



Air Force Association

STELLARXPLORES

THE NATIONAL HIGH SCHOOL SPACE CHALLENGE

Alumni Survey

August 31, 2018



I am very proud of the work done by the young men from Great Mills High School. They put in countless hours preparing and participating in this year's competition. They tackled the StellarXplorers problems with enthusiasm and tenacity. Their effectiveness comes from combining individual strengths and pushing each other to achieve. As an educator, I am extremely impressed with the authenticity of the StellarXplorers problems.

– Team Director Allen Skiller, Great Mills High School, MD

**STLX IV Champions: Great Mills HS, MD
Tahsin Machine Team**



StellarXplorers 2018 Alumni Survey



Welcome

This is StellarXplorers' first Alumni Survey. This program was created and produced by the Air Force Association (AFA) starting in September 2014 after an inquiry from the Air Force STEM Office. From our Proof of Concept in April 2015 with five Colorado High Schools, we have grown to 180 teams that completed "STLX IV" last April. StellarXplorers uses space system engineering as a means to inspire and motivate students to pursue education and careers in science, technology, engineering, and mathematics (STEM). The Program is building a pipeline of STEM talent for the future of government and industry to supplement and succeed an aging STEM workforce. High school-aged teams compete through four rounds from home for a chance at an all-expense paid trip to the National Finals. Through participation, students gain experience and confidence in problem solving, analytical skills, teamwork, and leadership.

The Program is making great strides in introducing STEM disciplines and aerospace engineering to more students, including under-represented minorities. This past season, about half the participants were of minority ethnicity and over a quarter were female – 44% of the teams came from Title 1 schools. Tapping this talent pool gains the Nation critical skills for our future workforce. For many of the students, it shows them an alternative future of which they may not have thought themselves capable, and it gives them hope for a better future for themselves and their families.

For this first survey, we were most interested in how the participants perceived the program, especially their knowledge of space systems concepts and space career opportunities, and their likelihood of pursuing STEM or space education and careers. We also asked why they participated, what they gained from the experience, and whether the program was engaging, their current interest in space careers, and whether the program was fun. Because the program is very "young" (91% of all teams participated in the past two years), we elected to ask their current pursuit of STEM/Space education/careers on next year's survey. We were very pleased with the results you will see here and hope you will agree that the program is on track to make a significant positive impact on U.S. competitiveness and national security.

We owe a large debt of gratitude to our sponsors: Air Force STEM (InterStellar level), United Launch Alliance (Platinum level), OrbitalATK (Gold level), and Kratos and SpaceX (Silver level). Just last week, the Harris Corporation at the platinum level was added to the list. Additionally, we could not conduct a program of this quality, for so many, within available resources without our Education Alliance Partners, Analytical Graphics, Inc., Coyote Enterprises, Inc., and the Space Foundation.

Registration for this year's competition ends 13 October 2918. To register a team, or for more information, visit our website at <www.stellarxplorers.org>.

Stephen K. Gourley,
StellarXplorers Program Director

SURVEY METHODOLOGY. The 18-question survey was emailed to 845 previous StellarXplorers participants, with a response period from late June to mid-August 2018. Just over 16% responded (137 total responses) rate. Most of the questions required Likert-type forced answers that yielded interval (vs. continuous) data. The reference to averages in comparing responses is used for convenience and not as a rigorous statistical claim.

STELLARXPLOERS

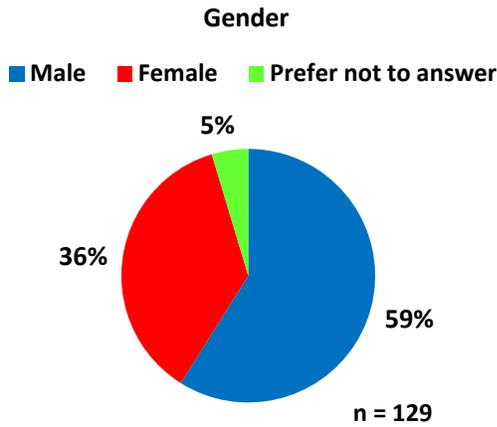
The National High School Space Challenge



