regional scale are among the anticipated users and beneficiaries of AEOP's JSS educational and event resource center and online competition. Website analytics data can provide a snapshot of the most commonly accessed portions of AEOP's JSS online resources. Local event hosts and educators who registered voluntarily at the jrsolarsprint.org website

can provide AEOP with valuable information about the use and perceptions of the JSS online education and event resources and the online national competition. These data, reported in the following section, provide information that TSA can use to improve the educational resources, event resources, and national online competition to maximize their utility for users.

In FY13 the jrsolarsprint.org website offered five unique levels that were available to all potential users, descriptions of which are summarized in Table 14.

Table 14. AEOP's JSS online resources.

Level	Description
About JSS	Provides information about the AEOP, TSA's role in the AEOP and JSS, a history of the JSS program, a video library of engineering and design processes for JSS, and a series of STEM career outbound links.
Competitions	Provides resources for competition hosts such as; local JSS competition rules, instructions, resources, and guidelines for hosting a race as well as forms. Additionally, this section provided the guidelines and procedural information for entering the online competition.
Build A Car	Provides model car specifications, instructions for building a car, and video-tutorials. Also supplies a list of important terms and their definitions, a description of race events, and a listing of suppliers for model solar car kits.
Calendar of Events	Provides a listing of upcoming JSS-related events including local races that were voluntarily registered with jrsolarspint.org. Also provides local hosts the opportunity to register and list their events on the webpage after a brief registration process.
Educational Resources	Provides course outlines (2, 4, and 8-week syllabi), information relating JSS to STEM standards, a link to the JSS YouTube channel, a list of lesson plans for classroom use, a list of term and their definitions, hosting a JSS race guidelines, and fundraising information.

The jrsolarsprint.org website offered a registration system for event hosts, educators, other adults, and students who chose to associate themselves with the AEOP's JSS online resource center (registrants are summarized in Table 15). In FY13, a total of 140 individuals registered with the system, most of who were educators (57%).

Table 15. Total registrants with AEOP's JSS online resource center.

Category	Freq.	%
Event Hosts	21	15%
Volunteers or other adults	19	14%
Educators	80	57%
Students	20	14%
Total	**140**	**100%**

AEOP's JSS online resource center delivered content to event hosts, educators, and/or students through the home page and 5 levels described in Table 14, the internet traffic for which is summarized in Table 16. Jrsolarsprint.org had 3740 unique page-views between October, 2012 and June, 2013; 42% of which left the website after visiting only the home-page (bounce rate = 41.84%). Of those visitors who stayed on the site, 1552 (41%) used the Educational Resources level,

1046 (28%) used the Build a Car level, 988 (26%) used the Calendar of Events, 777 (21%) used the Local Competitions level, and 529 (14%) used the About JSS level. Visitors spent the most time navigating the home page (Avg. Time = 1 min. 32 sec.) and the educational resources level (Avg. Time = 1 min. 6 sec.) while spending the least amount of time on the calendar of events and local competition levels (Avg. Time = 34 and 26 seconds, respectively).

Table 16. FY13 JSS Website analytics: Unique page views, avg. time, bounce rate, and exit rate.

Website Level	Unique Page Views	Avg. Time	Bounce Rate	Exit Rate
Home Page: jrsolarsprint.org	3,740	0:01:32	41.84%	39.76%
Tab: Local Competitions	777	0:00:26	32.00%	9.02%
Tab: Build a Car	1,046	0:00:39	55.91%	14.34%
Tab: Calendar of Events	988	0:00:34	49.23%	12.47%
Tab: Educational Resources	1,552	0:01:06	65.81%	14.85%
Tab: About JSS	529	0:00:56	72.50%	21.60%

From Table 17, visitors to the educational resources level regularly viewed at least one of the lesson plans (1499); most often they viewed the "basics of model solar car design" (523 unique views) and "friction investigation" (230 unique views) lesson plan while no one viewed "the design process" (0 unique views) lesson plan. Fewer visitors viewed the video build tutorials (344 unique views) page, downloaded any of the three course syllabi (117 downloads), or downloaded a host guide (13). Analytics did not indicate that visitors to this level of the website regularly viewed or downloaded content from the JSS and STEM standards page, the JSS on YouTube page (which is a dedicated page that provides an outbound link to the National JSS YouTube channel), the terminology page, or the fundraising page.

Table 17. Website use analytics: Educational resources level.

Event Label	Unique Events
Page Views: Lesson plans	1499
Basics of Model Solar Car Design	523
Friction Investigation	230
Investigating Model Car Materials	113
Transmission Investigation #2	108
Understanding Solar Energy	108
Aerodynamic Shape Investigation #2	105
Aerodynamic Shape Investigation #1	91
Transmission Investigation #1	89
Sun's Angle Investigation	83
Design Review	49
The Design Process	0
Page Views: Build tutorials	344
Downloads: 2, 4, or 8 week syllabus	117

Summarized in Table 18, visitors to the Build a Car level regularly viewed model car specifications (628), downloaded instructions for building a JSS model car (262), and viewed information about supplies and materials (160). Visitors also followed outbound links to solar car material suppliers (pitsco.com = 102; solarmade.com = 102). Visitors did not, however, regularly view the terminology page, the race (on-site competition) page, or the sample build video tutorials page.

Table 18. Website use analytics: Build a car level.

Event Label	Unique Events
Page Views: Model Car Specifications	628
Downloads: Instructions for building a JSS model car (.pdf)	262
Outbound link: pitsco.com	102
Outbound link: solarmade.com	102

The Calendar of Events level received 988 unique page views but 49% exited the page immediately (See bounce rate, Table 16 above), the activity of those who wished to view local JSS events advertised on the jrsolarsprint.org calendar of events page is summarized in Table 19. In total, 329 individuals decided to view local JSS events in a specified region. Most frequently, users viewed local events in the North East region (39%) and South East region (25%) while the Midwest region (7%) and Mountain region (5%) received the fewest views. In FY13, a total of 17 events were voluntarily registered with AEOP's JSS resource center, meaning that there was very little information available. The lack of event information is likely to have contributed to the low level of use that the Calendar of Events level received and the high bounce rate recorded by the website for this portion of the JSS resource center.

Table 19. Website use analytics: Calendar of events.

Event Label	Unique Events	%
Page Views: North East region	127	39%
Page Views: South East region	81	25%
Page Views: South West region	41	12%
Page Views: West Coast region	40	12%
Page Views: Midwest region	23	7%
Page Views: Mountain region	17	5%
Total	**329**	**100%**

The Local Competition level received 777 unique page views in FY13, however, very few users actually navigated this level of the website. The most-viewed portion of this level was "forms and links", which received 30 unique page views and they are summarized in Table 20 below. Again, very few users actually downloaded content from this section of the website, but those who did most often downloaded an on-site official rating form (16 downloads).

Table 20. Website use analytics: Local Competitions.	
Event Label	Unique Events
Page Views: Forms and links	30
Downloads: On-site official rating form	16
Downloads: Project log form	11
Downloads: Time trials form	7

The About JSS level received 529 unique views but a very high proportion viewers left this page immediately (bounce rate = 72.5%, Table 16 above). Of those that did stay, very few navigated the website. Unique events most often occurring at this level are outbound links to usaeop.com (85 links) and tsa.org (44 links; Table 21).

Table 21. Website use analytics: About JSS.	
Event Label	Unique Events
Outbound links: usaeop.com	85
Outbound links: webweb.org	44

In summary, AEOP's JSS online resource center currently attracts limited website traffic and registration, considering the nationwide distribution of JSS events and classroom programming delivery. The high bounce rates at the website may suggest that AEOP's JSS website is not what specific viewers are looking for. Basic information about solar car design appears to be among the most important resources to viewers according to website traffic.

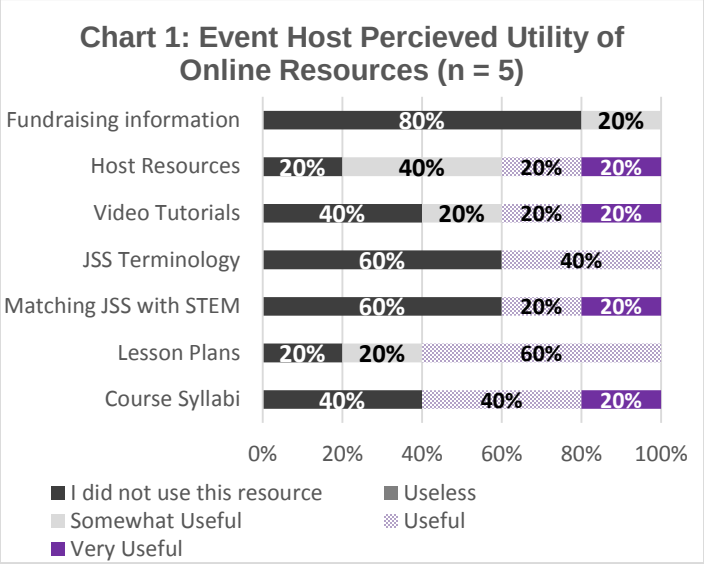
Perceptions of AEOP's JSS resources. Of the 15 registered event hosts and educators that were surveyed in 2013, 71% of event hosts and 75% of educators report that they used the JSS online resources provided at that jrsolarsprint.org website (Table 22).

