

EXECUTIVE SUMMARY

Returning to the GLOBE Regional Student Symposia after a 4-Year Pandemic Pause: Evaluation of the 2023 GLOBE SRS



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Midwest Regional SRS, University of Wisconsin, Madison WI

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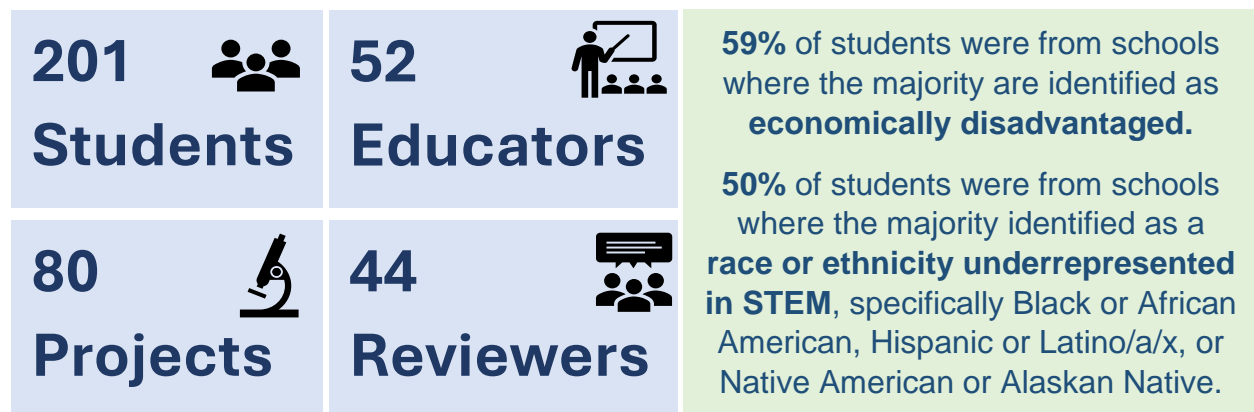
Introduction

The 2023 U.S. Regional [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 [GLOBE](#) Program offers an array of resources to support youth engagement in environmental science such as learning activities, research protocols, data sharing, mentorship, educator professional development, and expert consultation. The annual multi-day SRS allow students and educators to share the results of their GLOBE research projects in an immersive science learning environment, get feedback from knowledgeable reviewers and peers, and participate in experiential learning activities.

Spring 2023 marked a return to the Regional SRS after a four-year pause following the 2019 events due to the COVID-19 pandemic. The six GLOBE U.S. Regions were consolidated into four events due to lower registration than before the pandemic: Midwest, Northwest, Pacific, and the Northeast & Mid-Atlantic and Southeast regions merged with the Southwest. Funding for travel, meals, and lodging supported SRS attendance for nearly all participants, expanding access to those for whom it would have otherwise been out of reach based on need or geography and those new to the GLOBE community.

Participation in the 2023 Regional SRS

In total across the four regional symposia, 201 students and 52 educators from 51 schools and organizations, 18 GLOBE Partners from 10 GLOBE Partnerships, 44 STEM Professional reviewers, and 62 others attended, and 80 GLOBE research projects were presented. Although registration was lower in 2023 than in 2019, it recovered to pre-pandemic levels for the 2024 Regional SRS.



According to educators, the schools participating in the GLOBE 2023 Regional SRS include representation of rural (44%) and urban (31%) communities. School enrollment data show at least half of participating students represented schools where the majority of students are economically disadvantaged, and where the majority of students identify as a race or ethnicity that is an underrepresented minority in STEM (URM students; specifically, Black or African American, Hispanic or Latino/a/x, or Native American or Alaskan Native). Data from parent/guardian completed student registrations show that at least 31% of participating students were from households with annual incomes under \$50,000—among them at least 15% from households with annual incomes below the federal poverty line—and 35% identified as a race or ethnicity underrepresented in STEM; 60% identified their gender as female.

Student Outcomes of the GLOBE SRS

- **Students learned about science practices and 21st century skills through working on their GLOBE projects.** For every skill listed in our student survey, 75% or more students reported learning at least *some* about them by working on their GLOBE projects. ‘Work together as a group’ had the highest average rating, with 66% of students reporting they learned *a lot* about this.
- **Most students (over 80%) reported that participating in the SRS impacted their understanding of the scientific process and what it’s like to do science research.** Some also experienced a broader change in their worldview and benefited from exposure to different perspectives and ways of doing science through their interactions with scientists and other students at the SRS. Many students came into the SRS thinking they would be “scary,” “boring,” “serious,” “tense,” or “intimidating,” but left describing them as “fun,” “interesting,” “cool,” “welcoming,” and a “good experience.”

