



GLOBE SRS 2019 Evaluation Executive Summary

Prepared for:

Jennifer Bourgeault, MA
GLOBE U.S. Country Coordinator

Prepared by:

Eleanor M. Jaffee, PhD
Principal Consultant
Insights Evaluation LLC

Project Assistant:

Mahad Khan
University of New Hampshire Manchester

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Introduction

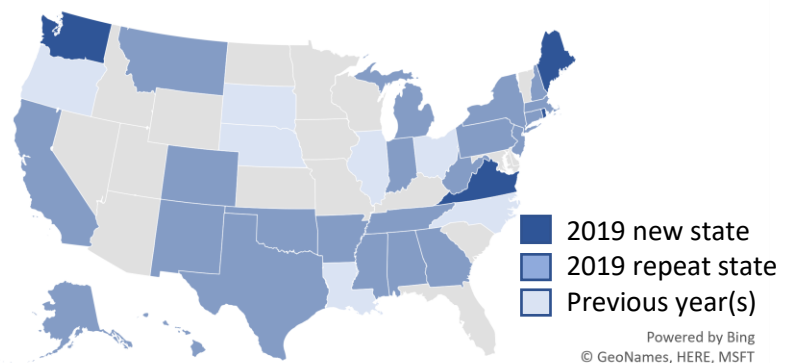
The 2019 [Global Learning and Observations to Benefit the Environment \(GLOBE\) Student Research Symposia \(SRS\)](#) were supported by the National Aeronautics and Space Administration (NASA Grant No. 80NSSC18K0135) and Youth Learning as Citizen Environmental Scientists (YLACES). The symposia give students and teachers an opportunity to share the results of their GLOBE scientific research projects, get feedback from knowledgeable reviewers, engage in peer review, and participate in experiential learning activities. The 2019 symposia were held in the spring in six regions across the U.S. Attendees included 261 students, 66 teachers, 32 GLOBE Partnership representatives, 14 scientists and reviewers, and 93 other registrants. A total of \$90K in GLOBE travel, meals, and lodging funds supported SRS attendance for 266 teachers and students from high-need schools, expanding access to those for whom it would have otherwise been out of reach. This summary highlights key findings of the 2019 GLOBE SRS evaluation. Data sources include participant registrations, student survey data collected at the beginning (pre-test) and end (post-test) of each SRS, and teacher survey data collected at the end of each SRS.

Who participated in the 2019 GLOBE SRS?



The number of states represented at the GLOBE SRS has increased from 20 in 2016 to 26 in 2019, with different states represented year to year. In that same timeframe, the number of registered students increased by 57% from 166 to 261, and the number of teachers by 53% from 43 to 66.

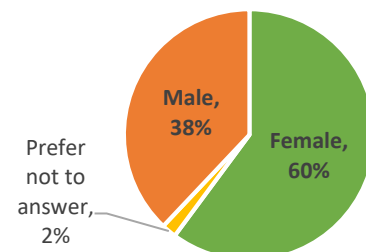
26 States Represented at the 2019 GLOBE SRS 34 States Total since 2016



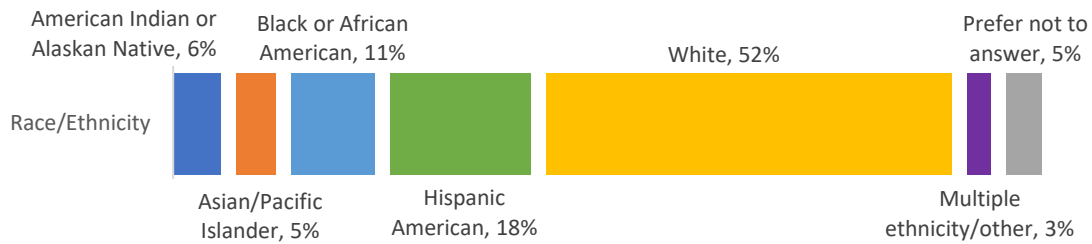
At the 2019 SRS:

- The largest percentage of students (45%) were in grades 10 to 12, particularly in tenth and eleventh grades; 26% percent were in grades 7 to 9 and 28% in grades 4 to 6.
- **The majority of students were reported by parents and guardians to be female at 60%; males represented 38%.**
- **Students were diverse in race and ethnicity.** Those reported by their parents and guardians as white comprised 50%, Hispanic American 20%, black or African American 11%, American Indian or Alaska Native 6%, and Asian/Pacific Islander 5%.