StellarXplorers 2018 Alumni Survey



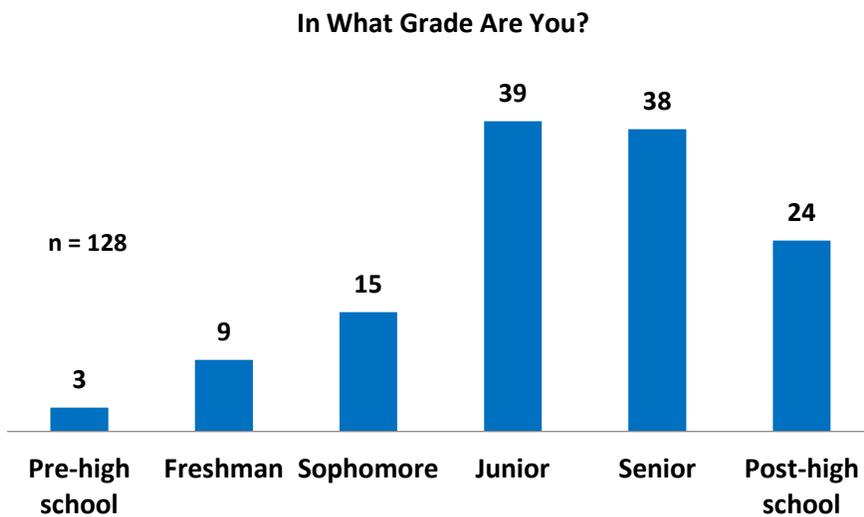
COMPETITOR DEMOGRAPHICS



The survey received a slightly greater response rate from females than our 28% all-participant data. While we are heartened to receive a greater response rate from females, the data for the “Attitudes Toward Females” questions may be partially a product of this response rate. We did not include an ethnicity question, preferring to use our all-participant data, shown in the table on the right. The overall 54% white compares to the most recent U.S Census of 62% White/non-Hispanic.

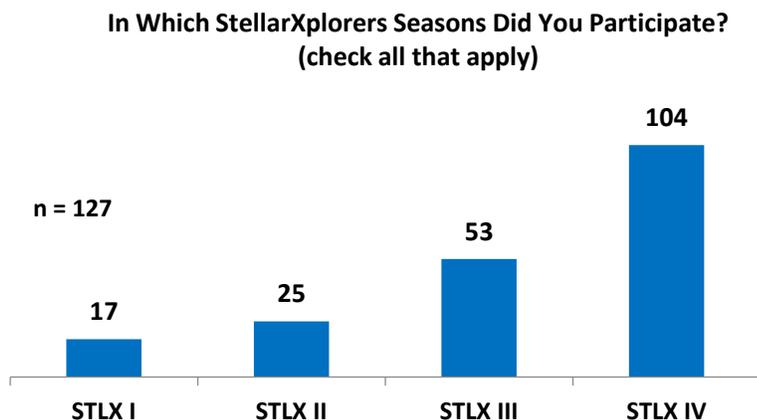
Ethnicity (all participants)	
Nat.Am./AK	0.5%
Asian/Pac. Is.	14.8%
Black(non-His)	5.1%
Hispanic	15.6%
Two + races	9.0%
White/non-His	54.2%

CURRENT GRADE LEVEL



The survey responses for current grade level are consistent with our all-participant data from Team Population registration. Again, it is worth noting that 91% of all teams participated in the past two seasons when the program had obtained its “Full Deployment” format.

SEASONS PARTICIPATED



The number of respondents from successive iterations of the program is consistent with the growth we’ve experienced each year from 5, to 27, to 131, to 180 teams. It is also reflective of the 80% year-to-year organizational return rate we have achieved, further indicating the perceived value of the program.

