NO TEACHER LEFT INDOORS

Lewis & Clark Elementary School
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Abstract: No Teacher Left Indoors was designed to provide resources that empower both students and teachers at Lewis and Clark Elementary School to better utilize their schoolyard classroom - the Outdoor Discovery Core (ODC). The project provided several different resources that focused on enhancing outdoor ecological education. These included a weather station, environmental temperature data loggers, personalized scientific inquiry CDs for teachers, and a new utility shed. Major accomplishments include the implementation of the weather station, the data loggers, the resource CDs, and the new utility shed for the Outdoor Discovery Corps. Students have begun incorporating weather observations with seasonal change observations in their journals, and teachers have become more comfortable leading outdoor science inquiries.

Introduction

The Lewis and Clark Elementary ECOS team wanted to focus on providing resources for the entire school, hence the project theme No Teacher Left Indoors. The aim was to help the students and teachers at the school better utilize their schoolyard habitat. Lewis and Clark transformed a wonderful portion of the schoolyard into the Outdoor Discovery Core (ODC), containing a butterfly garden, sensory garden, bird habitat, hummingbird garden, native grass mound, and a flowing stream/pond feature (Map 1). The site was dedicated as an official National Wildlife Federation Schoolyard Habitat Site. Although the ODC had great potential for outdoor education, few of the current teachers at Lewis and Clark used this resource on a regular basis. We found that the main obstacle to outdoor science education was curriculum. Teachers wanted to know how and what to teach outdoors. The goal of this project, then, was to provide all teachers with materials and inquiry experiences to empower them to use Outdoor Discovery Core to enrich and expand their science curricula. The project was designed to align with ECOS objectives by providing permanent resources teachers could use to enhance a variety of "learn-by-doing" inquiry lessons in the schoolyard and adjacent habitat areas. Our specific purposes were to enhance the Outdoor Discovery Core by adding equipment to broaden the scope of ecological inquiries and by providing

support and additional materials to help teachers sustain the goal of "No Child Left Indoors."

Map 1. The Outdoor Discovery Corps at Lewis and Clark Elementary School.

This project provided Lewis and Clark Elementary School with several different resources that focused on enhancing outdoor ecological education. These resources included a weather station, environmental temperature data loggers, personalized scientific inquiry CDs for teachers, and a new utility shed. These resources addressed science standards across grade levels (e.g., weather is a curriculum topic throughout K-5), and provided science data for long-term local and global study. They also equipped all Lewis and Clark teachers with additional

information, methods, and resources for enriching and sustaining the ODC as a schoolyard laboratory. The project also aligned with the specialties of the ECOS fellows, providing an important resource for engaging teachers, parents, and students for lasting impact. Moreover, this year's demonstration project built on the two previous demonstration projects in order to leave a lasting resource for the entire school community.

Schoolyard Demonstration Project Description

Science Theme: ECOS is based on the idea that science, and specifically ecology, should use the outdoors as a classroom for engaging students in questions that pique their interests and introduce them to authentic research so that no child is left indoors. The Lewis & Clark Demonstration Project built on the concept that students get outdoors when teachers know how and what to teach outdoors. Therefore, we chose a science theme to reflect that idea: no teacher left indoors. We also tried to enhance the Lewis and Clark schoolyard in a way that would impact the greatest number of teachers. For example, weather is a recurrent theme in the K-5 science curricula. The ECOS weather station is a permanent fixture on the school's campus that teachers and students can access and use to collect data. Moreover, the weather station is linked to the Outdoor Discovery Corps through

previous fellows' work and the data loggers creating a resource for exploring the interrelationships between biotic and abiotic factors. The data loggers can be placed in environments in and around the schoolyard to address questions students and teachers pose about how weather and microclimate interact in ecological systems.

Target Grade Level: We designed No Teacher Left Indoors to engage the entire school in a sustainable format. Weather figures prominently in the Earth and Space Science Standards for most of the elementary grades. The weather station links into the GLOBE Program providing a repository for long-term data collection, additional inquiry ideas for use with the basic weather instrumentation, advanced equipment and ideas for investigation, and the opportunity for large- and small-scale data analyses. The data loggers provide a simple data collecting method that complements the weather station studies of schoolyard climate. The resource CDs supply teachers with tested inquiry materials they can use outside with their classes. The new utility shed provides the entire school a place to organize and securely store tools, birdhouses, hoses and all the other supplies that are required for maintaining such a great educational resource. Thus, the ECOS demonstration project provides a variety of opportunities to engage all of the elementary students in scientific investigations, and, as a result, teachers, parents, and the

community will be engaged in ecological inquiries. Their participation will help ensure the sustainability of the project.

Purchases: As of May 25, 2007, the weather station housing and equipment, temperature data loggers, utility shed, and resource CD materials had been purchased. In addition, we purchased wood for mounting the station and for building steps to enable younger students to read the thermometers and precipitation gauge. The weather station was constructed and has been fully operational since early December, 2006. The temperature data loggers were installed in October, 2006, and used throughout the winter to monitor underground temperatures in various habitat zones of the Outdoor Discovery Core. The new utility shed was built in early May, 2007 and now houses all the school's outdoor supplies in a safe and organized manner. The resource CDs were created in late May, 2007 and distributed to each Lewis and Clark teacher.

