Using Schoolyard Bioblitzes and Open Science Resources to Build Scientific Skills and Understanding of the Nature of Science for Classroom Learning

Amy Lorenz - Encyclopedia of Life / Harvard University

The Encyclopedia of Life (EOL) is a free resource whose mission is to provide global access to information about life on Earth. The EOL Learning + Education group develops educational tools and resources to support ecological field experiences and citizen science activities in classrooms. Improving understanding of the nature of science and science practices is a critical component of education reform as highlighted in the Next Generation Science Standards. Through a Department of Defense Education Activity grant EOL has created place-specific classroom activities and field investigations for community- and project-based learning for a military community in northwest Florida. EOL and Florida partners have developed a K-12 program that utilizes schoolyard Bioblitzes, classroom activities, and EOL tools such as species cards, food webs, and collections to enhance science skills. The learning progression begins with activities targeting development of observation, identification, classification, and data collection skills. Classes then engage in schoolyard Bioblitzes to discover, classify, and identify species and document observations on iNaturalist. Next, classes engage in data analysis projects to investigate local biodiversity. The program further connects students and families to community projects to enhance their appreciation of local areas and to continue applying skills they learned in school. This year we are gathering information about student outcomes related to their understanding of concepts and in demonstrating science skills. This presentation will share the implementation and student outcomes from the K-12 Schoolyard Bioblitz program and its implications for improving STEM learning and preparing students to engage in other citizen science projects.

Engaging and Supporting Teachers in Curriculum-Based Citizen Science

Sara Ludovise - Crystal Cove Alliance

Curriculum-based citizen science, which bridges formal and informal learning environments, has been touted for its ability to engage school-aged learners of diverse backgrounds in authentic scientific practice (Bonney, Phillips, Ballard, & Enck, 2015). But curriculum-based projects must win over an extra audience in order to succeed: classroom teachers, who choose whether or not to have their class participate. Crystal Cove Alliance, the non-profit partner of Crystal Cove State Park in Orange County, California, has been partnering with teachers through its Marine Protected Area Citizen Science Cruise since 2012. During the cruise, junior high and high school students monitor the health of the Crystal Cove Marine Conservation Area by collecting data for ongoing citizen science projects. The program has grown from three teachers in its inaugural season to nearly forty teachers today. Teacher evaluations from the program show that participating teachers often express three distinct motivations for engaging in curriculum-based citizen science, and that many describe similar challenges when trying to incorporate these projects into their classroom, such as a lack of experience with authentic research and an unease when dealing with questions with uncertain answers. By aligning the program with teacher motivations and supporting the formation of a teacher professional development community, Crystal Cove Alliance has been able to help interested teachers overcome these challenges, paving the way to involve even more under-served students in citizen science. This presentation will share insights from teacher surveys and interviews, as well as a framework for engaging and supporting teachers in citizen science.

Enlisting Formal Educators as Partners in Conservation

Judith Hutton - New York Botanical Garden; Candyce Johnson - Brooklyn Botanic Garden

The Urban Advantage (UA) program in New York City is a collaboration between 8 science-rich cultural institutions and the NYC Department of Education. A major component of the program, designed to
support science instruction in New York City middle schools, is professional development for middle school science teachers. The New York Botanical Garden and the Brooklyn Botanic Garden co-developed professional development opportunities for teachers returning to the UA program. This innovative workshop introduces a model for using native plant collections at botanical gardens to learn about the impact of climate change on native plant communities and ecosystems. Participating Urban Advantage teachers engage in learning activities designed to (1) provide an introduction to phenology, the study of how periodic life cycle events in plants and animals are affected by seasonal and climate change, (2) introduce online citizen science projects that are actively collecting data on phenological events, (3) guide teachers in drawing conclusions about the changing ecosystems of the region using a set of data collected by citizen scientists through the National Phenology Network, and (4) underscore the importance of preserving native plant communities and the ecosystems they support. In our workshop session, participants will explore some of the strategies we use and learn about the benefits and challenges of enlisting educators as both agents of change and allies in the fight for maintaining the biodiversity of native plant communities and ecosystems.

**Teaching with Citizen Science: An Exploratory Study of Teachers' Motivations and Perceptions**

*Georgia Bracey - University of Missouri - St. Louis*

Bringing authentic science experiences into the formal education setting through citizen science has the potential to increase the meaningfulness and relevance of science for students and holds great promise for schools looking to boost student achievement, interest, and literacy in STEM (science, technology, engineering, and mathematics). Many teachers are now using citizen science activities in their classrooms, and many citizen science projects provide educational resources to assist teachers in implementing these activities. However, the successful adoption of any innovation by teachers is a complex process, and a teacher's values and beliefs play a large role in what gets taught and how. If integration of citizen science into the formal classroom is to be successful, it is essential to understand teachers' motivations and perceptions regarding teaching with citizen science. This presentation will describe the preliminary qualitative results of an ongoing mixed-methods study that examines the use of citizen science in the classroom and focuses on teachers' motivations, perceptions of student impact, and challenges in implementation. Initial findings will be presented from a thematic analysis of 20 in-depth semi-structured interviews conducted with middle school teachers who are using or have used citizen science in their classrooms. Emerging themes include increasing student engagement through relevant and meaningful activity, connecting students to something larger than themselves, and the need for teacher autonomy. These findings will be of use to project designers, professional development providers, and administrators as they consider how best to support teachers in integrating citizen science into their classrooms.