

## **Farm-based environmental studies as a component of middle school curriculum: benefits and challenges of integration**

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### **Introduction and objectives**

For many decades environmental educators across the world have advocated the benefits of environmental education for students learning, motivation, and the development of environmental literacy, sense of place and responsible attitudes towards the environment. However, although environmental education is an explicit part of the curriculum in many countries, environmental topics and issues are given marginal attention, at best. Teachers at all levels feel challenged when faced with the task of integrating environmental perspectives into their subject curricula. Practical models of integration are needed to illustrate how environmental philosophies may be translated into educational practices. This project examines that issue. Specifically we ask: how and under what conditions can environmental studies become a part of the middle school curriculum? What experiences will contribute to the development of subject-specific knowledge and skills, and environmental responsibility and stewardship in young people? And, what problems and challenges do teachers face when they attempt to integrate environmental topics into their subject area curriculum? We report on research in a project that brings middle school students and their teacher together with community farmers, to explore the value of intergenerational learning in fostering environmental knowing and care. The purposes of this research were:

1. To investigate whether structured participation in an intergenerational farm-based experience can engender environmental concern and care among children and promote subject specific knowledge and skills (i.e. achieve both subject area and environmental education objectives);
2. To develop a deeper understanding of the potential and challenges of integrating environmental and science education.

### **Theoretical underpinnings**

According to Hungerford *et al.* (1980), NAAEE (1999); Stapp *et al.* (1969), and others, the main aim of environmental education is to develop citizenry who are prepared and willing to participate in the solving of environmental problems. Furthermore, environmental education should encourage social action, critique, and transformation of the society and the world. In contrast to these action outcomes, the primary goals of many school subjects are the acquisition and application of knowledge. Thus, melding the aims of environmental education with subject-based learning requires a radical rethinking of teaching and assessment practices.

Gruenewald (2003) points out that caring for the earth and the environment requires more than cognitive engagement (also see Smith & Williams, 1991) and argues strongly for adopting a place-based approach that can infuse environmental education with elements of empathy for the earth and community-mindedness. However, the question remains, what type of *nurturing life experiences* will help young people become *care-full* and emotionally connected to the earth? Lave and Wenger (1991) suggest that to understand the learning process we must inspect and analyze the social and cultural milieu in which learning takes place. Deep and lasting learning, they claim, is embedded in authentic social practice that occurs in “communities of practice” and can transform human identity (Wenger, 1998). This situated view of learning translates to apprenticeship experiences and has been used to analyze the complex dynamics of learning in social and workplace

settings. Our research extends situated theory to examine the learning that occurs within and through human participation in the natural environment. Moved by our personal interest in the problem of how to promote environmental awareness and concern for the planet we began our search for a “special place” where the goals of science learning, environmental understanding, and stewardship for the land could be explored together. Our search took us to an urban organic farm situated at the periphery of a university campus. We decided to explore whether it was possible to bring science learning and environmental education together by working with a teacher to meld hand-on, food-growing experiences with science teaching and learning. We wondered if such an experience would help students become more connected to the earth and foster understanding of the importance of caring for the land.

## **Project Design and Research Approach**

### ***Project Design***

The project began two years ago when researchers met with interested teachers at a local girls’ school to discuss their ideas on how to integrate a farm experience into the grade seven curriculum. Following this discussion, one science teacher, eighteen students, and seven community elders with farming and gardening backgrounds volunteered to participate. Each farmer was partnered with three students to form six “farm friend teams.” Between January and June 2003, the girls traveled to the farm to meet and work with their farm friends on thirteen occasions. During these visits the teams planned and planted fruits, vegetables and flowers and discussed different issues related to farming and gardening. The teacher worked to integrate the experiential learning that was taking place at the farm with the provincially mandated science curriculum. Science lessons included activities relating to soil chemistry, composting, cycles of nature, and plant structure. Students were encouraged to conduct experiments as part of their growing activities at the farm. Over the course of the project, the students maintained a team journal documenting their farming activities and also interviewed their farm friends about their farming practices and their history and lives on the land. At the close of the project in June 2003, students gave class presentations using PowerPoint to visually represent their experiences on the farm, and what they had learned about growing crops, farming activities, and living with the land from their farm friends.