Description of demonstration project components:

Weather Station

The principal on-the-ground structure on the Lewis & Clark campus was the extensive weather station. Included in the weather station were tools to measure weather (e.g., max/min thermometers, rain gauge, sling psychrometer, junior

barometer, hygrometer, cloud chart), acid rain (e.g., waterproof electrical conductivity/temp/TDS meter, pH meter), and soils (e.g., soil color chart, soil sieve, soil thermometer). This equipment was required for participation in the GLOBE (Global Learning and Observations to Benefit the Environment) Program. GLOBE is a worldwide hands-on, primary and secondary school-based education and science program funded by the National Aeronautics and Space Administration (NASA) and the National Science Foundation that allows data sharing at variety of scales and time periods[1].

For Students, GLOBE provides the opportunity to learn by:

- Taking scientifically valid measurements in the fields of atmosphere, hydrology, soils, and land cover/phenology.
- Reporting their data through the Internet
- Publishing their research projects based on GLOBE data and protocols
- Creating maps and graphs to analyze data sets
- Collaborating with scientists and other GLOBE students around the world

For Teachers, GLOBE provides assistance through:

- Training at professional development workshops
- Teacher's Guide, "how-to" videos, and other materials
- Continuing support from a Help Desk, scientists, and partners

[1] From: http://www.globe.gov/fsl/html/aboutglobe.cgi?intro&lang=en&nav=1

- Contact with other teachers, students, and scientists worldwide.

One of the ECOS teachers at Lewis and Clark, Betsy Sharkey, is a GLOBE-certified teacher who has overseen the data-collection and long-term maintenance of the weather station. This weather station enabled all Lewis and Clark teachers and students to make inquiries into atmosphere, hydrology, soils, phenology, earth science, and biology, and to share data with other participating schools.

Both ECOS teachers have been using the GLOBE data with their classes. Because they are teaching multi-age classes (1st and 2nd grade students), the older students have been mentoring the younger students in data collection. The students have learned to graph maximum, minimum, and current temperatures, describe clouds, understand percent cloud cover, and discuss relative humidity. This spring, students were able to compare their monthly temperature observations of ODC habitats with variations in the weather data they collected.

Environmental Temperature Loggers

To enhance the applicability of the weather station, the No Teacher Left Indoors project provided unique technology to help relate weather and ecology. This technology came in the form of small temperature data loggers called iButtons that can be used to monitor everything from incubation rhythms in bird nests to

fluxes in groundwater temperature. iButtons are computer chip data loggers encased in a 16mm diameter stainless steel “button”. These buttons can be programmed to measure and record temperature at various time intervals and in harsh environmental conditions. Each button can store up to 2048 temperature readings, allowing for long- or short-term monitoring inquiries. These data loggers have been a great addition to the weather station because they have allowed constant monitoring of temperatures all over the Outdoor Discovery Core. The ECOS students buried the iButtons in several habitat regions of the ODC and monitored temperature fluctuations throughout the winter and spring. Then they developed hypotheses based on their data to try explaining the observed temperature patterns. These iButtons are available to all Lewis and Clark classes that want to monitor a specific schoolyard region over time. Incorporating technology and long-term observations aligned with both National Science Standards and Missoula County Standards, including Science as Inquiry, Unifying Concepts of Science, Life Science, and Earth and Space Science.

Utility Shed

Lewis and Clark Elementary’s ODC is an incredible resource for science education. However, the maintenance of this resource has required hundreds of hours of

labor from teachers, students, parents, and other community members. One of the key concerns of the ECOS Project is the sustainability of the outdoor classrooms and schoolyard demonstration projects, and this year Lewis and Clark Elementary was desperately in need of a new utility shed. The old shed housed the shovels, rakes, hoes, weeders, trowels, gloves, sprinkler system controls, and a random assortment of other items that belong in the ODC. It was small, cluttered, and insecure. The lid could be lifted right off, and thus it was prone to vandalism. The new shed was built in May and has been a huge improvement. It has a larger floor plan and is tall enough for adults to stand inside. All the tools have been neatly organized and there is plenty of room for everything. The biggest improvement is probably that the doors shut and lock securely. Now, vandalism is not as much of a concern. The improvement to this aspect of the Outdoor Discovery Core will ensure that the school community has a storage building that can keep their supplies organized and unharmed. Having this resource will allow teachers to find what they need and make large work parties easier to manage.

Personalized CDs for teachers

The No Teacher Left Indoors Demonstration Project will specifically target each individual teacher at Lewis & Clark Elementary School. We will provide them

with personalized CDs that include grade-appropriate inquiries, electronic versions of field guides, an inventory of all ODC educational resources, and an electronic map of the Outdoor Discovery Corps. After conducting workshops with each grade level at the school, each teacher has provided a list of inquiries from the ECOS website they would like to see developed specifically to use in the ODC. In addition, the ECOS team will try to develop new inquiries that address difficult curriculum topics, such as 4th grade physical sciences.