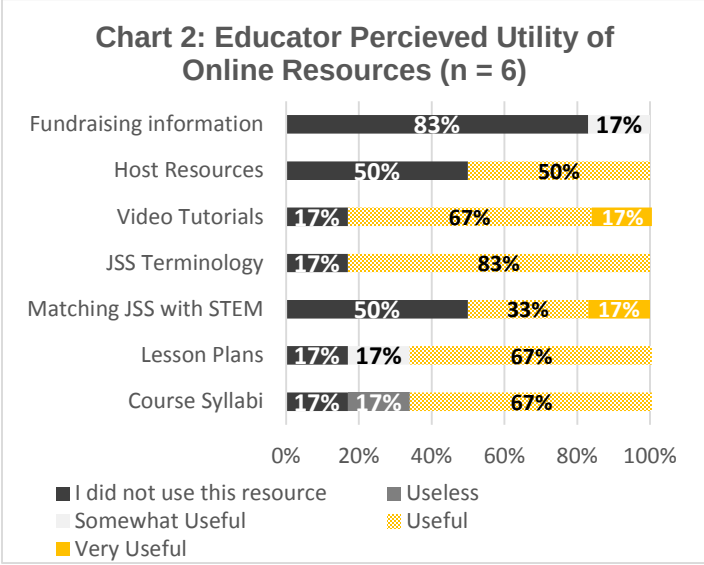
Table 22. JSS event host and educators: Use of JSS online resources.				
	Event Hosts		Educators	
	Freq.	%	Freq.	%
No	2	29%	2	25%
Yes	5	71%	6	75%
Total	**7**	**100%**	**8**	**100%**

The event host and educator questionnaires included seven items to pertaining to the utility of the different features of the JSS online resource center. Response choices included, "I did not use this resource," "Very useless," "Useless," "Somewhat Useful," "Useful," and "Very Useful." Responses are summarized in Charts 1 and 2 below.

Event hosts and educators generally believe that AEOP's JSS online resource center provides them with content that is useful. Larger proportion of educators (83%) reported that JSS terminology, Video Tutorials, and Lesson Plans were useful to some degree as compared to other resources. For event hosts, 60% report that Video Tutorials and Course Syllabi were useful to some degree while 80% report the same for Lesson Plans. Large proportions of event hosts and educators reported that they did not use Fundraising Information provided (which is curious considering that both groups request information regarding sponsorship later in the survey).

While no hosts and only one educator perceived any of these resources as being useless (course syllabi; 17%), all of the resources listed went unused by one or more of the respondents in both groups. Fundraising Information (80% event hosts, 83% educators) and STEM Standards alignment (60% event hosts, 50% educators) were the least used resources for both groups. Otherwise, the proportions of event hosts and educators reporting "I did not use this resource" appear consistent with their respective roles. For example, fewer event hosts and more educators reported not using host resources (20% event hosts, 50% educators). Similarly, fewer educators and more hosts reported not using most of the resources intended for educators.





Event host and educator questionnaires also included three items pertaining to the value of the of the JSS online resources. They responded to items on a scale from 1 = "Strongly Disagree" to 6 = "Strongly Agree." Their responses are summarized in Charts 3 and 4 below. Event hosts and educators believe that AEOP's JSS online resources are valuable. Most event hosts agree that students respond well to the material from JSS's online resources and that these resources have helped them become a better teacher (Agree = 67% and 67%, respectively). Half of educators agree that their students respond well to the material from JSS's online resources (Agree = 50%) and all educators generally agreed that AEOP's JSS online resources are valuable teaching and learning resources (Agree and Strongly Agree = 100%). As might be expected, event hosts have are likely to have different resource needs than educators and therefore do not agree to the same extent as educators about the value of the online resources.

Chart 3: Event Host Percieved Value of Online Resources

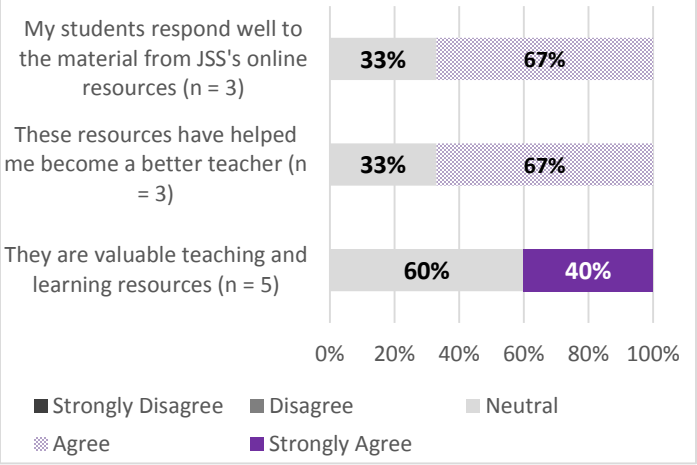
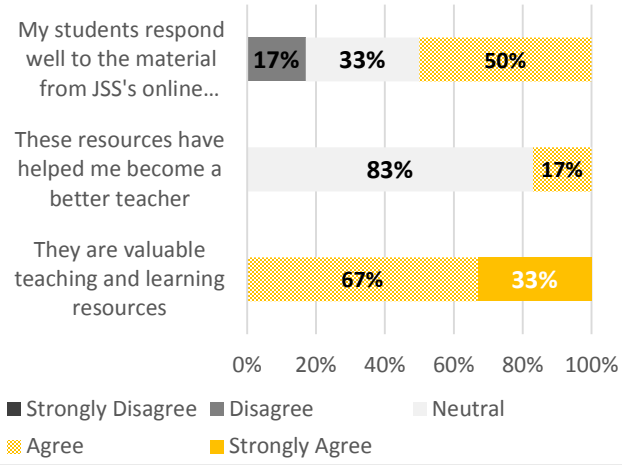


Chart 4: Educator Percieved Value of Online Resources (n = 6)



Event hosts and educators were asked to provide suggestions for improving AEOP's JSS online resources. Open ended feedback about the JSS online resources is included in Table 23 on the next page.

Of the five responses collected from event hosts, three (60%) offered suggestions for specific additions to online content. One event host recommended the addition of, *"…NASA information on how climate change is occurring for student and teachers to connect their Science Curriculum with Renewable Energies and JSS."* Another suggested that AEOP should offer a specific piece of equipment to help students in the car design and engineering process; a "*knockdown resistor*". One important suggestion, given the national call and movement toward cross-sector sharing of state-led standards, was that AEOP JSS educational resources be aligned with "*Next Generation Science Standards*".

Seven educators provided suggestions for improving AEOP's JSS online resources, three of who (43%) provided specific suggestions for additional content such as, "*A virtual simulation*," and, "*variations on the base car model [to] inspire younger participants.*" Three educators (43%) suggested that additional information and/or lists of resources be provided to help local JSS events procure sponsorships; "*we need a sponsor to run our regional race…,*" "*list local state resources as mentor for those wishing to start a JSS event…,*" and, "*get an engineering type company in the region to sponsor and organize the regional competition*."

Table 23. Suggestions for improving online resources (n = 5 hosts and 7 educators)
Specific Suggestions
Event Hosts
"…Next Generation Science Standards are of course the next alignment for teachers that we should look at…"
"It might be cool to show some NASA information on how climate change is occurring for students and teachers to connect their Science Curriculum with Renewable Energies and JSS"
"…better examples of how different teams tackled [the gearing problem] would be helpful. Instead of just photos of the car, having some "interior" photos would be helpful."
"We also find that the kids will test with the battery packs…then with the panels and they find their gearing is wrong. So, it would be great to have an economical knockdown resistor or some other method to make the battery packs better simulate the solar panel output."
"More video tutorials and pictures would be great. The web content can get a little overwhelming for first time users."
Educators
"A virtual simulation"
"List local state resources as mentors for those wishing to start a JSS event in their location."
"We need a sponsor to run our regional race because it is too much work for teachers to do by themselves. If you could help us that would be wonderful."
"Variations on the base car model [to] inspire younger participants"
"Get an engineering type company in the region to sponsor and organize the regional competition."
"I liked what was available."
"Create lists for teachers to create learning stations on several topics...like gear ratio, solar power, drive trains, wind resistance, wheels and axles. Something students can learn from before they build...could be online resources or small activities to do and students can rotate through each station to learn without it being a lengthy lessons. Use materials that are simple and cheap for teachers to create following your list."

In summary, AEOP's JSS online resources have the potential to be useful and valuable resources for hosts and educators. Future efforts to align with the Next Generation Science Standards and attention to host and educator feedback (e.g., providing additional resources requested) are likely to facilitate greater integration within classroom and school settings in particular.

Online Competition. In FY13, AEOP's JSS programming included an online competition for students who do not have access to local or regional JSS events and embedded it into the larger jrsolarsprint.org website. In the online competition level, potential participants are provided with four unique pages that guide them through the competition process: "how to compete" includes the process for registering and competing in the online competition; "on-line competition rules" is an extensive set of rules for eligibility, the competition itself, judging, and award information; "on-line registration" is a link to the competition registration system – registration with the jrsolarsprint.org website is required prior to competing; and "on-line competition awards" which provides the prizes for online competitors. Also in this level are two links to resources in other areas of the website: "educational resources" including curricula, lesson plans, and tutorials; and forms and links including the project log form, time trial form, and official ratings forms. The following section summarizes website traffic, student registration, and event host and educator feedback for improving the online competition.

The Online Competition level received limited traffic (Table 24), 161 page views in total, and fewer users navigated this portion of the website as compared to other main tabs. Specifically, 70 users viewed the how to compete page and 15 viewed the Awards information page. Subsequently, the online national competition received only 5 letters of intent and 1 participant in FY13.