More Participants Were **Girls** in 2019



Participants Were Diverse in Race and Ethnicity



- **Twenty-three percent of students lived in households where languages other than only English were spoken.** Household first and second languages included Spanish, Arabic, Chinese, Hindi, Punjabi, Apache, and American Sign Language, among others.
- Of students' parents and guardians reporting household income, most (73%) reported between \$25,000 - \$149,999; **15% of responding parents and guardians reported the lowest household income category of \$0 - \$25,000, below the 2019 federal poverty guideline for a family of four.**
- Teachers most frequently described their school communities as urban (45%), followed by rural (34%) and suburban (17%). **Two-thirds of teachers (66%) reported at least half the learners at their schools qualify for the federal free and reduced-price lunch program.** About a quarter (26%) reported English is not the first language of at least half the learners.

Impact of the GLOBE SRS on Students

Students reported significant gains in their confidence, skills, and interest in science as a result of participation in the GLOBE SRS.

- Of 116 students¹ who responded to the open-ended post-test question, "did participating in the symposium impact your understanding of the scientific process and what it's like to do science research?" 79% responded affirmatively.

"...I began to realize the importance of science and research in our lives. The research symposium left a big impact on my life." – 10th grade student, Midwest

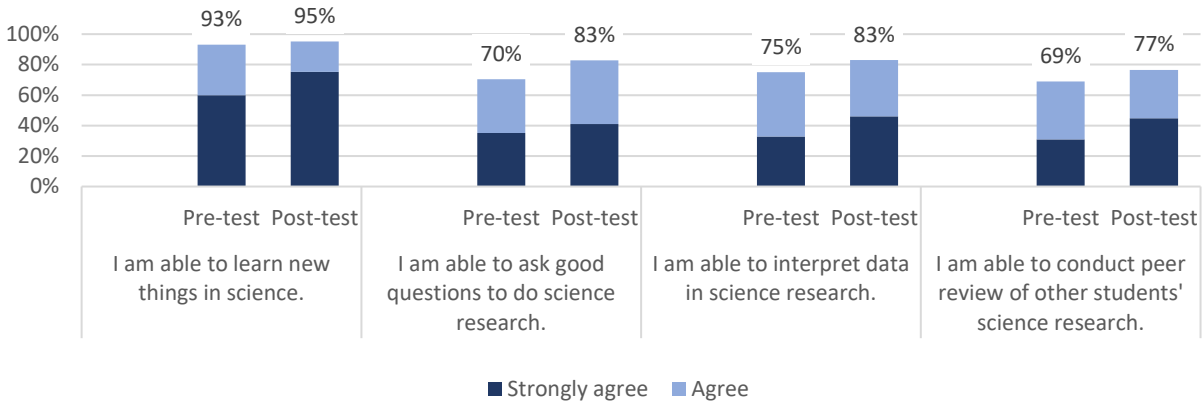
"Participating in this year's SRS has given me more inspiration and ideas on the scientific process. Doing science research for my project was fun and interesting." – 10th grade student, Southwest

- Students indicated their level of agreement with statements about science self-efficacy before and after the SRS. The summed agreement score improved significantly, and nine individual items improved significantly, from pre-test to post-test. The item showing the most significant improvement was "I am able to learn new things in science," followed by "I am able to ask good questions to do science research," and "I am able to interpret data in science research."
- Two of the relatively lower-scoring items at pre-test showed significant improvement between pre-test and post-test: "I am able to conduct peer review of other students' science research" and "I am able to construct scientific arguments."

¹A sample of 142 matched pre- and post-test student surveys (54%) were analyzed for the rest of this summary.

Significant Gains in Science Self-Efficacy

Percent Agreeing with Science Self-Efficacy Statements



Impact by Demographics

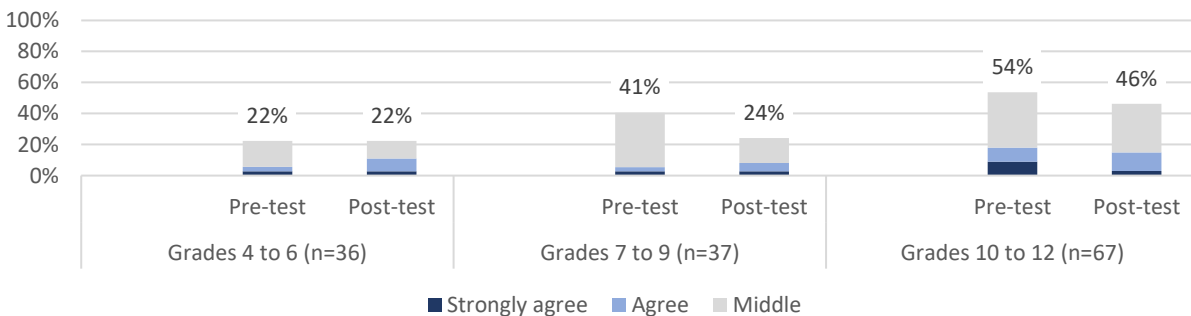
Gender. A gender gap closed on “I am worried I won't learn all of the things I'm supposed to in science.” Female participants were more worried at pre-test, agreeing or in the middle with the statement (46%) more frequently than male participants (30%). The percentage agreeing or in the middle decreased significantly by post-test for female participants (34%) while staying level for male participants (30%).

