Citizen Environmental Science and Science Education

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For over 21 years, the GLOBE Program has engaged K-12 students in citizen science through extensive support for taking, archiving, and sharing environmental measurements with one goal of improving science education. Since January 2015 this effort has involved an intensive approach in partnership with National Wildlife Federation's Eco-Schools program and SciStarter, a citizen science organization, to recruit, train, and equip schools and youth groups to measure surface soil moisture and temperature, precipitation, and cloud properties in formal and informal science education, with the intent of engaging youth in doing science. Teachers and adult group leaders have been recruited and trained through online and in person presentation of instructions and coaching. Required equipment has been awarded to schools and groups through financial support from the Youth Learning as Citizen Environmental Scientists organization. Results will be presented on how well citizen environmental science and this partnership is achieving its objective and lessons learned through the participation of over 150 schools and groups in this endeavor.

Citizen Science as a Springboard in the Practice of Science and Developing Scientific Explanations with Independent Student Directed Science Fair Projects

Michele Koomen - Gustavus Adolphus College; Elizabeth Schutz - Clear Springs Elementary School; Alissa Hoffman - Gustavus Adolphus College; Cindy Peterson - St. Hubert School

This study reports on the process and development of middle school science fair projects inspired by a summer science program of citizen science monitoring (Monarch Larvae Monitoring Project) with their classroom teacher. We gathered and analyzed both qualitative (interviews and focus groups) and quantitative [(analytical rubric scores aligned with the NGSS practices and claims, evidence and reasoning by McNeil and Krajcik, 2012)] data. Our analysis revealed four key findings: 1) citizen science serves as a springboard for the practice of science, 2) completing science fair projects engages students in many of the key science practices identified in the NGSS, 3) completing science fair projects provides students opportunities to develop scientific explanations, and, 4) a committed and dedicated mentor teacher plays an important role in successful completion of high quality science fair projects. We recommend greater emphasis on citizen science protocols and independent student research projects within secondary science classrooms.
How to Raise a New Generation of Citizen Scientists and Environmental Stewards in 7 Easy Steps  
*Laura Herszenhorn - California Academy of Sciences*

This talk will offer strategies for how to use citizen science to teach ecoliteracy and foster youth commitment to environmental sustainability at scale. Get youth outside and connected to nature. Put scientific tools and technology in their hands. Leverage social media and mobile apps so youth can share scientific data and build community. Foster 21st century skills through design-thinking challenges. Tackle environmental issues in a developmentally appropriate way. Train educators and administrators with high quality resources that set them up for success. Partner with experts in the field to spread and scale best practices. Science Action Club (SAC) is a nationwide STEM learning program for middle school youth in afterschool. We partner with afterschool providers to get youth outside, connected to nature, and contributing to citizen science research. In this session we'll share our top tips for how scientists, museums, and educators can collaborate to transform environmental education at scale, promote scientific engagement, and grow our global understanding of the natural world. We'll share our strategies for designing a successful STEM program, explore lessons learned, and work with participants to brainstorm how they can leverage their own community resources to expand youth participation in citizen science and raise the bar for STEM education. All attendees will get a free copy of our Citizen Science Toolkit for Educators.

Hack Days and ThinkCamps for Citizen Science  
*Margaret Gold - Natural History Museum London*

Many modern day citizen science projects are powered by mobile and web technologies, which enable ordinary citizens around the globe to take part in science research, and open up many fields of science to the participation of volunteers for the first time. These same underlying technologies also provide a unique opportunity for the co-creation of new tools, and the creative application of existing citizen science platforms. One way to harness this is through 'creative collaboration' events such as Hack Days, Code Sprints and ThinkCamps. Ever since the Hackathon and Hack Day event formats were first invented in the early 2000’s the number and range of these 'un-conference' events have continued to grow in popularity as a creative outlet for developers and ‘makers’, and a way to enhance software & platform development while engaging with a wider community of participants externally. These events have long since expanded beyond their initial software developer orientation and for the past decade have also been applied to an increasingly wide range of subjects - such as Science. In this talk I will outline the unique properties of a range of creative collaboration event formats and describe how they can be used as a tool to achieve outcomes such as increased engagement and innovation. I will also share lessons learned in running the first Citizen Science Hack Days at the London Citizen Cyberscience Summits and ECSA2016, and make recommendations for future event organisers, Citizen Science project owners, and policy makers.