Table 24. Website use analytics: Online competition.	
Event Label	**Unique Events**
Page Views: How to compete	70
Page Views: Awards	15

Event hosts and educators were asked to provide suggestions for improving the online competition. Two event hosts and four educators offered open-ended feedback regarding the online competition (Table 25). Of those, only one event host offered a recommendation for expanding participation while all four educators mentioned that they did not use or did not know about the online competition.

Table 25. Suggestions for improving online competition (n = 2 event hosts and 4 educators)
Specific Suggestions
Event Hosts
"I do like the idea of an engineering challenge that changes each year."
"Marketing to school districts would attract more participants."
Educators
"Did not use it."
"Have not checked it out."
"We did not use the service"
"did not know about it"

In summary, these data suggest that AEOP's JSS online national competition received limited interest in 2013. In addition, hosts, educators, and students appear to be largely unaware of its existence.

AEOP and Army STEM Awareness through AEOP's JSS Online Resources

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[1] and University of Virginia[2] found that exposure to STEM as adolescents piqued immediate interest in near-term STEM-related pursuits and had a significant effect on

[1] 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

[2] 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.

future pursuit of STEM degrees and careers, respectively. Subsequently, the Army's goal of establishing a coherent pipeline 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.

AEOP's JSS online resource center has contains a very visible AEOP logo complete with a direct link to the AEOP website (www.usaeop.com) in the right hand banner of the jrsolarsprint.org website. The AEOP logo is easily detectable on all levels and pages within jrsolarsprint.org. The TSA logo is also contained in the right hand banner of the jrsolarsprint.org website along with an outbound link to the TSAweb.org website that contains information about other AEOP programs (e.g., UNITE). The About JSS level of AEOP's JSS online resource center also contains a brief description of the AEOP initiative as a whole along with an outbound link to an AEOP .pdf brochure that outlines the entire AEOP catalog of programs. Also in this level, several outbound links are provided under the STEM Careers page to websites that contain information about STEM careers, including the U.S. Army's RDECOM.

Although website analytics for inbound links are not available at this time, jrsolarsprint.org users' outbound links have been recorded for FY13. From Table 26, 85 users followed the usaeop.com outbound link and 44 users followed the tsaweb.org outbound link from jrsolarsprint.org. There is no record of any users utilizing the following portions of the AEOP's JSS online resource center that are designed to promote Army STEM or AEOP awareness: Viewing the AEOP page in the About JSS level; following any of the outbound links from the STEM careers page in the About JSS level; and viewing the outbound link to the AEOP .pdf brochure.

Table 26. Website use analytics: About JSS.

Event Label	Unique Events
Outbound links: usaeop.com	85
Outbound links: tsaweb.org	44

Event hosts and educators were asked about their own awareness of the AEOP catalog of programs and their own awareness of eCYBERMISSION (another AEOP middle school STEM competition). Tables 27 and 28 summarize their responses. From Table 27, most event host respondents (86%) report that they are aware of the AEOP, while most educator respondents (75%) report that they are not aware of the AEOP. Conversely, most host respondents (71%) and half of educator respondents (50%) report being unaware of the eCYBERMISSION program (Table 28).

Table 27. JSS event hosts and educators: AEOP awareness.

	Event Hosts		Educators	
	Freq.	**%**	**Freq.**	**%**
Yes	6	86%	2	25%
No	1	14%	6	75%
Total	**7**	**100%**	**8**	**100%**

Table 28. JSS event hosts and educators: eCYBERMISSION awareness.				
	Event Hosts		Educators	
	Freq.	%	Freq.	%
Yes	2	29%	4	50%
No	5	71%	4	50%
Total	**7**	**100%**	**8**	**100%**

Event hosts and educators were asked whether they encourage students to participate in specific AEOP programs (Table 29). Nearly all hosts and educators reported do *not* encourage their students to participate in AEOPs with the exception of two (67%) event hosts who reported that they encouraged their students to participate in eCYBERMISSION and the West Point Bridge Design Contest. For all other AEOP programs, the majority of event hosts and educators indicate that they do not encourage their students to participate. This would be expected given the lack of awareness that is described in the section directly above.

Table 29. JSS event hosts and educators: Encouraging students to participate in AEOP programs.				
	Event Hosts		Educators	
	Yes	No	Yes	No
Gains in the Education of Mathematics and Science (GEMS)	1 (33%)	2 (67%)	1 (13%)	7 (88%)
eCYBERMISSION	2 (67%)	1 (33%)	1 (13%)	7 (88%)
Junior Science and Humanities Symposium (JSHS)	1 (33%)	2 (67%)	0 (0%)	8 (100%)
UNITE	1 (33%)	2 (67%)	1 (13%)	7 (88%)
West Point Bridge Design Contest	2 (67%)	1 (33%)	1 (13%)	7 (88%)
High School Internships: REAP, HSAP, or SEAP	0 (0%)	3 (100%)	0 (0%)	8 (100%)
College Internships: URAP or CQL	0 (0%)	3 (100%)	1 (13%)	7 (88%)

Taken as a whole, the data above suggests that AEOP's JSS online resource center is not currently raising Army STEM and AEOP awareness, a finding that is likely to necessitate strategic improvements to both the jrsolarsprint.org website as well as other aspects of AEOP's JSS programming.

Summary of Findings

The FY13 evaluation collected data that is useful for a developmental evaluation of AEOP's JSS online resource center and online competition. The findings contained in Table 30 are meant to provide developmental milestones and drive future iterations of AEOP's JSS programming.

Table 30. 2013 JSS Evaluation Findings	
Study Sample	
Evaluation data inform further development of AEOP's JSS online resource center and provide a baseline for measuring the impact of any future programming that aims to incorporate the JSS resource center.	• A small number of hosts and educators within a restricted geographic distribution of the local JSS events responded to evaluation surveys. It is not appropriate to generalize findings to the larger population of individuals and organizations that host local JSS events or educators that currently use JSS resources. Respondents provided information about their use and perceived effectiveness of AEOP's JSS online resource center and the online national competition, and whether, through the use of these resources, they successfully identified with the AEOP and contributed to the achievement of AEOP goals.
Actionable Program Evaluation	
AEOP's efforts to establish a nationwide network of JSS events and educators may benefit from and be challenged by hosts' and educators' longstanding relationships with local, independently organized JSS programming.	• When hosts and educators were asked to report how many years they have been involved in JSS, most hosts (57%) reported more than five years of involvement and approximately 10 years on average while half of educators (50%) reported more than five years of involvement and approximately 9 years on average.
AEOP may benefit from partnerships with non-profit organizations currently hosting and/or sponsoring JSS events.	• Six of seven hosts (86%) and two of seven educators (29%) reported that they became involved in JSS through an affiliation with a non-profit organization. Five of eight educators (63%) reported working with students in other STEM competitions, all of which are sponsored by non-profit organizations.
AEOP is poised to provide a strong model for JSS programming that reaches populations that are historically underserved and underrepresented in STEM.	• Hosts estimated that very small number of Title-I schools (less than one per event) are served by their JSS events; no educators reported serving Title-I schools. Small proportions of female students (37%) participate in their local events as compared to male participants.
AEOP's JSS online resource center currently attracts limited web-traffic, considering the nationwide reach of other non-AEOP JSS programming in communities and schools.	• In FY13, a total of 140 individuals registered with AEOP's JSS online resource center; the majority of whom are educators (80%). A total of 17 hosts registered and posted their competition on AEOP's Calendar of Events, most of which were located in the North East region of the United States. • The jrsolarsprint.org website received a total of 3740 unique visitors in FY13. Most of whom viewed, explored, or downloaded content from the Educational Resources and Build a Car levels including lesson plans and video tutorials.

AEOP's JSS online resources have the potential to be useful and valuable resources for hosts and educators; future efforts to align with the Next Generation Science Standards and attention to user feedback may facilitate greater integration in classroom and school settings.	• 60% of event hosts and 67% of educators report that AEOP's lesson plans and course syllabi are "Useful" or "Very Useful." Educators also report that JSS terminology and video tutorials were useful (87% and 87%, respectively). Large proportions of hosts and educators report that they did not use fundraising information (80% and 83%, respectively).
	• Hosts and educators reported that AEOP's JSS online resources are valuable. 67% of hosts agreed that their students responded well to the material from JSS's online resources and that these resources helped them become a better teacher. 50% of educators believe that their students responded well to the material from JSS's online resources while 100% of educators reported that they are valuable teaching and learning resources.
	• Hosts and educators suggested that including related content from NASA would improve the online JSS content offered by AEOP as well as alignment with Next Generation Science Standards. Hosts and educators requested more information and resources to help procure sponsorship for local events.
AEOP's JSS online national competition received limited interest in 2013; hosts, educators, and students were largely unaware of its existence.	• The online national competition received 161 page views, 5 letters of intent, and 1 submission during FY13. 57% of educators were unaware of the online national competition.
AEOP's JSS online resource center is not currently raising Army STEM and AEOP awareness but is likely to do so with strategic improvements to the website and broader JSS programming.	• Although hosts were aware of the AEOP (86%), only 29% were aware of eCYBERMISSION, and very few encouraged their students to participate in AEOP programming. • Only 25% of educators reported that they were aware of the AEOP but 50% reported that they were aware of eCYBERMISSION meaning that they do not associate the two together. Very few educators reported encouraging their students to participate in AEOP programming.
	• AEOP's JSS online resource center attempts to raise awareness of Army STEM and AEOP: AEOP logo is visible and provides an outbound like to www.usaeop.com; dedicated AEOP page in About JSS level; Army link in the STEM careers page; and outbound link to an AEOP .pdf flyer. • Only the usaeop.com outbound link was used with any frequency in FY13 (85 links).

