Georgia Science Teachers Association

eObservations

www.georgiascienceteacher.org

October 2013: Literacy & Citizen Science

Connect Your Students to Citizen Science

Are you interested in having your students learn about science content while being engaged in the process of conducting experiments and collecting data? Citizen science promotes the inherent connection between students, the community, and the science of everyday life. By engaging with the natural world through scientific experimentation students are exposed to diverse learning processes and content acquisition, and they experience increased social interaction through the sharing of their knowledge. Citizen science can serve as a resource for increasing scientific literacy and foster an alternative approach to teaching the crosscutting concepts that are foundational components of the Next Generation Science Standards.

Citizen science provides a platform that allows teachers to participate in existing projects or to work with their students to identify issues in the community that require action. A more school-independent, teacher/student-initiated, option promotes student responsibility for identifying projects within the community and developing a plan of action that enables immersion in and recognition of everyday science. Additionally, there are options for teachers and students to become involved in community-based science under the direction of large-scale projects that support research efforts of scientists on global issues. As an introduction to the citizen science experience, the initial practice does not have to be grandiose or even original–the goal is to get involved in the world around you so that children begin asking questions and learning about relevant science. By choosing an approach that focuses on providing input for research scientists, the two projects discussed below allow teachers and students the opportunity for participation in scientific inquiry with outside guidance through the project protocols.

Climate change research

The Bee Hunt! (http://www.discoverlife.org/bee/) project gets students involved in identifying plant-pollinator relationships and the relative abundance of seasonal species within their own community. Technology, such as camera phones, is utilized as students explore nearby habitat with goldenrod plants. By documenting the types of pollinators across seasons, students collect valuable data for scientists; they are also exposed to different plants, symbiotic relationships, and pollinators. These encounters encourage the teacher to connect different concepts in science while allowing the students to be actively engaged in real data. Discussion can lead to how this real data is utilized for global climate change research.

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In This Issue

Quick Links

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Citizen Science, continued

While this project focuses on symbiotic relationships, the student is encouraged to observe the natural world and other interactions beyond the goldenrod, which serves as a 'habitat' for pollinators. By documenting the various organisms and plants within a given area, students build awareness for diversity (or lack-thereof) and the processes of. The use of technology is an exciting tool of documentation for many children, and this project allows them to be creative in their presentation and share their knowledge regarding the relationships they observed and the process of collecting data. As an introduction to the methods of scientific experimentation, this project can be used to emphasize the interconnection of various disciplines (e.g. weather patterns, soil types, erosion, motion, plant and animal anatomy)

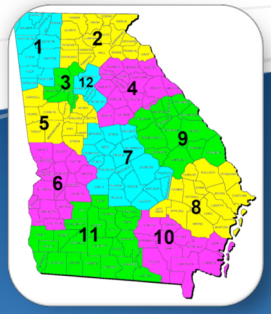
Science across 'content'

Zooniverse (https://www.zooniverse.org/) is a unique citizen science project that promotes research in multiple science disciplines using technology and decision-making skills in various ways. While the primary projects on this site involve identification of matter or organisms, there is a wealth of information and potential for student engagement in science. Galaxy Zoo (http://www.galaxyzoo.org/), a subsite of Zooniverse, includes projects for physics, astronomy, and earth science that afford classroom or individual learning activities that spark student interest. Each project provides direct instructions and practice activities for completing the tasks which scientists need assistance performing. Students gain valuable science knowledge and are able to participate in science topics that interest them, encouraging them to take ownership of learning. Again, technology is essential to this citizen science project, which serves a global community and encourages students to think beyond their local community to the knowledge gained across the globe.

Citizen Science Central (http://bit.ly/17FtxQV), from the Cornell Lab of Ornithology, provides access to a variety of activities that span multiple disciplines. Primarily, projects listed with CSC are current and require volunteers to be actively engaged in data collection. While many of the projects are specific to a geographic location, the activities specific to birding are familiar and provide opportunity for inquiry and involvement within the community. Identification of birds can lead to questions regarding habitat and how students can take action to provide spaces that are more accessible to multiple species. Engagement with weather and climate change projects can help to foster awareness for the connections between diverse cultures and geographic locations.

Bee Hunt!, Zooniverse, and Citizen Science Central serve to introduce students to scientific experimentation while providing a platform that is organized and intended to provide data for larger research studies. For those who are new to incorporating the schoolyard or want to increase the use of technology in their classroom, these two projects serve as a foundation on which to build deeper connections to how children exist and function within the global community. Once the children are comfortable with the ability to ask questions, and begin the approach to answering these questions, more advanced methods of integrating citizen science can be mastered. Then learning of science becomes more exciting, connected, and *alive* for the student (and the teacher)!

