

Community-Project-Based Learning for Middle School

Situation

Due to rapid urbanization, environmental degradation is a common problem in many communities. Many waterways throughout the State have suffered from this rapid growth and are considered impaired by the New Jersey Department of Environmental Protection (i.e., these waterways do not meet the State water quality standards). The main cause of these impairments is pollution that is carried to the waterways by stormwater runoff, often referred to as nonpoint source (NPS) pollution. NPS pollution is often called "people pollution" because it comes from our everyday activities such as adding too much fertilizer to our lawns, pet waste from walking our dogs, and leaky oil crankcases from our cars.



We as a society often continue to ignore our responsibility to preserve and protect our natural resources for future generations. Even when our children want to get involved and take action, there are few opportunities for them to embrace and even fewer opportunities for hands-on education on environmental restoration activities. As indicated by the National Science Standards, "In a world filled with the products of scientific inquiry, scientific literacy has become a necessity for everyone. Everyone needs to use scientific information to make choices that arise every day. Everyone needs to be able to engage intelligently in public discourse and debate about important issues that involve science and technology. And everyone deserves to share in the excitement and personal fulfillment that can come from understanding and learning about the natural world." (www.nap.edu/readingroom/books/nses/overview.html)

To minimize or eliminate NPS pollution sources, people's behavior has to change and best management practices (BMPs) have to put in place to control this pollution at its source. Many of the BMPs used to address NPS pollution are natural systems that use native plants and mimic our native woods and meadows; a rain garden is one such system. A rain garden is simply a shallow landscaped depression that is designed to receive stormwater runoff and slowly allow the stormwater to infiltrate into the ground. As the stormwater passes through the soil, the plants take up the nutrients and other pollutants adsorb to the soil particles, thereby releasing clean water into the groundwater aquifers.



Infiltration of stormwater replenishes the aquifer, providing a sustainable base flow to the waterways in the warm dry summer months. These systems use native plants and can be incorporated into almost any urban landscape and can be built by almost anyone including 5th, 6th, 7th and 8th grade students (i.e., middle school aged children). Perhaps the behavior change and the BMPs should begin with the youth of our society?

Action

The Rutgers Cooperative Extension Water Resources Program has joined forces with Research in Education Applied to Learning (R.E.A.L.) Science to create a new method of science instruction called "Community-Project-Based Learning." R.E.A.L. Science is a nonprofit organization that provides a support system for innovative standards-based authentic science projects along with effective teacher in-service training programs in science education. Community-Project-Based Learning incorporates the authentic practice of real scientists into the regular classroom setting. Community-Project-Based Learning identifies a real environmental problem in the community and works with the students to address these driving questions: Is there a real problem with our watershed? What is our contribution to the problem? If there is pollution in our watershed, how can we fix it? The project objectives include the students investigating various aspects of the natural environment on and around the school grounds, students documenting findings, and students communicating these findings to fellow classmates and the community. Working in teams the students design a solution to a problem and present these solutions to their classmates. The best solutions are selected and built on the school grounds and address the real environmental problems in the community.

Impact

Community-Project-Based Learning provides new methods of teaching science to reach a broader audience. This program has the potential of occurring in more than one school in a district simultaneously. This will allow the teachers to foster cooperative efforts among young scientists in the various schools that are studying related topics. This also helps provide social motivation for the students. Our young scientists learn to value accuracy and skills in reading, writing, and communication as they share information and data about their respective projects with their peers in other schools.



Two pilot projects have been completed in New Jersey middle schools. Over 375 middle school students have been instructed on environmental issues and stormwater management. Evaluation of the success of these projects can be conducted in a variety of ways. The completion of a watershed restoration project can be considered a performance-based assessment. Individual student reports, group presentations, and student notebooks can also be evaluated for depth of knowledge and content knowledge accuracy. Student notebooks can be used as an assessment of student growth in both critical reasoning strategies and environmental sciences knowledge. The results from these recent projects demonstrated significant gains from pretest to posttest on measures designed to assess the content standards. All students achieved significant content knowledge gains by project completion. Community-Project-Based Learning provides a method of science education that is capable of reaching all students.