Recommendations

1. Motivating and recruiting existing event hosts and educators to use AEOP's JSS resource center will require significant interaction and integration with very well-established implementers of JSS. If AEOP's JSS-related efforts are to be successful moving forward, non-profit organizations that host local events may be important points of contact and/or potential partners. In order to reach educators, AEOP will need to clearly demonstrate the value of JSS as a teaching tool, and the value of AEOP's JSS online resources for supporting educators in integrating JSS with school STEM curriculum. Alignment of JSS educational resources to the three dimensions of the Next Generation Science Standards—core disciplinary ideas, cross-cutting themes, and science and engineering practices--and robust professional development (e.g., online webinars, face-to-face professional development offerings at local events) will ensure resources are both relevant and feasible for integration with school STEM education nationwide. AEOP's JSS might consider whether and how to leverage lessons learned and promising practices of AEOP's eCYBERMISSION (eCM) in improving use of the JSS online resource center to support broader uptake of resources by local events and by educators in schools. eCM managers, ambassadors and event hosts, and team advisors (mostly educators) could provide valuable insight regarding a range of issues unique to AEOP's competition programs, including: maximizing potential use of online resources, marketing to existing users and potential event hosts, and initiating teacher and school partnerships to expand and study the participation of underserved populations.

2. AEOP should remain cognizant that attempts to perform outreach primarily through the jrsolarsprint.org website and existing school- and community-based JSS programming may constrain the diversity of the population that it attracts, according to data we collected from hosts and educators. We acknowledge that outreach to underserved and underrepresented populations may not be a key objective of JSS hosts and educators nationwide. However, outreach to these populations is an Army priority, and therefore AEOP's JSS programming in FY14 should incorporate explicit efforts to market to and recruit these populations, and to support them in successfully participating in JSS. In an effort to engage underserved and underrepresented populations, AEOP's JSS may need to identify and directly engage educators and students that have not been exposed to JSS-based programming to date. For example, these efforts might include a) promoting JSS to TSA's nationwide and diverse membership base, support and volunteer network, and local chapters, and supporting TSA-affiliated local and national competition options for students; b) initiating unique partnerships with educators at Title 1 schools, including the provision of low or no-cost kits for students, professional development for educators, and support for school-based communities of practice to help educator teams integrate JSS activities with their classroom STEM curricula; and c) strategically cross-promoting and forging initiating partnerships with Army and university sites that host other AEOP pipelines (e.g., GEMS-SEAP-CQL and UNITE-REAP) to expand outreach to diverse populations when they are younger, and prepare them for future engagement in GEMS and UNITE.

3. AEOP's JSS online resource center currently attracts limited web traffic and registrants considering the nationwide reach of other non-AEOP JSS programming. In FY13, a total of 140 teachers, hosts, students, and volunteers registered with AEOP's JSS online resource center while only 17 local events registered with AEOP's system (most in the North East region of the US). We expect that efforts to expand the number and geographic representation of events that register with the JSS resource center, and further development of relationships with those events that have already

registered with the resource center will necessarily increase traffic at and use of the website moving forward. Continued efforts to promote existing local events in areas outside of the North East US, may also help establish a national network for JSS information sharing and generate additional registrants and website traffic. The previous recommendations (1 and 2) will undoubtedly increase website traffic and expand the use of the JSS online resource center as well. Ongoing study of website traffic and registration numbers will be critical moving forward to provide information about the use of jrsolarsprint.org in FY14.

4. Hosts and educators that used the online resources provide by AEOP indicated that they are valuable for teaching and learning. Website analytics support these findings; lesson plans and video tutorials were the most viewed content in AEOP's JSS online resource center. Suggestions for improving these resources include the following: additional content such as information from NASA, virtual simulations, and providing variations on the base car model for younger students. Evaluators would like to highlight and recommend one respondents' suggestion to align educational resources with the Next Generation Science Standards. This suggestion aligns with both the AEOP objective and the national call for shared standards across formal and informal education settings. Evaluators also advise improving the visibility of existing resources and adding new resources to meet current and potential users' needs, as reported from the evaluation assessments. Examples from the current study include a list of resources that local hosts would need to start a new event as well as a list of companies that may be contacted to sponsor local events.

5. AEOP's online JSS competition showed limited efficacy in FY13. The information contained in AEOP's online national competition web page received very limited traffic and extremely limited participation (5 letters of intent and 1 official submission). When event hosts and educators that registered with AEOP's JSS online resource center were asked how the online competition could be improved, most stated that they were unaware of the competition entirely. Strategic promotion of the online competition to TSA's membership base may be needed for the success of this programming component. If such promotion is unlikely to produce the desired interest, and/or provide outreach to underserved populations, AEOP should consider live event programming for a JSS national competition, consistent with the format of other successful AEOP national competitions (e.g., eCYBERMISSION, WPBDC, JSHS).

6. Currently, AEOP's JSS online resource center has limited, if any, success at raising AEOP and Army STEM awareness. It has the capacity to do so with strategic changes to the website and to other AEOP JSS marketing. The visibility of information related to AEOP and Army STEM will, in part, determine the extent to which this program successfully raises awareness through the website. AEOP's JSS online resource center has dedicated content to AEOP, and analytics from outbound links demonstrate that they are used by those who visit the website. Additionally, AEOP's JSS resource center has dedicated a page to STEM careers, including Army STEM careers. However, this page is difficult to find (embedded in About JSS) and only contains external links to resources and information. Placement of STEM career information at a location in the website with higher traffic (e.g., placing a button or tab on the main page) and providing short text descriptions of each linked resource may improve the use of and awareness generated by these resources. Other suggestions for improving the visibility of AEOP and Army STEM offerings through TSA's other JSS-related efforts include offering AEOP and Army STEM career promotional materials to local event hosts and educators registered with the jrsolarsprint.org website, to schools, educators, and other AEOP program sites with which TSA partners, and to educators who participate in JSS-related professional development at TSA conferences. These strategic website

revisions and marketing efforts are likely to strengthen the visibility and participant awareness of Army STEM and the AEOP.

7. AEOP's investment in JSS is likely to see another year of transition, in FY2014. Most of the recommendations provided are likely to necessitate greater investment to support costs associated accomplishing them. In addition, the LO evaluators, Army, and TSA will need to prioritize evaluation to reflect where the most resources and effort are being expended in FY14, and thus, where the most impact is likely to be detected. To the extent possible, evaluation should include continued monitoring of the jrsolarsprint.org website as a measure of nationwide reach, but evaluation assessments should primarily focus on experiences of and potential impact on educators and students who are *directly* engaged by AEOP's JSS programming.

Appendices

Appendix A:
2013 JSS Evaluation Plan

Key Evaluation Questions

The purpose of the JSS evaluation was to support the development of TSA's JSS online resource center by establishing a baseline for use and evaluative feedback regarding TSA's efforts during FY13. The evaluation studied website content and analytics in an attempt to capture current levels of use for the online JSS resource center and online national competition. The evaluation also attempted to gather information from non-TSA-sponsored local event hosts and educators about the effectiveness of JSS resources and activities offered by TSA in FY13 (i.e., online resources, online competition, and marketing/outreach efforts). The purpose of the JSS evaluation is to support the development of TSA's JSS program by providing evaluative feedback regarding the feasibility of TSA's efforts during FY13 and to answer the following evaluation questions:

- To what extent did JSS successfully outreach to existing JSS events, schools, and educators?
- What aspects of the JSS online presence are working well? Which could be improved?
- To what extent was the JSS online competition successfully implemented?
- To what extent are TSA's JSS online resources capable of and currently accomplishing:
  - Facilitating AEOP partnerships with existing JSS events, schools and/or educators?
  - Incentivizing and promoting educator participation in the AEOP?
  - Exposing educators to Army STEM and the offerings of the AEOP?

Methods and Instruments

The FY2013 evaluation used a mixed methods approach (Creswell, 2003; Quinn 2001; Greene & Caracelli, 1997) to allow for deeper understanding of the information provided by respondents and maximum applicability to the development of the JSS program in the future. This mixed methods approach employed quantitative measures to assess perceptions of utility, and perceptions of value for users of TSA's JSS online resource center. The method also used qualitative measures, such as open or constructed-response items within surveys to gather un-structured data regarding perceptions, satisfaction, or suggestions for improvement.

The assessment strategy originally included questionnaires for students, non-TSA-affiliated local event hosts, and non-TSA-affiliated educators that registered and used TSA's JSS online resource center. TSA's online national competition did not, however, receive enough participation to warrant the student questionnaire. As a result, only event hosts and educators were surveyed in FY13 (Appendix B and C, respectively). Finally, information from surveys was triangulated with data from website analytics (e.g., page views, downloads, etc.) to provide a cohesive picture of host and educator use of TSA's JSS online resource center along with their perceptions of utility and value.

Data Collection and Sampling

In FY13, website analytics data was collected for the time period October 1st, 2012 through June 1st, 2013. The event host and educator surveys were hosted by Virginia Tech using Qualtrics® survey software and distributed electronically by TSA to a convenience sample; TSA identified respondents and distributed invitations to participate in the voluntary surveys using contact information provided to them during voluntary registration with the jrsolarsprint.org website. Questionnaires remained open for participation for more than 60 days in the summer of 2013 and the majority of responses were collected during the month of June.