“I enjoyed seeing other research presentations like mine and hearing their experience because I am not alone in thinking ‘I am still learning.’”
—Student, Pacific SRS

“I got to learn how different scientists get to do their jobs, and how it impacts the environment.”
—Student, Midwest SRS

- **Student survey results show significant positive change from pre-test to post-test for all science self-efficacy items, and for most items about value of science and belonging in science.**

Students rated their agreement with statements regarding their ability to do science (science self-efficacy), how important they find science (value of science), and sense of belonging, representation, and affiliation in the scientific community at pre-test and post-test so we could measure change from before to after the SRS. The results overall show positive change.

More Students *Agreed or Strongly Agreed* after the SRS (Examples)

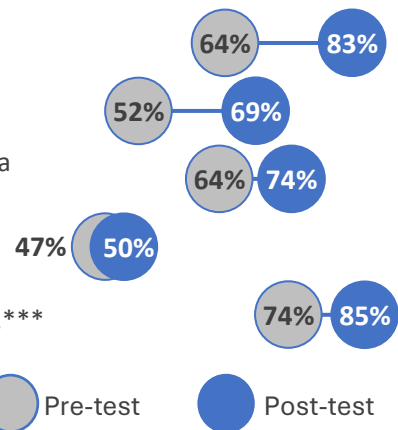
I am able to present my research to others.***

I am able to construct scientific arguments.***

I am able to interpret data in science research.***

I want to have a career in science someday.*

I am a member of GLOBE.***



- **Comparisons of 2023 and 2019 data suggest that the SRS experience can help mitigate pandemic science learning loss.** Pandemic-related school disruptions resulted in documented STEM learning loss for K-12 students, disproportionately so for students from low-income households and Black students (Rotermund & Freyman, 2023). Comparison of evaluation data from the 2019 and 2023 GLOBE SRS align with these findings, showing that students’ average pre-test ratings on our measures of science self-efficacy and value of science were lower in 2023 than in 2019. However, the average ratings also *increased more* from before to after the SRS in 2023 than in 2019, suggesting that the SRS experience narrowed the pandemic gap.

“I was nervous because I haven't done this in 4 years ... [but now I know] I'm confident.” —Student, Northwest SRS

- **Students identified as underrepresented minorities in STEM based on race or ethnicity (URM students) had significantly lower average agreement with multiple science self-efficacy statements at both pre-test and post-test than non-URM students but experienced a similar increase from before to after the SRS.** There was no significant difference in how much things changed between the pre-test and post-test between URM and non-URM students—for both groups they increased roughly in parallel. However, URM students did not show the same increase in their sense of belonging at the SRS as their non-URM counterparts from pre-test to post-test.
- **The sense of science representation and identity among URM students started lower but increased more from before to after the SRS.** URM students started with significantly lower average agreement than non-URM students on the statement ‘some scientists are like the people in my community,’ but the average agreement *increased more* for URM students than non-URM students from before to after the SRS, narrowing the gap to non-significance by post-test. Research shows that students’ engagement with STEM benefits from seeing scientists who look like them and the people in their communities (e.g. Barakat, 2022; Martin & Fisher-Ari, 2021).

Representation & Identity: Lower Start but Greater Gain for STEM Underrepresented Minority (URM) Students

Some scientists are like the people in my community.**



Some scientists are like the people in my community.**



● URM students ● Non-URM students

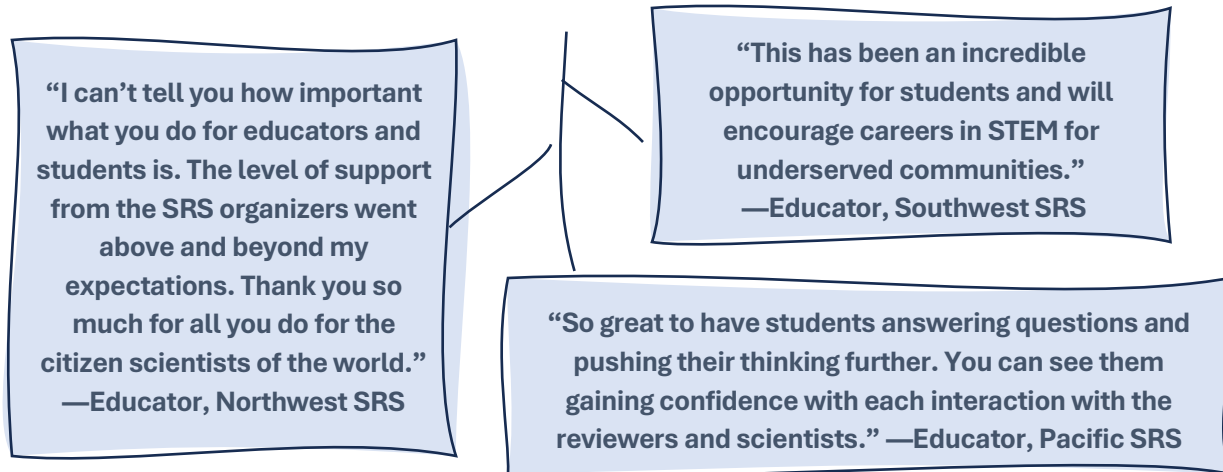
“I liked how non-stressful and inclusive it was.” —Student, Northwest SRS