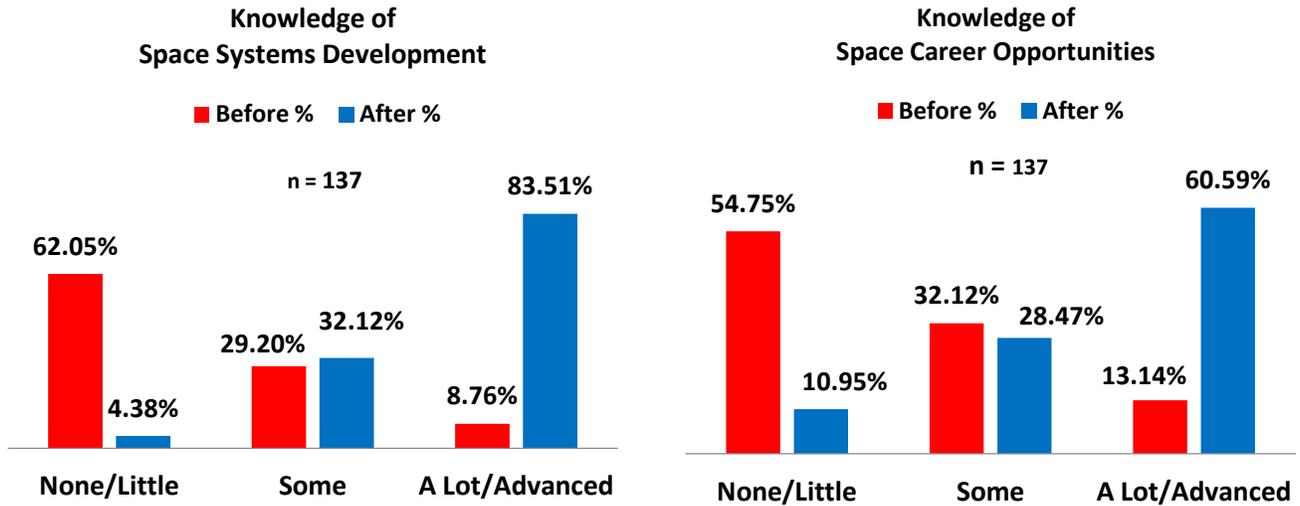




StellarXplorers 2018 Alumni Survey

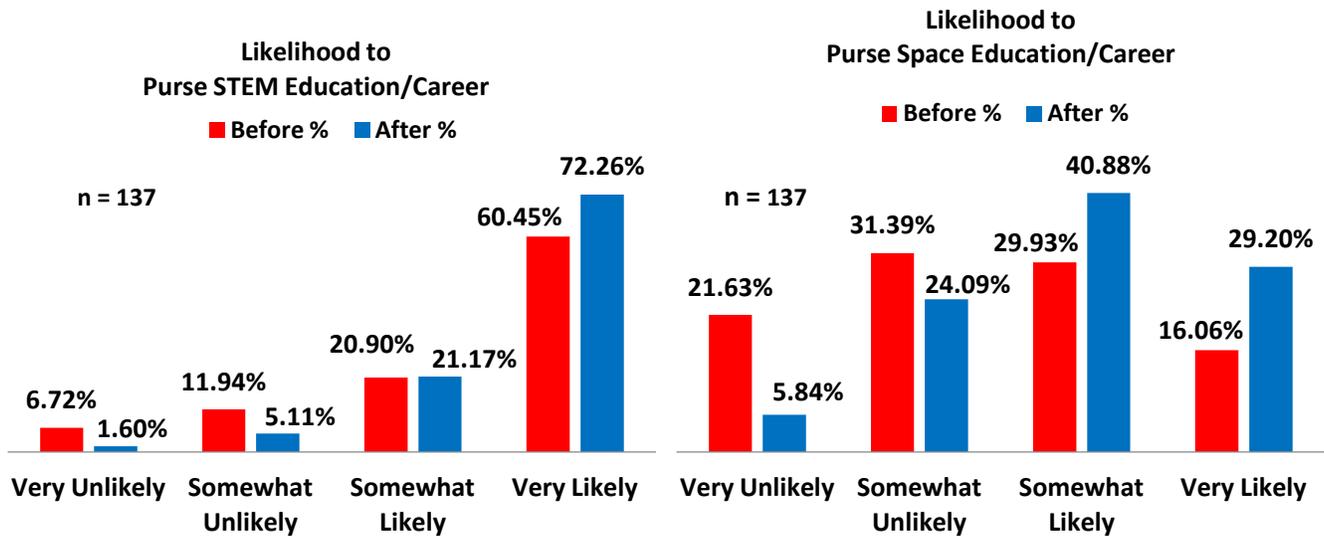


KNOWLEDGE OF SPACE SYSTEMS DEVELOPMENT/SPACE CAREER OPPORTUNITIES



The survey results for before/after knowledge for space systems development as well as space career opportunities both show positive shifts for these critical program objectives. Reported weighted averages increased 63% for systems development knowledge and 47% for career knowledge.

