



LESSONS IN LEARNING

Making the environmental grade: The benefits of going green in the classroom

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Over the past two decades, public interest in environmental issues has risen dramatically and stories about the environment are regularly featured on the front page of newspapers and are the focus of successful documentary films.

Today, environmental education has become an element of many provincial curricula, with the understanding that young people need to learn about and understand how their personal actions affect the natural world around them.

Environmental education appears to carry a number of benefits that go beyond learning about environmental issues.

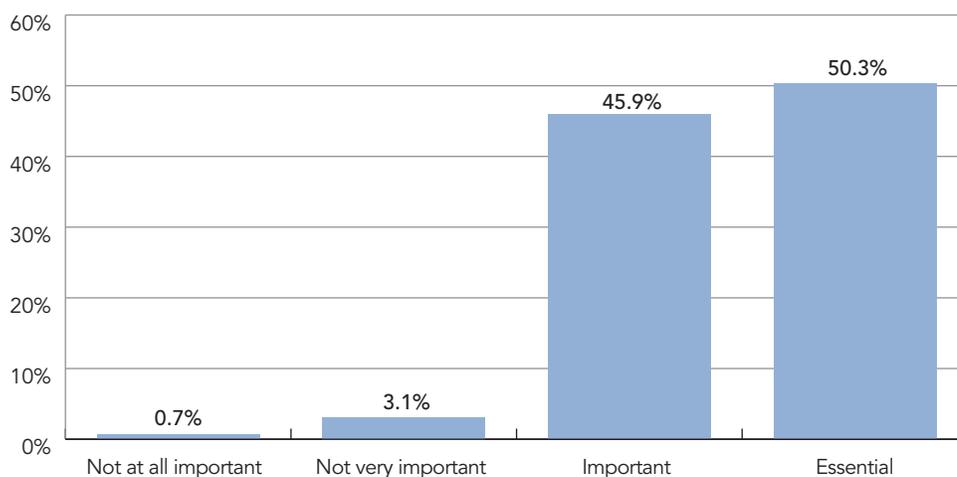
Environmental education in Canada

According to the world's first conference on environmental education, the 1977 Tbilisi Declaration (UNESCO's), environmental education is:

A learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action.

Canadians have expressed their support for the idea of including environmental education in school curricula. According to data from the 2008 Survey of Canadian Attitudes toward Learning (SCAL), Canadians believe it is either "important" (46%) or "essential" (50%) to include learning about the environment as part of compulsory topics at school. (see Figure 1)

Figure 1:
Canadians' attitudes toward environmental learning



Source: Canadian Council on Learning, *Survey of Canadian Attitudes toward Learning* (2008).

Approaches to environmental education within Canada vary greatly from province to province. While environmental education is mandated by curricular standards in only a few provinces, most provincial standards and resources include environmental education themes as part of other subjects, such as science and social studies.¹

For example, curriculum and resources packages in British Columbia provide suggestions for teachers on how to incorporate environmental topics into classroom activities in elementary and secondary schools. In Alberta, outdoor ecological investigations and other interdisciplinary topics are included in the curriculum at the elementary and secondary levels. In Quebec, the curriculum includes topics in the areas of consumer rights and responsibilities and the impact of personal actions on the environment.

The vast majority of Canadian students learn about environmental issues at some point in their schooling, but these lessons are generally confined to the science classroom.² Many teachers are reluctant to address environmental education and name various reasons for avoiding environmental topics, including; lack of resources, inexperience, lack of confidence and insufficient support.³ In recent years, an overloaded curriculum and emphasis on testing and standards were added to the list of reasons that prevent teachers from spending too much time on “extra” topics such as environmental education.

The benefits of environmental learning

Research conducted in the past several decades suggests that participation in environmental education helps students develop knowledge about the environment, positive environmental attitudes and environmentally friendly behaviours.⁴ In addition to these outcomes, some forms of environmental education have also been shown to be associated with learning advantages, such as: improvements in achievement, critical thinking, attitudes toward learning, and motivation to learn and achieve in school.⁵

Environmental education is not simply a strategy for educating young people about environmental issues, but rather a system for using the environment as an organizing theme around which other content areas are organized.⁶ Environmental education uses environmental issues

“Sustainable water use” as an integrating theme

A key feature of successful environmental education programs is their use of environmental issues to integrate learning across different subjects. For example, in the Outdoor Academy Program in Washington State, students learn about sustainable water use in several different subjects. In science, they investigate how their own communities use and manage water resources. They also learn about how pollution makes its way into water supplies and through the water cycle, and how water is tested for contaminants. In language arts, students study literary explorations of human relationships with water (e.g., *The Old Man and the Sea*, *A River Runs through It*) and write stories, poems and essays about their own relationships with water.

and topics to integrate various subject area concepts which students explore through hands-on, community-based and self-directed inquiry.