Current Status: All aspects of the demonstration project are complete except for the personalized CDs. The CDs are currently being created, and we hope to have them in teachers' hands before June 8th.

Changes to original proposal: While we considered installing a web-cam at Bancroft Pond, we encountered the issues of securing additional funding, locating a safe site for the camera, and providing for the future maintenance of the camera and its web connection. These issues prompted our team to reconsider the web-cam proposal. Ultimately, we decided that a more practical use of our funds could directly benefit the school without creating the maintenance burden of the web-cam. Thus, we opted to purchase the utility shed for the ODC. This re-allocation

of funds also left us without the originally proposed herbarium supplies, but the current ECOS teachers are considering creating the herbarium in the future.

Sustainability

Lewis and Clark Elementary School has an Outdoor Discovery Core committee of teachers and parents that manage and oversee the year-to-year operation of the schoolyard habitat and outdoor educational resources. This committee will ensure that any necessary maintenance will be provided to the weather station and utility shed. In reality, the weather station, utility shed, temperature data loggers, and resource CDs require minimal maintenance.

The sustained use of these resources depends on the Lewis and Clark teachers. This year our ECOS team teachers used the weather station and data loggers, but they have also made them available to the entire school. We hope that the ECOS experiences of the past year and the inquiry materials we have included on the CDs will inspire all Lewis and Clark teachers to take advantage of these educational tools.

Summary

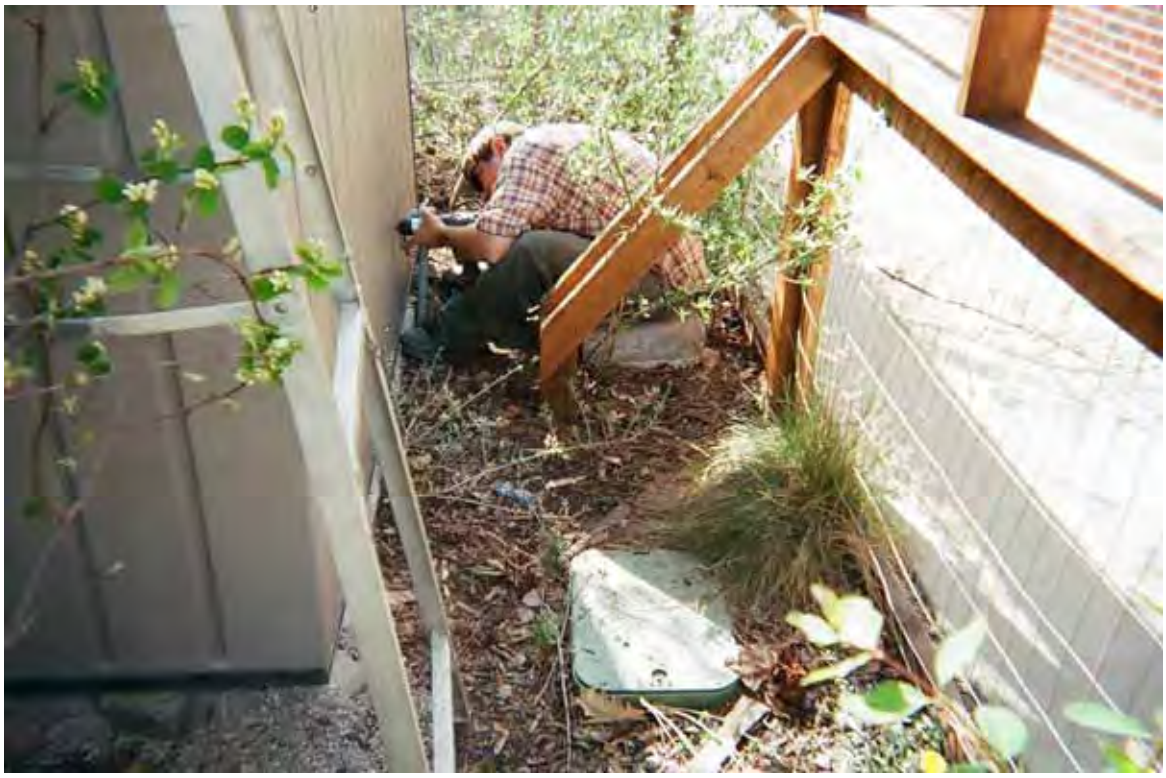
No Teacher Left Indoors provided resources allowing both students and teachers at Lewis and Clark Elementary School to better utilize their schoolyard classroom - the Outdoor Discovery Core (ODC). Our goal as an ECOS team was to inspire every teacher in the school to incorporate more outdoor science education into their curriculum. We attempted to accomplish this by providing educational tools to enhance the ODC (weather station, data loggers), practical necessities for the long-term maintenance of the ODC (utility shed), and curriculum resources for classes to use in the ODC (personalized CDs). Our hope now is that each teacher will utilize some part of this demonstration project to get their students outside for science class.

Appendix – Photographs


October
November
December


May
June
July
August
September
October
November
December


December

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