Data Analyses

Quantitative and qualitative data were compiled and analyzed after all data collection concluded. Evaluators summarized quantitative data with descriptive statistics such as frequencies, means, and standard deviations. The

resulting sample size was very small (n = 7 hosts and 8 educators) resulting in inadequate power to appropriately carry out inferential statistical analysis or detect "real" effects using significance testing.

Evaluators analyzed qualitative data, including constructed-response items within questionnaires, for emergent themes. These data were then summarized by theme or in whole form where possible. When possible, two raters analyzed each qualitative data set. When not possible, a portion of the qualitative data set was analyzed by both raters to determine and ensure inter-rater reliability. Thus, the summary of themes and frequency represent consensus ratings.

To the extent possible, findings were triangulated across data sources (local event hosts and educators), data types (quantitative survey data, qualitative survey data, and website analytics), and evaluators conducting analysis and reporting. For example, evaluators cite major trends from the qualitative data—emergent themes with high frequencies in respondents addressing them—to provide additional evidence of, explanation for, or illustrations of quantitative data. More specifically, quantitative survey data, qualitative survey data, and website analytics were all used to triangulate the use, utility, and value ascribed to TSA's JSS online resource center by hosts and educators. Further, two evaluators interpreted all quantitative, qualitative, and website analytics data to do so. Evaluators have posed plausible explanations when divergence between data sources or data types is evident; any such explanations are worthy of further exploration in the full study and, potentially, in future evaluation efforts. Periodically, less unique perspectives are reported and identified as such when they provide an illustration that captures the spirit of JSS or AEOP objectives.

Appendix B:
2013 JSS Host Questionnaire and Data Summary

Dear Junior Solar Sprint Hosts,

Thank you for your participation in this study about the 2013 Junior Solar Sprint (JSS) program. This questionnaire is intended to collect information about you and your experiences with JSS in 2013. The purpose of this study is to help guide program improvement and to report pertinent outcomes to those organizations that fund JSS. The results will be used to critically review JSS's current practices and their relation to improving student participation in Science, Technology, Engineering, and Mathematics (STEM) related endeavors.

- **While this survey is not anonymous, be assured that your responses are CONFIDENTIAL; when analyzing data and reporting results, your name will not be associated with any of the item responses or any comments you make.**
- **Additionally, the AEOP reserves the right to contact you at a later date in an effort to gauge your academic and career success.**
- **Responding to this survey is completely voluntary, you are not required to participate, although we hope you do because your responses will provide JSS with valuable information for meaningful and continuous improvement.**

******By choosing to click the ">>" button below and completing this survey, you are providing consent for us to use your responses as part of this study******

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

Tanner Bateman, Virginia Tech
Senior Project Associate, Army Educational Outreach Program Cooperative Agreement
(540) 231-4540, tbateman@vt.edu

Lynda Haitz, Technology Student Association
Program Manager, Junior Solar Sprint
(703) 860-9000, lhaitz@tsaweb.org

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Please tell us a little bit about yourself:

First Name: _____
Last Name: _____
Email address: _____
How many years have you participated in JSS? _____ .
How long has JSS been held in your region? _____ .

Which of the following best describes you?

- ❍ Teacher
- ❍ Non-profit worker (which organization?): _____
- ❍ Other (please specify): _____

Is JSS formally integrated into the curriculum in your classroom/school district?

- ❍ No
- ❍ Yes

At what type of school do you teach?

- ❍ Public
- ❍ Private
- ❍ Home School
- ❍ Other (please specify): _____

Does your school qualify for Title-I status?

- ❍ No
- ❍ Yes

What grade do you teach?

- ❍ K-5
- ❍ 6th
- ❍ 7th
- ❍ 8th
- ❍ 9-12
- ❍ Other (please specify): _____

What subject do you teach? _____
_____

How did you learn about / become involved with JSS? _____
_____

Our records indicate that you hosted a Junior Solar Sprint race this year, where did this Junior Solar Sprint race take place?

Name of Site: _____
City: _____
State: _____

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What organization is this Junior Solar Sprint race affiliated with (e.g., school, non-profit, science club, etc.)?

Name of Organization: _____
City: _____
State: _____

Does your organization/school participate in any other STEM competitions? Which ones? _____
_____
_____

Please report/estimate the following participation information for your Junior Solar Sprint event:

- How many STUDENTS COMPETED at your event? _____
- How many STUDENTS APPLIED to participate in your event? _____
- How many TEACHERS participated in your event? _____
- How many VOLUNTEERS (including judges) participated in your event? _____
- How many ADULT CHAPERONES/MENTORS participated in your event? _____
- Title-I schools have a high percentage of students from low-income families and qualify federal funding to improve the level of education provided at those schools.
  How many "TITLE-I" schools were represented at your competition? _____

Please report/estimate the number of students in each of the following categories that participated at your Junior Solar Sprint event:

- Male: _____
- Female: _____
- 4th grade: _____
- 5th grade: _____
- 6th grade: _____
- 7th grade: _____
- 8th grade: _____

Where did the race participants obtain the car kit/solar panel supplies? _____
_____

Did your school/organization provide the staff (e.g., volunteers, emcee, director, etc.) for the race itself?

- ❍ Yes
- ❍ No (please elaborate) _____

Please estimate the number of staff and the hours that they worked at the race event: _____
_____

Did your school/organization provide the funding (e.g., venue, race material, etc.) for the race itself (excluding the cost of car kits/solar panels)?

- ❍ No (please elaborate) _____
- ❍ Yes

How was the race funded? _____
_____

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Can you estimate the cost of the race event? _____
_____

Did you use the online JSS curricular resources offered by the Army Educational Outreach Program (AEOP) through the JSS website?

- ❍ No
- ❍ Yes

***Here are all of the online JSS resources offered through the website, how useful were these resources to you?**

	N/A - I didn't use this resource	Not Useful at all	Minimally useful	Somewhat Useful	Useful	Very useful
Course syllabi	❍	❍	❍	❍	❍	❍
Lesson Plans	❍	❍	❍	❍	❍	❍
Matching JSS with STEM standards	❍	❍	❍	❍	❍	❍
JSS Terminology	❍	❍	❍	❍	❍	❍
Video Tutorial	❍	❍	❍	❍	❍	❍
Host Resources	❍	❍	❍	❍	❍	❍
Fundraising information	❍	❍	❍	❍	❍	❍

What is your opinion of the online curricular resources offered through the JSS website?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
They are valuable teaching and learning resources	❍	❍	❍	❍	❍	❍
These resources have helped me become a better teacher	❍	❍	❍	❍	❍	❍
My students respond well to the material from JSS's online resources	❍	❍	❍	❍	❍	❍

The AEOP, in collaboration with TSA, will continue to develop the online resources for JSS. Do you have any suggestions of resources that would be useful to improve the JSS experience in your region? _____
_____
_____
_____

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The online JSS competition was designed to help students across the country who do not have access to JSS in their community participate in the program. Do you have any ideas of how we can improve the online competition and/or attract more participants? _____
_____
_____
_____
_____

The JSS website (www.jrsolarsprint.org), online resources, and online competition are sponsored by the Army Educational Outreach Program (AEOP). Are you aware that the AEOP offers a portfolio of free programs that look to inspire and encourage students, from elementary through graduate school to pursue education and careers in science, technology, engineering, and mathematics (STEM)?

- ❍ Yes
- ❍ No

Many of the students who participate in JSS are also eligible for the AEOP's eCYBERMISSION program. eCYBERMISSION (www.ecybermission.com)is a web-based STEM competition in which more than 15,000 6th – 9th grade students work on teams to solve problems in their communities using STEM skills. Top winners receive scholarships in recognition of their achievement. Are you aware of the eCYBERMISSION program?

- ❍ Yes
- ❍ No

Do you encourage your students to participate in any of the following Army Educational Outreach (AEOP) programs?

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	Yes – I encourage my students to participate	No – I do not encourage my students to participate
Gains in the Education of Mathematics and Science (GEMS): A 1-3 week summer STEM experience at Army research installations for 6^{th} – 8^{th} grade.	❍	❍
eCYBERMISSION: A web-based science, technology, engineering, and mathematics (STEM) competition for 6^{th} – 9^{th} grade.	❍	❍
Junior Science and Humanities Symposium (JSHS): A high school STEM research competition.	❍	❍
UNITE: An engineering summer program for high school students from underserved groups.	❍	❍
West Point Bridge Contest: A computer-based engineering design competition for 6^{th} – 12^{th} 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: Internships in laboratories at colleges throughout the country with the Undergraduate Research Apprenticeship Program **(URAP)** or in Army laboratories through College Qualified Leaders **(CQL).**	❍	❍

What do you think that students like most about JSS? Do you have any stories of past participants who have used JSS as a springboard into other STEM pursuits? _____
_____
_____
_____

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How many years have you been involved in JSS?		
Years	**Freq.**	**%**
2 years	2	29%
4 years	1	14%
10 years	2	29%
20 years	1	14%
23 years	1	14%
Total	**7**	**100%**

Note. Average = 10.14 years, SD = 8.49 years.

How long has JSS been held in your region?		
Years	**Freq.**	**%**
1 year	1	17%
10 years	1	17%
11 years	1	17%
19 years	1	17%
20 years	1	17%
23 years	1	17%
Total	**6**	**100%**

Note. Average = 14.00 years, SD = 8.20 years.