In year two the project continued. Eight farmers, one science teacher and seventeen girls participated. Based on an analysis of the outcomes and challenges of the first year, some changes were made in the project design. Topics relating to the environment and plant growth were introduced prior to the students beginning their farm visits and activities. Students made one visit to the farm in late fall to view the activities from the prior year and to prepare the soil and beds for winter. Students were asked by their teacher to conduct more formal and complex experiments in their growing plots. In order to promote a stronger sense of personal responsibility and motivation, each student maintained a personal journal documenting their experiences and activities on the farm. In both years, a harvest celebration was held at the end of the school year. Parents, teachers, students and farm personal came together to view the efforts of the farm friend teams and to join in the harvest of early season crops.

### ***Research Methods***

In both project years two faculty members and three graduate students served as the research team, documenting each group meeting and farm visit using video, photographs and field notes. Interviews were conducted with the students and teacher at the beginning, middle and end of the project. An interview was conducted with each farm friend near the beginning of the project and a focus group was held at the end. Student school-based assignments and journals kept throughout the project also constituted data. Qualitative methods were used to analyze data.

## Findings

One of the goals of the project was to investigate the influence of structured participation in the social practices of farming on the development of environmental concern and care among children. We also aimed to understand the role of an intergenerational land-based project in the development of subject-based knowledge and skills as well as environmental concepts. Finally, we wished to develop a deeper understanding of the challenges a teacher faces while integrating environmental studies into her subject area curriculum. In this paper we present insights learned from observing and talking with the students and teacher who participated in the project for the past two years.

### Students learn about science and environment through farming

Through the combination of farming and classroom-based activities the girls in the project gained scientific knowledge and understanding of environmental concepts. While planting flowers and vegetables, students become familiar with different plants, their structure and needs in water, light and nutrients, growing seasons and lifecycles, and discovered “good” and “bad” pests that inhabit the soil.

*We're learning what plants are for outside, what plants are for inside. How we should plant them and how deep we should plant them, where we should plant them. We're learning how to protect the plants. We're learning how to weed and what to weed instead of say, weeding the plant. (Karen, interview 2, April, 2003)*

Ethical and environmental issues became “real” and relevant in the farm-based setting. Students developed an understanding of environmental issues around food production as well as positive attitudes and a sense of responsibility. This responsibility for something living was novel and exciting and provided the girls with a sense of purpose, pride, and ownership.

*I like how we can grow stuff and eat it later and I like how ... it's kind of our responsibility to water it and take care of it. And, not how someone else does it for us. It is our own experience to do it. (Jackie, Interview 2, April 2003)*

### Students learning new social skills through teamwork and intergenerational activity

In both years of the project we observed that the students developed collaborative and decision-making skills. Each farm friend team was given their own space and conducted their own experiments. As part of their work in small groups the girls had to decide what to plant, when to plant, and how to deal with pests and other environmental issues. Despite the differences across the teams the majority of girls did not regard this project or their growing activities as a competition but rather as a collaborative undertaking in which everybody has a role to play and “a say” in the decision making process. Students were first a bit shy in working with their elderly companions. But over time a novel relationship developed between students and their adult farming partners, whom they saw not as a parent or a teacher but rather than a buddy and a mentor.

*We usually talk and he (our farm friend) tells us that he's been checking on our raised beds and tells us improvements. It's really fun because at first we were kind of uncomfortable with him but now we just talk and stuff and now it's not. Sometimes we talk about school and then he tells us tips about stuff. (Julie, Interview 1, Jan. 2003)*

### Students gain a situated understanding and develop a personal connection with the land

While working on the land, girls developed a personal relationship with the environment. At the start of the project students defined environment as physically separate from themselves. As the project progressed they developed a connected notion of themselves as part of the environment.

*It (the farm) teaches you about the environment and how it interacts with things around it. Like how the insect interacts with the plant and how the plant interacts with us and how we really depend on each other. (Rita, interview 3, June, 2003)*

Students also developed an emotional connection to and began to identify with the plants they were nurturing. They gained a situated understanding of land and its significance in supporting human life through their developing relationships with farm-experienced elders

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From interviews and observations we concluded that working on the land becomes a powerful and memorable experience for the students because it engages all their senses and emotions. Evidence of synaesthesia (Pajaczkowska, 2001) was apparent. Girls talked about working with plants, feeling the soil, touching worms and insects. Such experiences have the potential to foster ecospiritual knowing (Riley-Taylor, 2002).