LIKELIHOOD OF PURSUING STEM/SPACE EDUCATION/CAREER



The survey results for before/likelihood to pursue STEM/Space education/careers also show positive shifts for these key program objectives. Reported weighted averages increased only a modest 4% for STEM (we appeal to a STEM-friendly crowd already) and 20% for career knowledge.



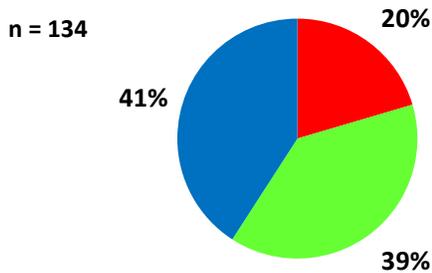
StellarXplorers 2018 Alumni Survey



ATTITUDES OF SPACE CAREERS TOWARD FEMALES

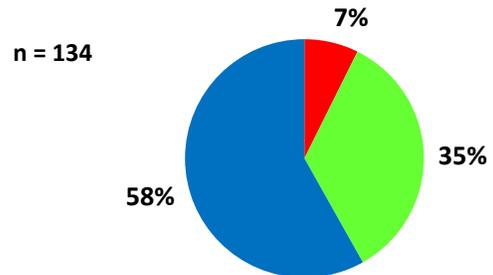
Attitude of Space to Females (before)

- Unwelcome/Pretty Difficult
- Neither
- Pretty Easy/Very Welcome



Attitude of Space to Females (after)

- Unwelcome/Pretty Difficult
- Neither
- Pretty Easy/Very Welcome

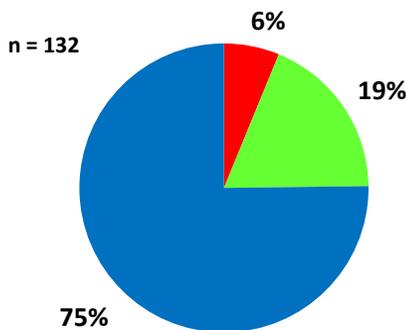


There was only a modest positive shift in participants' views on the space career environment for females going from 80/20% positive/neutral vs. negative to 93/7%. When we parsed the data by gender, an interesting dynamic emerged. Males before numbers were 11.4% more positive/neutral than the females, but the females' positive attitude shift was 9.4% more than the males. Of course, with such small differences it is impossible to draw any real conclusions, but one might see this type of data if females tend to see STEM as a males' domain, and the experience of performing as well (often better) than their male colleagues has an empowering effect.

YOUR VIEWS OF STELLARXPLOERS

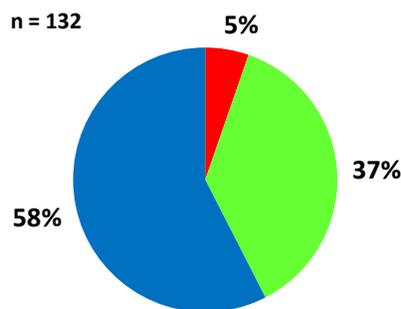
How Engaging Was StellarXplorers?

- Very/Pretty Boring
- As Other Activities
- Pretty/Very Engaging



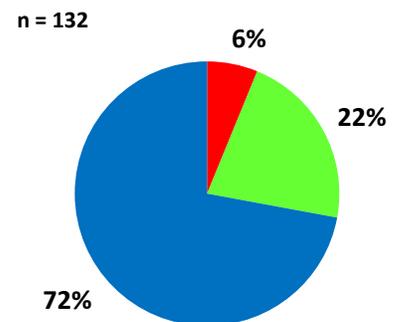
How Interested in a Space Career?

- Boring/No Interest
- Career OK
- Interested/Determined



How Much Fun Was StellarXplorers?