- Stacey Britton, Ph.D., University of Georgia Alumna, Assistant Professor, University of Missippi-DeSoto



GSTA Board Teaching Tip, Donna Governor, President-elect

More Citizen Science Resources

There are some GREAT Citizen Science Projects to use with your kids to involve them in REAL science. Take a look at some of my favorites:

- The Mastodon Matrix for Paleontology: http://bit.ly/Hb7MSW
- The Ventus Project for Climate Change: http://bit.ly/1a8Njbo
- Scientific American has a list of other projects ranging from Roadkill Surveys to Microbial Ecology: http://bit.ly/1gz5vAz

Apply for a GSTA Award or Mini-Grant

Have a great idea for your classroom? Know a great science teacher or administrator? Then take advantage of one of GSTA's awards of mini-grants. We believe it is important to recognize and reward excellence in science teaching. Therefore, we offer the awards, scholarships, and mini-grants listed at right. Nominate a colleague, apply for yourself, or share this with your network of teachers.

Award Categories

- Teacher of the Year
- Teacher of Promise
- Mini-Grants
- ScienceQuest Teacher Scholarships
- Conference Grant
- Science Adventure Student Scholarship
- Dallas Stewart Award

The deadline for the 2013-2014 awards is **November 30, 2012**. Follow this link (http://bit.ly/1a5ixyx) for complete details on guidelines and application procedures. All awards will be presented at the GSTA Awards Luncheon to be held in Macon, Georgia on Saturday, February 7, 2014. We look forward to seeing you there!

Register for the 2014 GSTA Conference

The GSTA conference committee is hard at work planning another outstanding professional learning experience for you. The 2014 GSTA Annual Conference in Macon, February 6-8, will feature more than 200 sessions addressing a variety of issues important to science teachers, as well as a wide range of vendor exhibits and local science-related field trips. Conference strands include STEM, Environmental Education, and NGSS-GPS Connections. The conference will again feature the BYOP (Bring Your Own Principal) Day—Friday, February 7th—to help administrators understand the particular issues faced by their science teachers. Click here (http://bit.ly/19gFEnL) to register for the conference. Registration is $120 if paid by January 1 and $140 thereafter. Follow this link (http://bit.ly/19faLRK) for booking information for the conference hotel and other nearby options.

STEMulate LEARNING
SCIENCE TECHNOLOGY ENGINEERING MATH

Have Something to Share with GSTA Members?

Want to share something with GSTA's 1400+ members? GSTA seeks to share announcements, information, and resources from not-for-profit or government-sponsored organizations at no cost. We also offer a range of paid advertising options for commercial interests that align with GSTA's goals. To submit an announcement or inquire about advertising rates, please email the newsletter editor at gstanews@gmail.com.

ACS Chemistry Day for Teachers

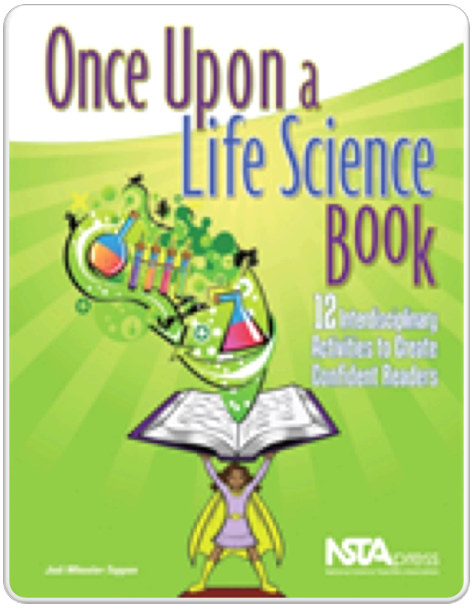
"Chemistry Day for Teachers" welcomes all teachers in the Southeast Region to join us November 15-16 for this wonderful program featuring speakers from Virginia, Florida, Georgia, and New York for a nominal registration fee of $20. Come be a part of the fun while learning in the beautiful Loews Hotel in Midtown Atlanta! Social events include a World of Coke Tour and Friday night "Dance Off". Workshops include AP Chemistry teacher refresher training for experienced AP teachers, water quality/Adopt-a-Stream programs, school safety, common core and chemistry at the Georgia Aquarium! Don't miss it! You'll be glad you came! Check the website (http://bit.ly/1aPgKyD) for program and registration information.