An evaluation of 40 American elementary and secondary schools with environment-based programs suggests that students in programs where environmental education is used as an integrating theme tend to have higher scores on standardized tests in math, reading, writing, science and social sciences.⁷

In physical education, students learn about and participate in water based physical activities, explore the impact of recreational activities on human health and water resources, and collect water quality samples for their science experiments. Over the course of the year, students engage in a service-learning project that involves habitat restoration work around a local stream.

Fourteen of the evaluated schools specifically conducted comparative quantitative studies of academic achievement using grade point averages, test scores on standardized tests, and other comprehensive and subject-specific tests as measures of achievement. Out of 39 comparative analyses conducted, 36 (or 92%) indicated that environmental-education students outperform students in more traditional programs. Table 1 presents the results of comparative analyses. Five schools participating in the study also conducted comparative analyses of behavioural, attitudinal and attendance data and reported that environmental education students outperformed their counterparts in these areas as well.

Table 1: Comparisons of students in environmental-education (EE) programs with students in regular programs on standardized tests, grade-point averages, measures of attendance and attitudes toward school.

Area of assessment	Assessments indicating that EE students outperform non-EE students		Total assessments administered
	%	Number	
Language arts	100%	17	17
Math	71%	5	7
Science	75%	3	4
Social Studies	100%	2	2
Comprehensive assessment	100%	9	9
Student behaviour	100%	4	4
Attendance and attitude to school	100%	5	5

Source: Lieberman and Hoody (1998)⁸

The *California Student Assessment Project* evaluated student achievement and attendance in elementary schools in California between 1998 and 2002. Using a combination of qualitative and quantitative methods, researchers conducted a comparative analysis of the data for 12 pairs of schools: schools with environment-based programs and schools with a more traditional curriculum.^{9,10} As seen in Table 2, environmental-education students showed stronger results in 101 (72%) out of 140 academic assessments in language arts, math, science and social science.¹¹

Table 2:

Comparisons of students in environmental-education (EE) programs with students in regular programs on standardized tests, grade-point averages, measures of attendance and attitudes toward school.

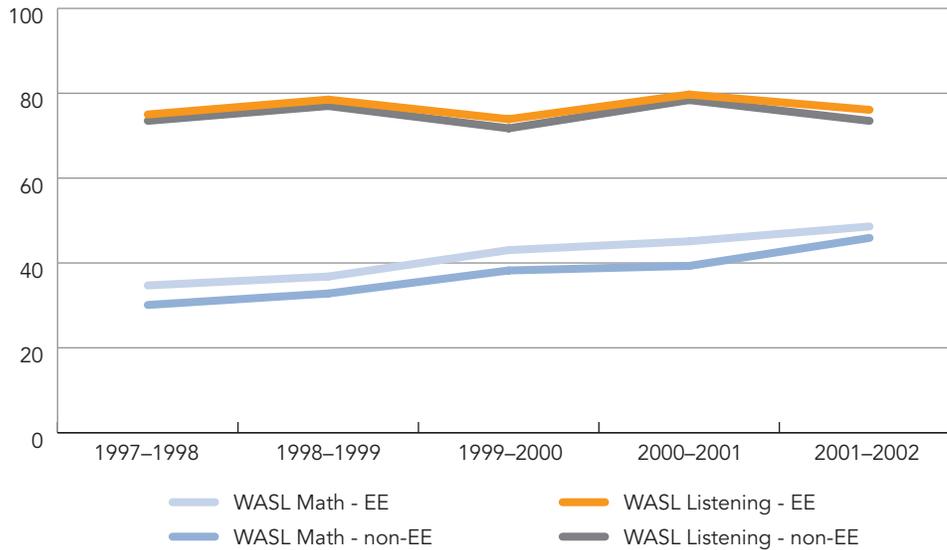
Area of assessment	Assessments indicating that EE students outperform non-EE students		Total assessments administered
	%	Number	
Language arts	76%	69	91
Math	63%	17	27
Science	64%	7	11
Social Studies	73%	8	11
Attendance and attitude to school	77%	17	22

Source: Lieberman, Hoody, and Lieberman (2000)¹²

Another American study compared 77 pairs of schools in Washington State. For comparison purposes, schools with environmental-education programs were matched with schools with more traditional curricula using U.S. census and other economic, demographic and geographic criteria. The researchers found that schools that undertake systemic environmental-education programs consistently outperform “traditional” schools on state standardized tests in math, reading, writing and listening. In 73 pairs (out of 77), environmental schools had higher scores in at least one subject. Furthermore, analysis of longitudinal data for the period of 1997–2002 showed that environmental-education schools had higher mean percentages of students who met standards on the Washington Assessment of Student Learning test (WASL) every year.¹³ Figures 2 and 3 present the percentages of students who met standards on the WASL math, listening, writing and reading tests for environmental education and non-environmental education students between 1997 and 2002.

