

Improving Student Achievement with Environmental Education¹

Martha C. Monroe, Jeanette Randall, and Vicki Crisp²

Public education began as a uniquely American idea. The architects of the newly formed democracy trusted the people with the power to maintain a just government and counted on a system of public schools to prepare citizens for this responsibility. Unlike European schools that educated children of nobility, by the mid 1800s, schools on the American frontier offered reading, writing, and arithmetic to boys and girls of farmers.

Governance for the public school system has always been the responsibility of the state, and in many parts of the country, this responsibility is passed to the local school district. This assures that those paying for public schools are also determining policy and curriculum. In some respects local control provides an important flexibility in school curriculum; it increases the likelihood that content is locally relevant and meaningful.

By the end of the 20th century, however, local control appeared to assure enormous disparity between economically privileged and disadvantaged youth. In some states graduation requirements did not guarantee the most basic of skills. In an age of

increased mobility, youth educated in one state should be capable of becoming employed in any other state, and not limited by a poor education to remain in their home community.

Education Reform

In 1983, the National Commission on Excellence in Education reported in *A Nation at Risk: The Imperative for Educational Reform* that the country needed to standardize our educational curriculum and improve accountability from the classroom to the principal, and from the superintendent to the state board. This launched the long process of developing curriculum goals, curriculum objectives, assessment tests, and reform guidelines in every state. Out of necessity, teachers caught in the transition altered their teaching strategies. One of the most significant changes required many teachers to plan their lessons within the structure of a new standard curriculum framework. This reduced teachers' ability to take advantage of local opportunities to bring meaning to their students' world.

-
1. This document is FOR87, one of a series of the School of Natural Resources and Environment Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date May 2001. Revised November 2009. Reviewed September 2006. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.
 2. Martha C. Monroe, Assistant Professor and Jeanette Randall, graduate student, School of Forest Resources and Conservation, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611. Vicki Crisp is the Supervisor of the Area Center of Educational Enhancement at the North East Florida Educational Consortium in Palatka, FL 32177.

The Institute of Food and Agricultural Sciences (IFAS) is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations. U.S. Department of Agriculture, Cooperative Extension Service, University of Florida, IFAS, Florida A. & M. University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Millie Ferrer-Chancy, Interim Dean

In Florida, the reform process began with the development of Blueprint 2000 that provided the framework for the Sunshine State Standards (SSS). The Standards are specified for seven subject areas (language arts, mathematics, science, social studies, arts, health and physical education, and foreign languages). The most recent revision process resulted in grade level benchmarks from kindergarten to 8th grade and a cluster of benchmarks for high school students. In Science, for example, there are four Bodies of Knowledge (nature of science, physical science, earth/space science, and life science). Within each Body of Knowledge there are Big Ideas (K-8) or Standards (9-12) that identify broad concepts. Benchmarks specify what students should know. For example, Big Idea 17 for elementary grades is Interdependence. The same three components (A. plants and animals interact with and depend on each other and their environment; B. human activities and natural events can have major impacts on the environment; C. energy flows from the sun through producers to consumers) are listed in Grades 3, 4, 5, and 7. This Big Idea is not part of the curriculum for grades 6 and 8, Standard 17 in Life Science for Grades 9-12 is also Interdependence but it is defined with three different components (A. the distribution and abundance of organisms is determined by the interactions between organisms, and between organisms and the non-living environment; B. energy and nutrients move within and between biotic and abiotic components of ecosystems; C. human activities and natural events can have profound effects on populations, biodiversity and ecosystem processes). The benchmarks are grade specific and increase in complexity, as this sampling of benchmarks within the same Big Idea and Standard (17) indicates:

Third Grade: SC.3.L.17.1: Describe how animals and plants respond to changing seasons.

Fourth Grade: SC.4.L.17.4: Recognize ways plants and animals, including humans, can impact the environment.

Fifth Grade: SC.5.L.17.1: Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

Seventh Grade: SC.7.L.17.3: Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

Grades 9-12: SC.912.L.17.12: Discuss the political, social, and environmental consequences of sustainable use of land.

For more information on the Next Generation Sunshine State Standards, search on www.floridastandards.org.

To ascertain that students are indeed learning the concepts covered in the standards, a series of assessment tests have been developed for several different points in a student's public education. To date, the Florida Comprehensive Assessment Tests (FCAT) are given in reading, writing, and math each year from third through tenth grade. The science FCAT is given at the fifth, eighth, and eleventh grades. Although all subjects are included in the standards, teachers are less likely to cover social studies or art benchmarks if they must improve student scores on the subjects tested in the FCAT. For information about FCAT, go directly to www.fcat.fldoe.org.

Not only are students assessed through the FCAT process, but schools are scored as well. Through a complicated formula of student scores, attendance rates, suspension rates, and high school drop out rates, schools receive an overall letter grade. "Failing" schools are given two years to improve their scores, or students are eligible for state-funded vouchers allowing them to attend a different school.

Needless to say, administrators and teachers are working hard to increase student test scores in their school's weakest area of performance. In some elementary schools, education in science, history, and other subjects has been jettisoned in favor of concentrated attention on the basics. At the secondary level, subject area teachers are encouraged to develop assignments that give students practice in writing, for example, and to score their papers for writing skills. Professional development opportunities for teachers are often limited to those that increase teachers' ability to improve student performance on the FCAT

(see Addressing Sunshine State Standards in Elementary School Teacher Professional Development Workshops at www.edis.ifas.ufl.edu/FR282).