Which of the following best describes you?		
	Freq.	**%**
Teacher	0	0%
Non-profit employee (which organization?) • "Buffalo Museum of Science" • "Cradle of Aviation Museum" • "Florida Solar Energy Center / University of Central Florida" • "Derry, NH Energy Committee" • "Self-Reliance"	5	71%
Other (please specify) • "State government coordinator" • "SAE member (Mechanical Engineer)"	2	29%
Total	**7**	**100%**

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Is JSS formally integrated into the curriculum in your classroom / school district?		
	Freq.	**%**
No	0	0%
Yes	0	0%
Total	**0**	**100%**

At what type of school do you teach?		
	Freq.	**%**
Public	0	0%
Private	0	0%
Home School	0	0%
Other (please specify)	0	0%
Total	**0**	**100%**

Does your school qualify for Title-I status?		
	Freq.	**%**
No	0	0%
Yes	0	0%
Total	**0**	**100%**

What grade do you teach?		
	Freq.	**%**
K-5	0	0%
6th	0	0%
7th	0	0%
8th	0	0%
9-12	0	0%
Other (please specify)	0	0%
Total	**0**	**100%**

What subject do you teach?						
Subject	**Freq.**	**%**		**Subject**	**Freq.**	**%**
				Total	**0**	**100%**

Appendix B:
2013 JSS Host Questionnaire and Data Summary

How did you learn about / become involved with JSS?		
	Freq.	**%**
"Buffalo JSS held teacher workshop in the museum, I then entered a home school team in the event."	1	14%
"Through the web"	1	14%
"through work"	1	14%
"A Solar Engineer brought it to my attention. I am an educator for the Florida Solar Energy Center and believe in the value of hands-on project based learning."	1	14%
"In 1991, Indiana SAE organized a JSS event and I helped organize the inaugural event."	1	14%
"Through NESEA"	1	14%
"Self-Reliance has served as the regional coordinator for the Cape & Islands JSS race for 10+ years"	1	14%
Total	**7**	**100%**

Our records indicate that you hosted a Junior Solar Sprint race this year, where did this Junior Solar Sprint race take place?				
Site	**City**	**State**	**Freq.**	**%**
"Buffalo Museum of Science"	Buffalo	NY	1	14%
"Cradle of Aviation Museum"	Garden City	NY	1	14%
"Dover International Speedway"	Dover	DE	1	14%
"EnergyWhiz Olympics at the Florida Solar Energy Center"	Cocoa	FL	1	14%
"Columbus Christian School"	Columbus	IN	1	14%
"Gilbert H Hood middle school"	Derry	NH	1	14%
"Cape Cod Community College – was canceled due to lack of interest"	Barnstable	MA	1	14%
		Total	**7**	**100%**

What organization is this Junior Solar Sprint race affiliated with (e.g., school, non-profit, science club, etc.)?				
Organization	**City**	**State**	**Freq.**	**%**
"JSS Buffalo www.jssbuffalo.com & Buffalo Museum of Science"	Buffalo	NY	1	14%
"Cradle of Aviation Museum, non-profit"	Garden City	NY	1	14%
"DNREC"	Dover	DE	1	14%
"Florida Solar Energy Center (Part of University of Central FL)"	Cocoa	FL	1	14%
"Indiana Section of SAE"	Columbus	IN	1	14%
"Derry Energy & Environmental Advisory Committee"	Derry	NH	1	14%
		Total	**6**	**100%**

Appendix B:
2013 JSS Host Questionnaire and Data Summary

Does your organization / school participate in any other STEM competitions? Which ones? (n = 7 organizations)		
Competition	**Freq.**	**%**
KidWind	3	43%
No	2	29%
eCYBERMISSION	1	14%
EnergyWhiz Olympics	1	14%
Indiana SAE	1	14%
Lego First	1	14%
Mag Lev	1	14%
School Science Bowl	1	14%

Note. % = percentage of respondents (n = 7) reporting participation in the STEM competition listed.

Please report/estimate the following participation information for your Junior Solar Sprint Event:				
	n	**Total #**	**Avg. #**	**SD**
How many STUDENTS COMPETED at your event?	6	477	**79.50**	42.85
How many STUDENTS APPLIED to participate in your event?	6	589	**96.17**	66.21
How many TEACHERS participated in your event?	6	84	**14.00**	14.30
How many VOLUNTEERS (including judges) participated in your event?	6	92	**15.33**	8.14
How many ADULT CHAPERONES/MENTORS participated in your event?	5	37	**9.25**	4.27
Title-I schools have a high percentage of students from low-income families and qualify for federal funding to improve the level of education provided at those schools. How many "TITLE-I" schools were represented at your competition?	5	2	**0.50**	1.00

Please report / estimate the number of students in each of the following categories that participated at your Junior Solar Sprint event:				
	n	**Total #**	**Avg. #**	**SD**
Male	6	218	**43.60**	23.61
Female	6	130	**26.00**	15.98
4th grade	3	13	**6.50**	9.19
5th grade	3	30	**15.00**	21.21
6th grade	4	58	**19.33**	9.45
7th grade	7	199	**33.17**	20.12
8th grade	5	96	**24.00**	28.93

Appendix B:
2013 JSS Host Questionnaire and Data Summary

Where did the race participants obtain the car kit/solar panel supplies?		
Response	**Freq.**	**%**
"Local middle school teachers as part of their Technology Program build cars, most teachers use Pitsco as thier primary supplier. Second is Kelvin, then a mix of Science Kit/Wards or misc local hobby stores."	1	17%
"We purchased some of their kits, others teachers purchased via Pitsco"	1	17%
"From our office DNREC"	1	17%
"Solar Made, Pitsco"	1	17%
"Indiana SAE purchases the battery packs and motors, and we loan solar panels. The panels are returned/reused each year so save money, and the motors/packs are not returned. We also have some gears, pulleys and wheels available, but encourage the kids to find things on their own they can use."	1	17%
"From their schools"	1	17%

Did your school/organization provide the staff (e.g., volunteers, emcee, director, etc.) for the race itself?		
	Freq.	**%**
No (please elaborate)	1	14%
Yes	6	86%
Total	**7**	**100%**

Note. Please elaborate = "event was canceled".

Please estimate the number of staff and the hours that they worked at the race event:		
	# of staff	**Total Man-Hours**
"18 - Myself over 120 hours, JSS staff 3 - website & registration 60 hours, 4 judges, & 2 scorekeeper/announcers & 4 track & 4 crowd/support 14 @ 6 hours each for race day. Plus 4 hours of Exhibits time for printing signs and setting up track 4 people."	18	268
"12 people for 4 hours"	12	48
"15 staff @ 7 hours each"	15	105
"At least 80 hours"	-	80
"Approximately 25 help on raceday for about 6 hours. About 10 mentors help for about 2 hours a week for about 2 months at the schools."	35	310
"7 members, approximately 4 hours each"	7	28
Avg.	**21 staff**	**139.83 man-hours**

Appendix B:
2013 JSS Host Questionnaire and Data Summary

Did your school/organization provide the funding (e.g., venue, race material, etc.) for the race itself (excluding the cost of car kits/solar panels)?		
	Freq.	**%**
No	0	0%
Yes	7	100%
Total	**7**	**100%**

How was the race funded? (n = 7)		
Funding Source	**Freq.**	**%**
The organization that runs the event (e.g.,	4	57%
Sponsorship / private donations	3	43%
Entry / Registration fees	2	29%
Grants	1	14%

Note. % = percentage of respondents (n = 7) reporting the listed funding source.

Can you estimate the cost of the race event?		
Cost	**Freq.**	**%**
No responses	0	0%

Did you use the online JSS curricular resources offered by the Army Educational Outreach Program (AEOP) through the JSS website (www.jrsolarsprint.org)		
	Freq.	**%**
No	2	29%
Yes	5	71%
Total	**7**	**100%**

Here are all of the online JSS resources offered through the website, how useful were these resources to you?									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
Course Syllabi	2 (40%)	0 (0%)	0 (0%)	0 (0%)	2 (40%)	1 (20%)	5	**3.60**	2.41
Lesson Plans	1 (20%)	0 (0%)	0 (0%)	1 (20%)	3 (60%)	0 (0%)	5	**4.00**	1.73
Matching JSS with STEM standards	3 (60%)	0 (0%)	0 (0%)	0 (0%)	1 (20%)	1 (20%)	5	**2.80**	2.49
JSS Terminology	3 (60%)	0 (0%)	0 (0%)	0 (0%)	2 (40%)	0 (0%)	5	**2.60**	2.19
Video Tutorials	2 (40%)	0 (0%)	0 (0%)	1 (20%)	1 (20%)	1 (20%)	5	**3.40**	2.30
Host Resources	1 (20%)	0 (0%)	0 (0%)	2 (40%)	1 (20%)	1 (20%)	5	**4.00**	1.87

Fundraising information	4 (80%)	0 (0%)	0 (0%)	1 (20%)	0 (0%)	0 (0%)	5	**1.60**	1.34

Note. Response scale: **1** = "N/A-I did not use this resource," **2** = "Very Useless," **3** = "Useless," **4** = "Somewhat Useful," **5** = "Useful," **6** = "Very Useful".