Figure 2:

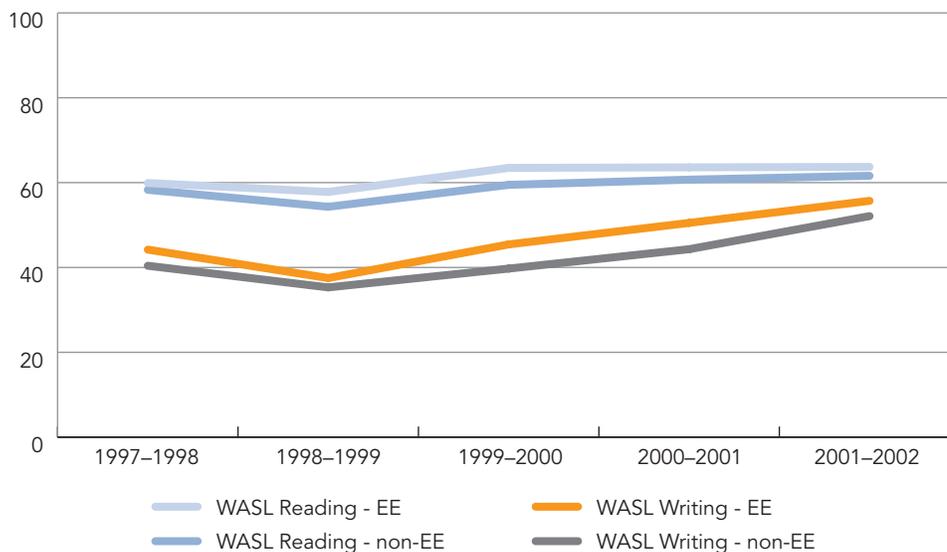
Percentages of students who met standards WASL math and listening tests: environmental education (EE) and non-environmental education group, 1997–2002.



Source: Bartosh et al (2005)¹⁴

Figure 3:

Percentages of students who met standards WASL reading and writing tests: environmental education (EE) and non-environmental education groups, 1997–2002.



Source: Bartosh et al (2005)¹⁵

Environmental education is also associated with improved critical thinking skills. A study of 401 Grade 9 and 12 students from 11 Florida high schools found a strong positive correlation between participation in environmental-education program and higher achievement on tests that measure critical thinking. Environmental-education students scored 4.33 points higher on the Cornell Critical Thinking Test than students in the control group.¹⁶ In Molokai, Hawaii, students who participated in an inquiry-based environmental-education program called Investigating and Evaluating Environmental Issues and Actions (IEEIA) also performed better on a critical-thinking test when compared to their non-environmental education counterparts.¹⁷

Participation in environment-based programs is also associated with increases in student motivation and engagement. A study in Florida found that high-school students in environmental programs scored significantly higher on the California Measure of Mental Motivation and the Achievement Motivation Inventory, with Grade 9 and Grade 12 students scoring three and nine points higher respectively than students in traditional programs.¹⁸ Similarly, in the American Institutes for Research's study of outdoor programs in four California elementary schools, students showed positive gains in self-esteem, leadership, co-operation, conflict resolution and students' relationships with their teachers.¹⁹

Lessons in learning

Environmental education provides diverse teaching and learning opportunities.

Environmental education provides a method for achieving a number of desirable student outcomes. For teachers, the use of the environment as a context for learning or an integrating theme in the curriculum allows students to develop a deeper understanding of environmental concepts and is also associated with improved student performance in such areas as science, math, language arts and social studies.

The multi-faceted nature of environmental education is a key component of its effectiveness as it allows for integration of many techniques that are thought to define good education such as critical thinking, inquiry, hands-on and co-operative learning, and group work. As students explore diverse and multi-dimensional environmental issues, they integrate subject-specific concepts through real-world projects making connections among disciplines. These explorations help students foster independent and co-operative learning abilities and develop problem-solving and critical-thinking skills such as questioning, investigating, forming hypotheses, interpreting data, analyzing, developing conclusions and solving problems. Hands-on experiences in local communities help students develop a sense of connectedness and stewardship, making school learning relevant and interesting.²⁰

Many teachers require professional development in order to effectively integrate environmental education into their teaching strategies.

Integrating environmental education with everyday classroom activities is not an easy task. While most educators have positive attitudes towards environmental education, many do not have sufficient training, knowledge and confidence. Research indicates that teachers do not feel competent in teaching environmental issues, most of which are interdisciplinary in nature and require knowledge of concepts from different subject areas.^{21,22} Furthermore, teachers are “usually not well-equipped for understanding pupils’ viewpoints and for handling controversial, conflicting issues in the classroom in a constructive way”.²³ These issues can be addressed both through initial and continuing professional education by providing examples of models that work, teaching materials and resources and introducing pre-service and in-service teachers to effective teaching strategies and approaches to meld environmental education with the classroom activities.

Teachers engaged in environmental education require the support of school and district administrators.

Integrating environmental education into the classroom is also challenging because it often requires changes in scheduling, integration of various subject areas, and time for field trips and outdoor activities.²⁴ To successfully incorporate environmental education in their teaching, teachers need support and understanding from school and district administrators.

Environmental education represents an approach to teaching students about issues that affect their lives in profound ways, while simultaneously enhancing the overall quality of their learning experiences. Teachers who receive appropriate professional development and support can use environmental education to help students develop strong learning, problem-solving, and critical-thinking skills.

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