- Not Fun/Pretty Boring Interest
- As Other Activities
- Very/Most Fun of All



From the inception of StellarXplorers we wanted to design a competition that would be rigorous enough to keep students fully engaged, that would generate interest in pursuing a space career, all while having fun! This particular group of our clients led us to believe we are achieving these goals.



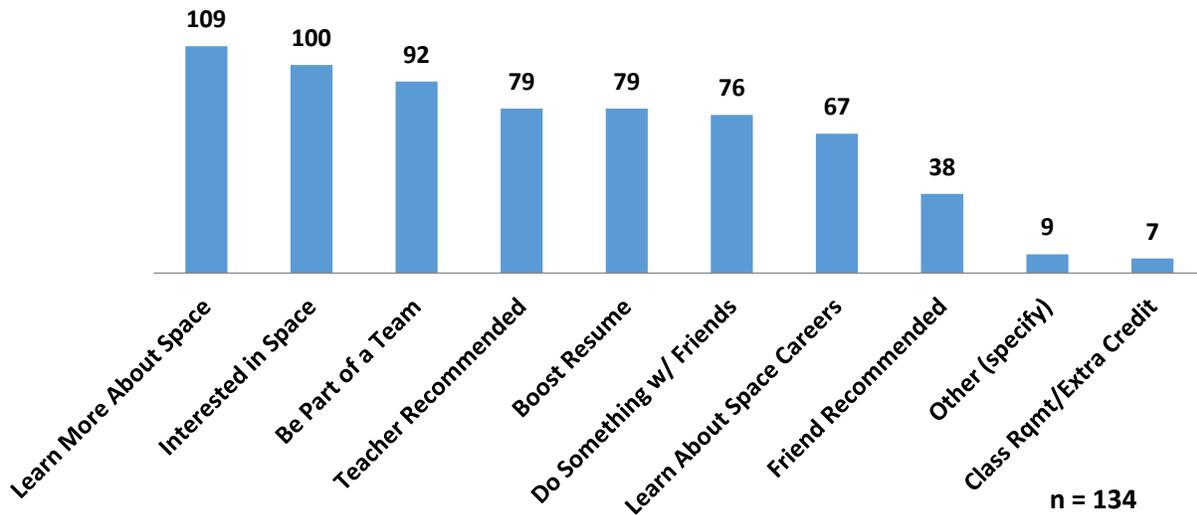


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For these final two diagrams, we will let the data and participants speak ...

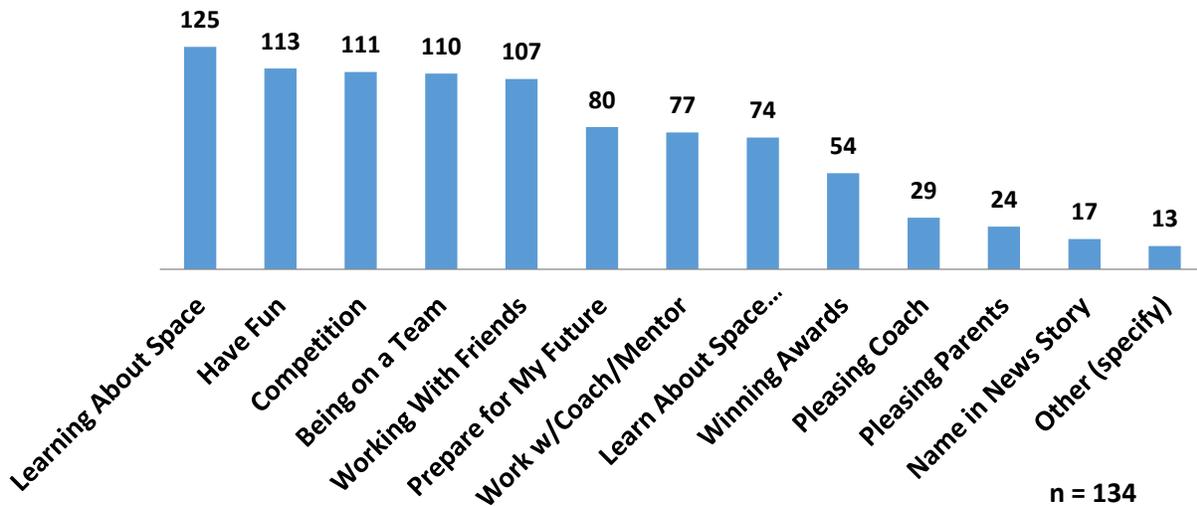
FACTORS IN YOUR DECISION TO PARTICIPATE IN STELLARXPLOERS



WRITE-IN COMMENTS:

Space is my jam, Stellar just gave me so much more than I could have imagined.
 To learn more about the subject to apply the learning one day.
 I had heard about the program and thought it would be fun to try it out.