“I enjoyed doing the hands-on activities because I felt like a scientist out there and I enjoyed talking to professionals who work in the area I want to work in.” —Student, Pacific SRS

Educator Feedback

- **In our educator post-survey, all responding educators reported that participating in the SRS improved their ability to integrate science research into their classroom or program.** Overall, educators *agreed* that GLOBE projects helped learners build 21st century and science practice skills, especially making observations and recording data, collaborating on a group project, and communicating the outcomes of their research investigations.
- **Educators were overwhelmingly satisfied with the SRS events.** Ninety-eight percent of educators were *very satisfied* or *satisfied* with the SRS overall for themselves, and 97% were *very satisfied* or *satisfied* for their learners. Educators were also highly satisfied with the SRS locations (100%), venues (98%), and schedules (98%). Other aspects of the SRS that received high satisfaction ratings from educators include student research presentations to reviewers (93%), student research presentations to other students (93%), and hands-on science activities (93%).

- **About half of the educators (49%) reported that 2023 was their first GLOBE SRS.** A third (33%) had participated in one Regional or Local SRS before, and the rest (16%) had participated in two or more.



- **Of the available GLOBE resources, educators most frequently used consultation and support from their local GLOBE Partnership (81%), emails from the U.S. GLOBE office (57%), and the science practices resources pages on the internal GLOBE SRS webpages (45%).** While the GLOBE Watercoolers (informal virtual discussions), educator blog posts, and mentorship with a STEM Professional from the GLOBE International STEM Network were not as widely used by either educators or learners, there is interest in utilizing those resources in the future. Additionally, 25 of the 42 educators (59%) reported participating in a professional development activity at the SRS and they generally rated their professional development experience very highly.

Reviewer Feedback

Our reviewer survey response rate was fairly low, but all respondents were either *very satisfied* (69%) or *satisfied* (31%) with the GLOBE SRS event as a science learning experience for students. They cited unique aspects of the SRS compared with traditional student science fairs. Some wanted more training for reviewers, especially on the review criteria and providing student feedback.



Key Findings & Recommendations

Overall, the evaluation results provide ample evidence that the GLOBE U.S. 2023 Regional SRS were successful in achieving their objectives of increasing students' interest and engagement in science, broadening participation in science learning activities, and building a supportive scientific community of students, educators, and STEM Professionals. Although attendance returned to pre-pandemic levels in 2024, continued efforts to reduce barriers to participation will allow more students and educators to access the demonstrated benefits of the SRS.

Key finding: Working on GLOBE research projects for the SRS helped students learn science practices and 21st century skills, and participation in the SRS itself had a positive influence on students' science self-efficacy and value of science. The SRS offered students a unique opportunity to practice their science skills and to see how others are applying them in different ways, broadening their perspective on science and the world around them.

Recommendation: Since it began in 2016 the GLOBE SRS model continues to show evidence of positive outcomes for students' science self-efficacy and value of science. These findings warrant continued support for the Regional SRS and continued efforts to expand access so that more students may benefit from working on GLOBE research projects and presenting their research at the SRS.

Key finding: Evaluation results suggest that the return of immersive science activities like the GLOBE SRS may mitigate some of the damage the pandemic had on student engagement in STEM.

Recommendation: Promote participation in the SRS to schools and programs as a way to help with STEM learning recovery, citing these positive outcomes. Support GLOBE Partnerships to help them share this message with their regional school districts and programs and help them steer educators to the appropriate GLOBE resources for their learners if needed.

Key finding: Participation in the SRS helped students who identify as a race or ethnicity underrepresented in STEM to see that scientists can be like the people in their own communities, suggesting that GLOBE's efforts toward representation at the SRS is yielding benefits for students.

Recommendation: Intentionally fostering the sense of belonging and inclusion among students underrepresented in STEM at the GLOBE SRS is an area for improvement to build on successes in reducing barriers, expanding access, and broadening participation. This includes continuing efforts to recruit and retain a diverse pool of STEM Professional reviewers.

Key finding: The 2023 Regional SRS marked a return to the annual events after a four-year pause. Registration was lower than prior to the pandemic in 2019. Yet nearly half of the participating educators were new to the SRS, suggesting that educators are continuing to join the GLOBE community.

Recommendation: Explore how barriers to participation have changed since the pandemic and new ways to address them to improve educator retention. At the same time, continue recruitment of new educators into the GLOBE community and track participation to follow trends over time.

Key finding: NASA and YLACES sponsorship has supported not only the SRS events themselves but also investments in GLOBE U.S. Partner outreach to schools in minoritized communities and funding to cover SRS travel expenses. The results of these investments were evident in the participation of students from low-income communities and households, and the participation of students identifying as a race or ethnicity underrepresented in STEM.

Recommendation: NASA and YLACES support remains critical to the objectives of reducing barriers, expanding access, and broadening participation in the GLOBE SRS and in STEM.

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