Appendix B:
2013 JSS Host Questionnaire and Data Summary

Use the scale provided to tell us how much you agree or disagree with the following statements:									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
They are valuable teaching and learning resources	0 (0%)	0 (0%)	0 (0%)	3 (60%)	0 (0%)	2 (40%)	5	**4.80**	1.10
These resources have helped me become a better teacher	0 (0%)	0 (0%)	0 (0%)	1 (33%)	2 (67%)	0 (0%)	3	**4.67**	0.58
My students respond well to the material from JSS's online resources	0 (0%)	0 (0%)	0 (0%)	1 (33%)	2 (67%)	0 (0%)	3	**4.67**	0.58

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

The AEOP, in collaboration with TSA, will continue to develop the online resources for JSS. Do you have any suggestions of resources that would be useful to improve the JSS experience in your region?
Specific Suggestions
"…Next Generation Science Standards are of course the next alignment for teachers that we should look at…"
"It might be cool to show some NASA information on how climate change is occurring for students and teachers to connect their Science Curriculum with Renewable Energies and JSS"
"…better examples of how different teams tackled [the gearing problem] would be helpful. Instead of just photos of the car, having some "interior" photos would be helpful."
"We also find that the kids will test with the battery packs…then with the panels and they find their gearing is wrong. So, it would be great to have an economical knockdown resistor or some other method to make the battery packs better simulate the solar panel output."
"More video tutorials and pictures would be great. The web content can get a little overwhelming for first time users."

The online JSS competition was designed to help students across the country who do not have access to JSS in their community participate in the program. Do you have any ideas of how we can improve the online competition and/or attract more participants?
Specific Suggestions
"I do like the idea of an engineering challenge that changes each year."
"Marketing to school districts would attract more participants."

The JSS website (www.jrsolarsprint.org), online resources, and online competition are sponsored by the Army Educational Outreach Program (AEOP). Are you aware that the AEOP offers a portfolio of free programs that look to inspire and encourage students, from elementary through graduate school to pursue education and careers in science, technology, engineering, and mathematics (STEM)?		
	Freq.	**%**
Yes	6	86%
No	1	14%
Total	**7**	**100%**

Appendix B:
2013 JSS Host Questionnaire and Data Summary

Many of the students who participate in JSS are also eligible for the AEOP's eCYBERMISSION program. eCYBERMISSION (www.ecybermission.com)is a web-based STEM competition in which more than 15,000 6th – 9th grade students work on teams to solve problems in their communities using STEM skills. Top winners receive scholarships in recognition of their achievement. Are you aware of the eCYBERMISSION program?

	Freq.	%
Yes	2	29%
No	5	71%
Total	**7**	**100%**

Do you encourage your students to participate in any of the following Army Educational Outreach (AEOP) programs?

	Yes-I encourage my students to participate	No-I do not encourage my students to participate
Gains in the Education of Mathematics and Science (GEMS): A 1-3 week summer STEM experience at Army research installations for 6th-8th grade.	1 (33%)	2 (67%)
eCYBERMISSION: A web-based STEM competition for 6th – 9th grade	2 (67%)	1 (33%)
Junior Science and Humanities Symposium (JSHS): A high school STEM research competition	1 (33%)	2 (67%)
UNITE: An engineering summer program for high school students from underserved groups	1 (33%)	2 (67%)
West Point Bridge Design Contest: A computer-based engineering design competition for 6th – 12th grade	2 (67%)	1 (33%)
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**).	0 (0%)	3 (100%)
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**).	0 (0%)	3 (100%)

Appendix B:
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What do you think that students like most about JSS? Do you have any stories of past participants who have used JSS as a springboard into other STEM pursuits?
Specific Comments
"I do think that building physical objects is a necessity for students, we don't joke about things made in China we have accepted it and that is far worse. We need to know how to make things, not just design virtual things in a computer environment but to build real objects."
"The students always have great feedback for JSS. They love constructing a car that is able to zoom down our tracks. The trial and error of the project is exciting and fun for them. JSS has been a springboard for teachers to discuss global warming, climate change, and engineering careers with their classes."
"The actual races"
"Hands-on, project based learning is more fun."
"From my 23 years of doing JSS, I think the kids enjoy that this is not a "cookie cutter" project, but is a hands-on event with no one "right" answer. They also love the racing portion which can be very exciting. Some of the kids really focus on the design and making it look "cool", while others are only worried about speed. I don't have specific stories, but we do have several former JSSers that are now working as engineers or are in engineering school."
"I think the students like the hands-on aspects of building the car, getting creative, working with a team and ultimately racing in a competition. It helps them learn about trial and error (I hear a lot of students tell me about their cars saying 'At first we tried this, but when it didn't work we went with this instead')."

Appendix C:
2013 JSS Educator Questionnaire and Data Summary

Dear Junior Solar Sprint Educators,

Thank you for your participation in this study about the 2013 Junior Solar Sprint (JSS) program. This questionnaire is intended to collect information about you and your experiences with JSS in 2013. The purpose of this study is to help guide program improvement and to report pertinent outcomes to those organizations that fund JSS. The results will be used to critically review JSS's current practices and their relation to improving student participation in Science, Technology, Engineering, and Mathematics (STEM) related endeavors.

- **While this survey is not anonymous, be assured that your responses are CONFIDENTIAL; when analyzing data and reporting results, your name will not be associated with any of the item responses or any comments you make.**
- **Additionally, the AEOP reserves the right to contact you at a later date in an effort to gauge your academic and career success.**
- **Responding to this survey is completely voluntary, you are not required to participate, although we hope you do because your responses will provide JSS with valuable information for meaningful and continuous improvement.**

******By choosing to click the ">>" button below and completing this survey, you are providing consent for us to use your responses as part of this study******

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

Tanner Bateman, Virginia Tech
Senior Project Associate, Army Educational Outreach Program Cooperative Agreement
(540) 231-4540, tbateman@vt.edu

Lynda Haitz, Technology Student Association
Program Manager, Junior Solar Sprint
(703) 860-9000, lhaitz@tsaweb.org

Appendix C:
2013 JSS Educator Questionnaire and Data Summary

Please tell us a little bit about yourself:

First Name: _____
Last Name: _____
Email address: _____
How many years have you been involved in JSS? _____

Which of the following best describes you?

- ❍ Teacher
- ❍ Non-profit worker (which organization?): _____
- ❍ Other (please specify): _____

Is JSS formally integrated into the curriculum in your classroom/school district?

- ❍ No
- ❍ Yes

At what type of school do you teach?

- ❍ Public
- ❍ Private
- ❍ Home School
- ❍ Other (please specify): _____

What grade do you teach?

- ❍ K-5
- ❍ 6th
- ❍ 7th
- ❍ 8th
- ❍ 9-12
- ❍ Other (please specify): _____

What subject do you teach (e.g., biology, chemistry, etc.)? _____
_____

Does your school qualify for Title-I status?

- ❍ No
- ❍ Yes

How did you learn about / become involved with JSS? _____
_____

Did you use the online JSS curricular resources offered by the Army Educational Outreach Program (AEOP) through the JSS website (www.jrsolarsprint.org)?

- ❍ No
- ❍ Yes

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2013 JSS Educator Questionnaire and Data Summary

Here are all of the online JSS resources offered through the website, how useful were these resources to you?

	N/A - I didn't use this resource	Very Useless	Useless	Somewhat Useful	Useful	Very useful
Course syllabi	❍	❍	❍	❍	❍	❍
Lesson Plans	❍	❍	❍	❍	❍	❍
Matching JSS with STEM standards	❍	❍	❍	❍	❍	❍
JSS Terminology	❍	❍	❍	❍	❍	❍
Video Tutorial	❍	❍	❍	❍	❍	❍
Host Resources	❍	❍	❍	❍	❍	❍
Fundraising information	❍	❍	❍	❍	❍	❍

What is your opinion of the online curricular resources and lesson plans offered through the JSS website?

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
They are valuable teaching and learning resources	❍	❍	❍	❍	❍	❍
These resources have helped me become a better teacher	❍	❍	❍	❍	❍	❍
My students respond well to the material from JSS's online resources	❍	❍	❍	❍	❍	❍

The AEOP, in collaboration with TSA, will continue to develop the online resources for JSS. Do you have any suggestions of resources that would be useful to improve the JSS experience in your region? _____
_____
_____
_____

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2013 JSS Educator Questionnaire and Data Summary

The online JSS competition was designed to help students across the country who do not have access to JSS in their community participate in the program. Do you have any ideas of how we can improve the online competition and/or attract more participants? _____
_____
_____
_____
_____

The JSS website (www.jrsolarsprint.org), online resources, and online competition are sponsored by the Army Educational Outreach Program (AEOP). Are you aware that the AEOP offers a portfolio of free programs that look to inspire and encourage students, from elementary through graduate school to pursue education and careers in science, technology, engineering, and mathematics (STEM)?

- ❍ Yes
- ❍ No

Many of the students who participate in JSS are also eligible for the AEOP's eCYBERMISSION program. eCYBERMISSION (www.ecybermission.com)is a web-based STEM competition in which more than 15,000 6th – 9th grade students work on teams to solve problems in their communities using STEM skills. Top winners receive scholarships in recognition of their achievement. Are you aware of the eCYBERMISSION program?

- ❍ Yes
- ❍ No

Are you familiar with the following initiatives and programs that are sponsored by the United States Army?