REWARDS YOU RECEIVED FROM PARTICIPATING IN STELLARXPLOERS



WRITE-IN COMMENTS:

Helped me decide on a career choice (Space or astroengineering) and discover something new I enjoyed.
 Applying the math and science taught in school into a practical scenario.
 I am presently at the USAFA [U.S. Air Force Academy] and Stellar has given me an immense head start on the astronautics material required for my astro degree.





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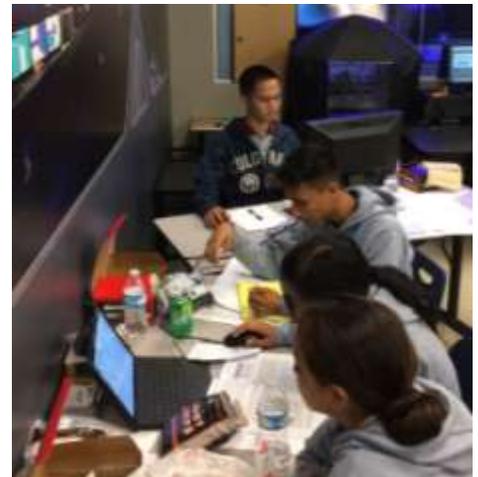


CONCLUSION

We are proud of this relatively new STEM program that joined AFA’s other flagship STEM program, CyberPatriot, The National Youth Cyber Education Program. Already we have seen noteworthy gains in our participants’ knowledge and motivation to pursue STEM education and careers. Perhaps as important, we have watched them become more confident of their own capabilities and increase their leadership, teamwork, and communication skills. We close with some vignettes of just a few of our amazing participants.



Three members of last year’s runner-up team, *Space Y*, from Palos Verdes Peninsula High School from Rolling Hills Estates, CA. Peninsula High has become a fixture, it seems, at our National Finals, taking both top spots in the 2016 STLX II Finals. The flight suits were the students’ initiative. Their team director Hassan Tweit and his two assistants/mentors/chaperones, and parents Greg and Liz Grenier are all educators *par excellence*. Peninsula High is also no stranger to the CyberPatriot Awards stage either.



At the other end of the experience spectrum are the four members of the *Islanders* team from JFK High School AFJROTC in Tamuning, Guam. In their first year in the competition this team with a single Senior, two Juniors, and a Freshman made the Finals and more than held their own. Their Team Captain Senior Jos Malig-on said: “in our efforts we gained valuable experience in working as a team and insight into how space missions are designed. I look forward to a career in the aerospace industry, hoping to design the next mission to Mars and beyond.”



Finally, we go to the archives for a picture of the 2016 Champion *Sky Dragons* Team from San Pedro High School, CA. In the center of the picture holding the trophy is then-Senior Sareta Gladson who co-captained the team. She is currently a rising sophomore at Syracuse University on a five-year dual MS/BS program in Mechanical and Aerospace Engineering. Last year she applied for a very competitive Department of Defense (DoD) SMART scholarship that provides full tuition for the remainder of her schooling, guaranteed internships, and then four years of employment at a DoD facility.

Last spring, Sareta was notified she had won the award with the Air Force Space and Missile Center at El Segundo, CA, as her designated facility. In her application for the SMART scholarship, Sareta wrote: “I chose to study aerospace engineering as a result of my participation in the StellarXplorers National High School Aerospace Challenge. ... These missions gave me a taste of what it’s like to be challenged to find the best answer to a problem that has a multitude of good answers. However, what kept me in aerospace engineering was the experience of failing the first year I competed. Failing reaffirmed my passion for designing satellites.”

DISCLAIMER: Sareta also joined the StellarXplorers Program Office Volunteer Staff, and the perspective she brings as a recent competitor is invaluable.