International Study in Conservation

Offered by Project Dragonfly at Miami University, Earth Expeditions (http://earthexpeditions.org) graduate courses and the Global Field Program master's degree (http://gfp.miamioh.edu) bring together graduate students, scientists, educators and community leaders at critical conservation sites worldwide. Sites for 2014 include the Amazon, Australia, Baja, Belize, Borneo, Costa Rica, Guyana, Hawai'i, India, Kenya, Mongolia, Namibia and Thailand. Either program can be completed part-time from anywhere in the United States or abroad. They are open to educators and other professionals who hold a bachelor's degree from any discipline.

The Bucket Is Full: Using the Learning Cycle to Address Literacy in the Science Classroom

"I can't possibly teach reading and writing in addition to all of the other things I'm supposed to teach in my science class!" an exasperated teacher declared to me in a staff development I was conducting recently. She's right, of course. Science teachers have too much to teach as it is. They can't possibly add more. Unfortunately, being able to read science writing and write about science reasoning are important skills for both scientists and citizens. So what is a science teacher to do?



Learn more at Wheeler-Toppen's website (http://bit.ly/18EvkJv) or see her book at the NSTA Store: http://bit.ly/HbOr45.

Here's some good news: one of the biggest problems that students have when reading science texts isn't really a reading problem at all. It's a knowledge problem. Every text makes some assumptions about what the reader already knows, and starts explaining from that level. Science texts are notorious for assuming that students bring more background knowledge to their reading than they actually do.

For example, consider an Earth science textbook talking about rocks. It might describe how rocks vary based on their composition and method of formation, and how they can transform into each other through the rock cycle. Now consider a middle school student who lives in the decidedly un-rocky portions of south Georgia. This child's main experience with rocks has been gravel. For this child, the textbook reading quickly becomes a swirl of meaningless terms and definitions to memorize.

Fortunately, this means that you can make a big difference in your students' reading comprehension, simply by better preparing them for reading. And you can do that without adding—by simply rearranging your teaching. Take this typical rock lesson that I often see in middle school classrooms: The teacher lectures about rocks. Then students do an activity where they draw and test different properties of sample rocks. Finally, they do a worksheet or other written activity.

With a few changes, this lesson can build reading and writing skills at the same time it addresses the science content. Start with having students draw and test rock properties. Next, substitute reading the key sections of the textbook for a lecture. Students are more likely to be able to learn from the textbook after they have built the necessary background knowledge by studying real rocks. Encourage students to mark (perhaps with post-it notes) places in the text that confuse them, and make space for discussing those topics. Finally, give a follow-up assignment that requires writing at least a paragraph. Perhaps students could go back and describe how one of the rocks they looked at earlier would have been formed.

You may be familiar with this "lab-first" way of teaching—it's called the learning cycle. It is a particularly appropriate approach to literacy because it can build the knowledge students need to read a text before they attempt it. And by substituting reading and writing for lectures and worksheets (not all the time, just sometimes!) allows you to incorporate literacy without adding to your already packed classroom activities. See the next page for other examples of this approach

- Jodi Wheeler-Toppen is the author of *Once Upon a Life Science Book: 12 interdisciplinary lessons to create confident readers*, *Science the Write Way*, and the upcoming *Once Upon an Earth Science Book*. She also conducts staff development on incorporating reading and writing in science classes. For information on becoming a *Once Upon an Earth Science Book* field test teacher, e-mail her at wheelertop@gmail.com.

Learning Cycle Examples

	Biology	Earth Science	Chemistry	Physics
Exploration	Lab looking at and drawing plant, animal, and bacteria cells	Lab simulating 3 types of erosion on a mountain road	Students perform 4 reactions (one of each type) and record what happens	Pairs of students lift a heavy box onto a table, and then push it up a ramp
Explanation	Textbook reading on cell parts found in those cells	Textbook reading on the types of erosion	Textbook reading on single and double displacement, composition, and decomposition reactions	Read the textbook on the use of an inclined plane as a simple machine
Application/ Extension	Students write a letter to an FBI agent who found cells at a crime scene and wants to know how to figure out if they come from a plant, bacteria, or animal	Students write a letter to the road contractor to explain the types of erosion he'll need to avoid	Students write an explanation of which reaction from the lab fit into each category, and why, including complete chemical reactions	Students write an explanation of why it was easier to push the box up the ramp, including a calculation of mechanical advantage

Engage Your Students in eCybermission

eCYBERMISSION is a web-based science, technology, engineering and mathematics competition for 6th, 7th, 8th, and 9th grade teams. Students propose solutions to real problems in their community and compete for state, regional, and national awards.

Students who register before November 1 will receive a free STEM kit. Additionally, the first 1500 team advisors who register will receive a free STEM activity kit which will help students differentiate between engineering design and scientific practices.

If you decide to participate, then please use the following code when registering: ***NSTA: Referred by NSTA State Chapter***.

Visit the site for information and to register: www.ecybermission.com.