Appendix C:
2013 JSS Educator Questionnaire and Data Summary

	Yes	No
Gains in the Education of Mathematics and Science (GEMS): A 1-3 week summer STEM experience at Army research installations for 6^{th} – 8^{th} grade.	❍	❍
West Point Bridge Contest: A computer-based engineering design competition for 6^{th} – 12^{th} grade.	❍	❍
Junior Science and Humanities Symposium (JSHS): A high school STEM research competition.	❍	❍
UNITE: An engineering summer program for high school students from underserved groups.	❍	❍
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: Internships in laboratories at colleges throughout the country with the Undergraduate Research Apprenticeship Program **(URAP)** or in Army laboratories through College Qualified Leaders **(CQL).**	❍	❍
Science Teacher Program Initiative's (STPI) STEM teachers' academy: A 1-week professional development program for middle and high school science teachers.	❍	❍

What motivates YOU to participate in JSS? _____
_____
_____
_____

Do you work with students to participate in any other STEM competitions? Please list them: _____
_____
_____

What do you think that students like most about JSS? Do you have any stories of past participants who have used JSS as a springboard into other STEM pursuits? _____
_____
_____
_____

Appendix C:
2013 JSS Educator Questionnaire and Data Summary

How many years have you been involved in JSS?		
Years	**Freq.**	**%**
1 year	2	25%
2 years	1	13%
4 years	1	13%
12 years	1	13%
15 years	1	13%
18 years	1	13%
20 years	1	13%
Total	**8**	**100%**

Note. Average = 9.13 years, SD = 8.01 years.

Which of the following best describes you?		
	Freq.	**%**
Teacher	7	88%
Non-profit employee (which organization?)	0	0%
Other (please specify) • *"State Advisor, NYSTSA"*	1	13%
Total	**8**	**100%**

Is JSS formally integrated into the curriculum in your classroom / school district?		
	Freq.	**%**
No	5	71%
Yes	2	29%
Total	**7**	**100%**

At what type of school do you teach?		
	Freq.	**%**
Public	4	57%
Private	3	43%
Home School	0	0%
Other (please specify)	0	0%
Total	**7**	**100%**

Appendix C:
2013 JSS Educator Questionnaire and Data Summary

What grade do you teach?		
	Freq.	**%**
K-5	0	0%
6th	2	29%
7th	1	14%
8th	3	43%
9-12	0	0%
Other (please specify) • *"6,7,& 8"*	1	14%
Total	**7**	**100%**

What grade do you teach?		
	Freq.	**%**
General Science	4	57%
Crafts and science	1	14%
Science and Math	1	14%
Technology and Engineering Education	1	14%
Total	**7**	**100%**

Does your school qualify for Title-I status?		
	Freq.	**%**
No	6	100%
Yes	0	0%
Total	**6**	**100%**

How did you learn about / become involved with JSS?		
	Freq.	**%**
"Phila Solar Energy"	1	14%
"My son was in his local TSA chapter during which they conducted JSS races."	1	14%
"I don't remember but NH tech college ran it in the beginning and I think they sent something to science teachers in the region."	1	14%
"Internet research"	1	14%
"Way back when, 1998 my colleague introduced me to it."	1	14%
"Some type of mailing I think."	1	14%
"internet"	1	14%
Total	**7**	**100%**

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Did you use the online JSS curricular resources offered by the Army Educational Outreach Program (AEOP) through the JSS website (www.jrsolarsprint.org)		
	Freq.	**%**
No	2	25%
Yes	6	75%
Total	**8**	**100%**

Here are all of the online JSS resources offered through the website, how useful were these resources to you?									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
Course Syllabi	1 (17%)	0 (0%)	1 (17%)	0 (0%)	4 (67%)	0 (0%)	6	**4.00**	1.67
Lesson Plans	1 (17%)	0 (0%)	0 (0%)	1 (17%)	4 (67%)	0 (0%)	6	**4.17**	1.60
Matching JSS with STEM standards	3 (50%)	0 (0%)	0 (0%)	0 (0%)	2 (33%)	1 (17%)	6	**3.17**	2.40
JSS Terminology	1 (17%)	0 (0%)	0 (0%)	0 (0%)	5 (83%)	0 (0%)	6	**4.33**	1.63
Video Tutorials	1 (17%)	0 (0%)	0 (0%)	0 (0%)	4 (67%)	1 (17%)	6	**4.50**	1.76
Host Resources	3 (50%)	0 (0%)	0 (0%)	0 (0%)	3 (50%)	0 (0%)	6	**3.00**	2.19
Fundraising information	5 (83%)	0 (0%)	0 (0%)	1 (17%)	0 (0%)	0 (0%)	6	**1.50**	1.22

Note. Response scale: 1 = "N/A-I did not use this resource," 2 = "Very Useless," 3 = "Useless," 4 = "Somewhat Useful," 5 = "Useful," 6 = "Very Useful".

Use the scale provided to tell us how much you agree or disagree with the following statements:									
	1	**2**	**3**	**4**	**5**	**6**	**n**	**Avg.**	**SD**
They are valuable teaching and learning resources	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (67%)	2 (33%)	6	**5.33**	0.52
These resources have helped me become a better teacher	0 (0%)	0 (0%)	1 (17%)	4 (67%)	1 (17%)	0 (0%)	6	**4.00**	0.63
My students respond well to the material from JSS's online resources	0 (0%)	1 (17%)	0 (0%)	2 (33%)	3 (50%)	0 (0%)	6	**4.17**	1.17

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

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Appendix C:
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The AEOP, in collaboration with TSA, will continue to develop the online resources for JSS. Do you have any suggestions of resources that would be useful to improve the JSS experience in your region?
Specific Suggestions
"A virtual simulation"
"List local state resources as mentors for those wishing to start a JSS event in their location."
"We need a sponsor to run our regional race because it is too much work for teachers to do by themselves. If you could help us that would be wonderful."
"Variations on the base car model till inspire younger participants"
"Get an engineering type company in the region to sponsor and organize the regional competition."
"I liked what was available."
"Create lists for teachers to create learning stations on several topics...like gear ratio, solar power, drive trains, wind resistance, wheels and axles. Something students can learn from before they build...could be online resources or small activities to do and students can rotate through each station to learn without it being a lengthy lessons. Use materials that are simple and cheap for teachers to create following your list."

The online JSS competition was designed to help students across the country who do not have access to JSS in their community participate in the program. Do you have any ideas of how we can improve the online competition and/or attract more participants?
Specific Suggestions
"Did not use it."
"Have not checked it out."
"We did not use the service"
"did not know about it"

The JSS website (www.jrsolarsprint.org), online resources, and online competition are sponsored by the Army Educational Outreach Program (AEOP). Are you aware that the AEOP offers a portfolio of free programs that look to inspire and encourage students, from elementary through graduate school to pursue education and careers in science, technology, engineering, and mathematics (STEM)?

	Freq.	**%**
Yes	2	25%
No	6	75%
Total	**8**	**100%**

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Many of the students who participate in JSS are also eligible for the AEOP's eCYBERMISSION program. eCYBERMISSION (www.ecybermission.com)is a web-based STEM competition in which more than 15,000 6th – 9th grade students work on teams to solve problems in their communities using STEM skills. Top winners receive scholarships in recognition of their achievement. Are you aware of the eCYBERMISSION program?

	Freq.	%
Yes	4	50%
No	4	50%
Total	**8**	**100%**

Do you encourage your students to participate in any of the following Army Educational Outreach (AEOP) programs?

	Yes-I encourage my students to participate	No-I do not encourage my students to participate
Gains in the Education of Mathematics and Science (GEMS): A 1-3 week summer STEM experience at Army research installations for 6th-8th grade.	1 (13%)	7 (88%)
eCYBERMISSION: A web-based STEM competition for 6th – 9th grade	1 (13%)	7 (88%)
Junior Science and Humanities Symposium (JSHS): A high school STEM research competition	0 (0%)	8 (100%)
UNITE: An engineering summer program for high school students from underserved groups	1 (13%)	7 (88%)
West Point Bridge Design Contest: A computer-based engineering design competition for 6th – 12th grade	1 (13%)	7 (88%)
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).	0 (0%)	8 (100%)
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).	1 (13%)	7 (88%)

Appendix C:
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What motivates YOU to participate in JSS?
Specific Comments
"A good hands on problem solving engineering activity"
"It's a program we've used for nearly 2 decades. It incorporates STE(A)- for Art and M concepts SO well. It's a wonderful bridge activity between disciplines."
"Students absolutely love building these cars. Middle-schoolers learn so much about engineering, Newton's Laws, working in groups with this project. "
"Engaging students"
"I see the value in what kids learn, some engineering, some mechanical, some basic hand tool usage and an introduction to a modern sustainable energy source."
"Students love doing the hands-on building of a car from scratch. It is a wonderful way to end the year. "
"Good teaching tool."
"Project based inquiry engages students and inspires them to seek careers in STEM"

Do you work with students to participate in any other STEM competitions? Please list them:
Specific Comments
"Future Cities"
"All the TSA competitive events."
"No"
"Local Construction and University outreach efforts"
'Yes? FIRST Lego Robotics"
"No"
"No"
"FIRST Lego League"

What do you think that students like most about JSS? Do you have any stories of past participants who have used JSS as a springboard into other STEM pursuits?
Specific Comments
"The racing is the cool thing"
"Public speaking, Construction challenge, Transportation Challenge, Marine Challenge, CAD2D, CAD3D"
"It's hands on"
"Kids like the hands on aspect. Many of my 7th graders go on to participate in the HS robotics club."
"The building/making things. I am on Facebook with a student who works in the Auto industry."
"Building the cars and participating in the competition"