Environmental Education in the Climate of Reform

Environmental education (EE) has a long history of being a supplemental opportunity for youth—a field trip to the nature center, a week at camp, or a project in the local stream. Although some argued that EE should be included in the national and state standards, it was deemed to be a topic that applied to many subjects, not a subject unto itself. Environmental education goals can be achieved in a science class studying the movement of groundwater at a landfill site, or in a history class discussing the use of natural resources in the development of a new nation. Since environmental literacy means that youth have the awareness, knowledge, ability, motivation, commitment, and skill to work with others to resolve environmental problems and prevent new ones, environmental education activities can also improve communication, group process, and problem solving skills. These citizenship skills help prepare society-ready graduates and are often a part of a school's written mission or goal.

Many environmental educators have encouraged subject-based teachers to use environmental studies to keep students' interest in their lessons. Environmental topics also provide an important connection between the curriculum and the real world, but it has only been recently that evidence exists to justify these claims. Focusing first on forty schools that are using the environment as an avenue to achieve school-wide reform, the State Education and Environment Roundtable (SEER) coined the term Environment as an Integrating Context, or EIC, and launched an exploratory study to document these schools' efforts. All schools in the study showed improvement in standardized test scores (Lieberman and Hoody, 1998) and teachers commented on valuable outcomes as diverse as an increase in student attendance, improved attention in class, and reinvigorated teachers. A follow-up study compared eight EIC schools to eight non-EIC schools in California and found that the students at the EIC

schools scored higher on standardized tests than did the control group (SEER, 2000).

At the classroom level, a host of studies indicate that environmental education programs are successful at building problem solving skills, environmental knowledge, and skill at taking environmental actions, but few measure environmental curricula with a state assessment ruler. If the curriculum is not designed to meet state curriculum goals, it is not likely to show student achievement in these arenas. In addition, most state performance tests are more generic than environmental curriculum. For example, if a curriculum improves critical thinking in the context of solid waste management, but critical thinking is assessed in the context of consumer purchases, students may not show a gain on the state test.

Environmental Education in Florida

A recent study in Florida demonstrates that environmental education lessons that are designed to meet state curriculum goals can indeed improve student achievement as measured by the state achievement test (Randall, 2001). A set of biodiversity lessons designed to combine biology and writing skills was tested with 132 ninth and tenth graders in Gainesville, Florida. Students practiced effective writing techniques while learning about taxonomy, introduced and invasive species, and endangered habitats by conducting activities with the Florida Museum of Natural History collection databases. The FCAT writing rubric was used to score the students' first and last writing assignments to measure change. Results indicate that this combination of writing practice and interesting science topics can significantly increase writing test scores (Wilson and Monroe 2005).

When teachers perceive environmental education as an “extra,” environmental activities will be easily discarded in favor of increasing student knowledge and performance for state tests. When environmental education lessons are developed for state curriculum standards, they might be acknowledged as supporting student achievement in dimensions that educators recognize, such as performance tests, attendance, and interest. Many national environmental education resource materials are developing correlations to state standards.

In Florida, for example, the Project Learning Tree (PLT) Steering Committee is adapting this national, award-winning program to state-specific standards and achievement test goals. Each of the 96 activities have been correlated to the age-appropriate Sunshine State Standards (for correlations, see www.sfrc.ufl.edu/plt/correlations/index.html), and the training workshops demonstrate how a PLT activity can be modified to provide students with practice for the reading, writing, and mathematics state assessment tests. For example, the activity "How Big is Your Tree?" engages students in measuring trees in different ways and supports several SSS in math and language arts. With a few simple additions, this activity can launch teachers and students into a host of FCAT-type practice exercises:

In Mathematics

Use a string or tape measure to find the circumference of two different trees outside your classroom. Calculate the diameter of each tree. Check your answers by using the DBH tape (Diameter at Breast Height tape, a forestry tool). Show your work or explain in words how you determined the diameter of each tree. This exercise relates to the Sunshine State Standards: MA.1.G.5.2, MA.4.A.6.6. or MA.5.G.5.2.

In Reading/Language Arts

1. Trees range in size from tiny seedlings to magnificent giants. Think about a drawing or painting of a forest landscape that contains a variety of trees. Imagine the landscape is real and you take a walk through the area. Write a story about your walk and describe how the size of the trees seems to change as you walk deeper into the forest. This exercise relates to the Sunshine State Standards: LA.3.3.2.2.

Florida is fortunate to have a great variety of large trees that grow throughout the state. In this text, the author states that among the 290 Florida trees, 172 trees are considered "champion trees." Using details and information from the article, explain the criteria for being a "champion tree." This exercise relates to the Sunshine State Standard LA.3.2.2.2.A. A variety of additional questions or exercises can

enhance existing environmental education resource materials to help teachers use the environment to increase FCAT scores. The enhancements are often modeled in teacher workshops that support environmental education.

Summary

Florida teachers and environmental educators are in the midst of great change. It is without a doubt important to use statewide standards to design classroom learning objectives and to periodically ascertain student achievement. It is also critically important to promote student learning about the world in which we live. Environmental education, fortunately, can do both. Environmental education programs like Project Learning Tree engage learners in interactive lessons to discover and apply concepts. These concepts are relevant to the outdoor world and interesting to students. Environmental education programs can be used to promote a renewal of teacher and student interest in learning and, with appropriate adaptation, can reinforce the skills that are measured in the state achievement tests.

Literature Cited

Lieberman, G.A. and L.L. Hoody. 1998. Closing the achievement gap: Using the environment as an integrating context for learning. State Environmental Education Roundtable. Poway, CA: Science Wizards.

Wilson, J. R. and M. C. Monroe. 2005. Biodiversity curriculum that supports education reform. Applied Environmental Education and Communication. 4, 2, 125-138.

State Education and Environment Roundtable (SEER). 2000. California Student Assessment Project: The Effects of Environment-based Education on Student Achievement. San Diego, CA: SEER.