#### Challenges for students: Unclear connections between farm experiences, classroom science, and environmental education

We observed that it was important for the teacher to make explicit connections between the science curriculum and the environmental project. Due to curricular and time constraints, however, this did not always happen. This disjunction appeared to influence how students made sense of their field experience. For example, even when explicit discussion about the farm took place in their classroom a number of students saw the project as “enrichment” rather than an integral part of their school science experience. Furthermore, even when talking about scientific concepts and information they learned on the farm, some of the girls did not recognize or acknowledge their farm activities as “real” science. Here we see one more of the challenges of trying to bring an environmental focus to the school curriculum.

*It's nice to have this knowledge at the back of your mind, but a lot of it we already know about it. Its kind of good enrichment, but it's not a big necessity in your education. I find it more of an enrichment. It's good to have it but it's not that necessary. (Amy, interview 3, June 2003)*

Amy's view, which indicates field-based learning as enrichment suggests that even young students have visions of what constitutes legitimate learning.

#### Challenges for teachers: Melding and managing an intergenerational farm based project.

Even an enthusiastic teacher moved by environmental concerns found it difficult to incorporate the farm experiences into the mandated curriculum. There were a number of reasons for this. The time required to carry out farming activities competed with time for other science activities, which created a tension in the schedule.

*“The curriculum isn't designed to have something integrated into it in this way. This is a topic-based curriculum and the farm project is a year-long project... I can't see it being ever completely seamless unless it was an entirely different course. But that would defeat the purpose in my mind. I think it has to be a part of science. (Ellen, teacher interview, 2004)*

The teacher often had to combine several science and farming topics in one lesson, which made it difficult to create smooth transitions between the class and field experience. On some occasions science lessons and farm-topics would get out synch, leading to disjointed instructional units. This worried the teacher who was concerned it would be difficult for her students.

*“My only concern there is how it affects them because basically they’re running 2 versions of science. For them it’s not a linear process at all. It’s a paralleling thing...”* (Ellen, teacher interview)

Creating connections between the learning that was happening on the farm and in the classroom was not easy. Attempts to involve the farm friends in integrating curricular decisions with growing events created a tension for the teacher that remained unresolved. Leadership in the project was made even more complex by including school, community, farm, and university participants.

*Running a class of 12 year olds is one thing and running a group of 12 year olds, adults and a whole bunch of researchers is quite another. It is much more difficult...* (Ellen, teacher interview)

Creating a space and opportunities in the teachers’ schedule for both planning and activities was challenging. Little time was available for meetings between the teacher and the farm friends as most project time involved “time on the land.” Thus, time needed for developing mutual goals and trust through communication with the participants competed with time needed to carry out the growing projects with students. The teacher found this stressful and was concerned that her goals were not always well matched with those of the participating farmers.

*It’s a catch up game all the time. I find that interesting and frustrating... I’m not sure what their [the farm friends] understanding is. Part of their understanding is that it’s a research project from UBC and that may actually be more important [to them], but I’m concerned about the kids’ education. So it might be we’re actually on two different paths. But then I don’t know them that well and I certainly don’t have time to meet them. And, I don’t have [involvement in] the choosing of them. It’s an interesting situation. It’s just harder to manage a mixture of people like that.* (Ellen, teacher interview, 2004)

### **Conclusions**

This two-year study has illustrated some of the complexities of initiating and sustaining community-based projects that require commitments of time, resources and the development of trust among partners. Thoughtful planning, ongoing communication and establishing of mutual goals are key elements in this process. We have found that teaming community farmers and young students can be effective not only in promoting understanding of land based traditions and concern for the environment, but also in developing scientific knowledge and skills, and social knowledge, skills and abilities. We also learned that for a place-based experience to be meaningful we not only must acknowledge students’ perspectives, but also need to help them understand the nature and value of learning that occurs through situated participation on the earth. Our future research will explore how we can address a number of the challenges we have identified, thus far.

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