Race and Ethnicity. At pre-test, black or African American students agreed less (59%) than white students (82%) with the statement “I am able to interpret data in science research.” By post-test, the difference narrowed somewhat with the percent agreement increasing for both groups (70%, 88%).²

Grade. Students in grades 10 to 12 agreed or were in the middle (54%) significantly more than students in grades 4 to 6 (22%) with “I am worried I won't learn all of the things I'm supposed to in science” at pre-test. There was still a difference between groups at post-test, but it was not statistically significant. Older students may be more concerned about preparation for their next steps in education and career.

Older Students Worried More about Science Learning than Younger Students, but Worried Less After SRS

Percent Agreeing or in the Middle with "I am worried I won't learn all of the things I'm supposed to in science"

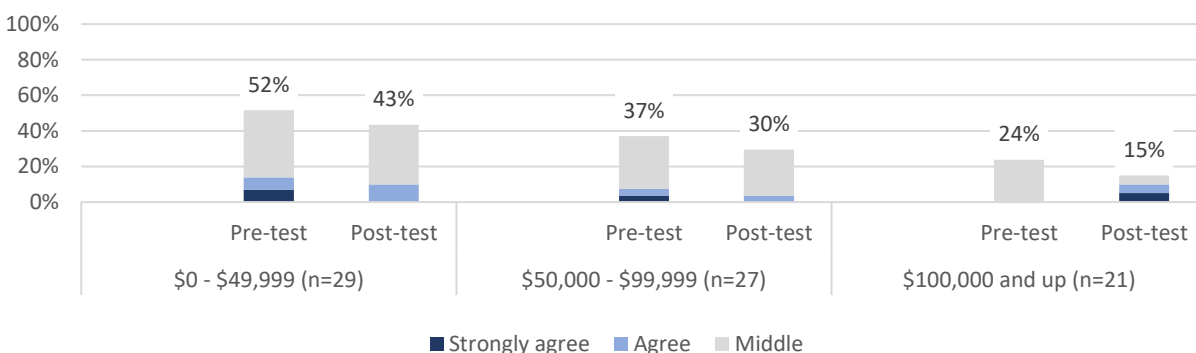


² This finding was inconclusive—likely due to small and imbalanced group sizes in the sample—but was retained in reporting because it neared statistical significance and the difference is descriptively notable.

Income. There was a significant gap of over seven points on the summed score of agreement with all science attitude and self-efficacy statements between students from low-income (85.19) and high-income (92.63)³ households at pre-test. There were also significant differences by household income on “I am worried I won’t learn all of the things I’m supposed to in science” as well as with “I get embarrassed in science.” Students in the low-income group agreed or were in the middle with both statements (52%, 23%) more than the high-income group participants (24%, 0%). Although there were still differences in these percentages at post-test, they were no longer statistically significant.

Students from Lower-Income Households Worried More about Science Learning than Peers, but Worried Less After SRS

Percent Agreeing or in the Middle with "I am worried I won't learn all of the things I'm supposed to in science"



Impact of the GLOBE SRS on Teachers

Asked if participation improved their ability to integrate science research into their classroom or program, 32 of 36 teachers responding (84%) said “yes.”

Teachers’ comments in response to an open-ended follow-up question (28) frequently focused on new approaches or ideas for teaching (15).

“It has made me feel more confident in asking the questions and giving the students more time to discuss and/or explain themselves. Stop rushing them and let them be more creative.” – Teacher, Midwest

“Seeing the final product then having this in mind while teaching really helps me push the students to produce better quality research.” – Teacher, Pacific

“I really learned how to better facilitate scientific writing. I am looking forward to expanding next year. I loved this project!” – Teacher, Southwest

“Talking to other teachers and students about their projects help me find new things/activities to do in class with my students.” – Teacher, Northeast & Mid-Atlantic

³ Of a maximum summed score of 102.

