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Inclusive Strategies in Climate Change Teaching, Learning and Action

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Our project “Feedbacks and Impacts of a Warming Arctic: Engaging Learners in STEM Using NASA and GLOBE assets” also called “Arctic and Earth SIGNs” (STEM Integrating GLOBE and NASA) engages in climate change education, audiences underserved and underrepresented in STEM e.g. Alaska Natives, those economically disadvantaged, and those who work in rural regions. We invite and support teams of formal and informal educators and community members from Alaska and beyond to participate in a Climate Change in My Community course and to work with youth on climate learning and a stewardship project relevant to their community. Our strategies include: 1) using a culturally responsive learning model we developed, 2) braiding multiple knowledge systems, 3) negotiating content and process in course planning and implementation, 4) ensuring a voice and a seat at the table for everyone, 5) inquiry-based, experiential and place-based STEM teaching practices, 6) intergenerational teaching and learning, 7) interactive Meet the Scientist live video sessions, 8) building relationships within and beyond participant teams and with the project team of educators, Elders and University of Alaska/NASA scientists, 9) providing skills and citizen science tools to engage youth in addressing climate change issues in their communities or for use in developing their community climate change adaptation plans, and 10) cultivating partnerships such as the Association of Interior Native Educators, Renewable Energy for Alaska Project, Climate Literacy and Energy Awareness Network, and the Alaska Arctic Observatory and Knowledge Hub.

In 2020, ten teams implemented stewardship projects that reflected many of the principles of citizen/community science that effectively engage diverse audiences. Of these course participants, 100% increased their confidence to facilitate real-world inquiry activities ($p < 0.001$), 77% increased

their knowledge of the earth systems, ($p < 0.001$) and 69% of the students who teams worked with, reported increased critical thinking skills ($p < 0.01$). Twelve individuals from these teams were interviewed: 100% of interviewees reported benefits to students, such as learning to collect data, presenting their findings to their peers, exploring STEM careers, and interacting with scientists; 83% reported specific benefits to themselves as an educator which include increased content knowledge and the opportunity to think more deeply about the science and opportunities to connect with students outside of the classroom; 100% reported that the project goals and activities align with and are relevant to the needs and interests of the participants, including contribution to conservation efforts, contribution to science, curricular goals, and a personal connection; 67% reported community engagement, including involving Elders and community members in data collection and storytelling, representatives of local park and water conservation district offering a science talk to the whole community, and advertising their project at the community post office. Those that didn't report involving the community noted the impact of the COVID-19 pandemic.