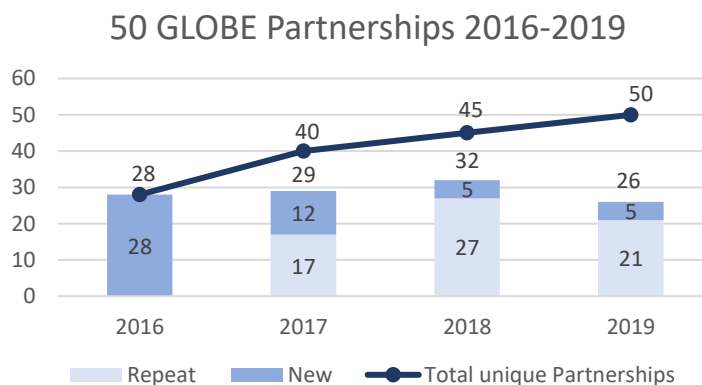
Teachers were asked about the GLOBE resources they and their students used prior to attending the SRS. The resources used by the greatest numbers of teachers and students were ‘consultation/support from your local Partnership’ and ‘Science Practices resource pages,’ and both resources were highly rated for their helpfulness as well. Additionally, 84% of teachers reported that they had participated in a professional development activity while at the SRS. Feedback indicated they generally found the activities useful, relevant, and interesting, and anticipated that they would help improve their teaching.

GLOBE Data & Projects

Between August 2018 and July 2019, 44 schools uploaded data to the GLOBE website – three times as many as the prior year. Additionally, 33 submitted projects to the GLOBE website.

GLOBE Partnerships

GLOBE has added new regional Partnerships across the country each year. Participation of Partners—in terms of attending the SRS and/or mentoring students on their science projects—varied year to year, and the active number dipped somewhat in 2019, but the cumulative number of GLOBE Partnerships has increased steadily from 28 in 2016 to 50 in 2019.



Satisfaction with the GLOBE SRS

Students and teachers were asked about their satisfaction with the 2019 GLOBE SRS. Overall, they reported positively on their experiences.

- The student post-test survey asked which SRS events they enjoyed the most, and which they enjoyed the least. They were invited to select multiple events. Students made many more selections of events they enjoyed the most (601) compared to events enjoyed the least (165).
- **The SRS events selected by students as those they enjoyed most involved interaction with scientists.** Meeting scientists was selected most frequently (84), followed by review from scientists (82), and research presentations to the reviewers (77).
- **The SRS events selected by students as the events they enjoyed the least involved sitting and listening to speakers rather than active participation.** Although again, few selections were made, keynote speaker was selected most frequently (21) followed by the opening remarks (20).
- **Ninety-two percent of teachers were satisfied (40%) or very satisfied (53%)⁴ with the SRS for themselves, and 92% were satisfied (30%) or very satisfied (62%) for their students.**
- **About 90% of teachers or more were satisfied or very satisfied with most SRS events.** Topping the list at 97% satisfied (35%) or very satisfied (62%) was review from scientists. At the lower end of the scale but still with high ratings of satisfaction were the keynote speaker (86%), the opening remarks (85%), peer review from other students (82%), and evening activities (79%).

⁴ Total exceeds 92% due to rounding.

Report Highlights & Recommendations

Highlight	Overall, the GLOBE SRS appear to be effectively improving students' science self-efficacy, building students' confidence in the science skills that are practiced at the event, and getting students excited about science.
Recommendation	Showcase science-related jobs at the SRS to help students think about how they can translate their science skills and self-efficacy into interesting career paths. Make efforts to recruit diverse representation of teachers, scientists, and reviewers so that all students can see themselves as future science professionals.

Highlight	Participation in the GLOBE SRS helped to reduce worry about science learning.
Recommendation	Investigate the specific reasons for worry about science learning among the most affected groups of students (girls, students from low-income households, older students) to better understand how to address their concerns.

Highlight	Students from low-income and middle-income households experienced some significant benefits in science self-efficacy and reduced worry about science learning from the GLOBE SRS.
Recommendation	Provide as much support for science engagement and experiential learning (mentoring, equipment grants, scholarships, travel support, etc.) as feasible to GLOBE low- and middle-income community partner schools, not just at the SRS but throughout the year, to help mitigate income-based differences in science interest and self-efficacy. Ensure that students from low- and middle-income schools have access to the same opportunities, activities, and amenities as their high-income peers throughout the SRS event weekends.

Highlight	Teachers find certain GLOBE resources offered prior to the SRS—consultation and support from local GLOBE Partnerships and Science Practice webpages—particularly helpful for themselves and their students. The professional development activities and other learning opportunities offered during the SRS help teachers expand their strategies for building student engagement in science and facilitating science learning.
Recommendation	Offer more teacher training on the GLOBE protocols and more options for teacher professional development. Continue building and strengthening GLOBE regional Partnerships to increase teacher and student access to GLOBE resources throughout the year, particularly in high-need school districts.

Highlight	Students really enjoy the GLOBE SRS, especially interacting with scientists and reviewers. Teachers are also very satisfied with the SRS events for themselves and their students.
Recommendation	Reduce the time students spend sitting and listening in favor of more active and hands-on learning experiences.