

Teacher Preparation for Environmental Education: Faculty Perspectives on the Infusion of Environmental Education Into Preservice Methods Courses

Amy L. Powers

ABSTRACT : Based on interviews with 18 professors of education, this study provides a report on the ways in which environmental education (EE) theory and practice are currently incorporated into preservice elementary education science and social studies methods courses. It further reports perceptions of faculty about the barriers to incorporating EE in preservice programs and their ideas about action steps toward a more widespread use of EE as an integrating context for teaching preservice science and social studies methods courses.

KEY WORDS : elementary education, environmental education (EE), preservice, science methods, social studies methods

The power of the preservice curriculum is its multiplier effect. Where one teacher has the potential to impact the number of students taught throughout a career, a methods course has the potential to impact many future teachers and, ultimately, a far greater number of students. This study investigates the role that environmental education (EE) does and can play as an underlying philosophy and methodology in preservice science and social studies methods courses. The perspectives and practices of faculty who use EE to teach their elementary education methods courses are discussed and compared.

Research shows that such courses and requirements are more the exception than the rule. A 1996

Amy L. Powers works with Program Evaluation and Educational Research (PEER) Associates and focuses on evaluating environmental and community-based education programs. This research was conducted while she was a fellow with the U.S. Environmental Protection Agency's National Network of Environmental Management Studies and a graduate student at Antioch New England Graduate School.

study stated that “higher education is not a player in current environmental education efforts. . . . Historically higher education has not been an active participant in developing programs to incorporate environmental perspectives into the teaching of our current and future teachers” (Gabriel, 1996, p. 5). More recently, Rosalyn McKeown-Ice’s survey of formal teacher training programs for evidence of EE training found that, in general, students had limited access to EE content and methods.

Few colleges and universities across the United States offered a major, minor, concentration, specialization, or even a course in EE. Few institutions required environmental education experience in their coursework or field experiences. All schools required preservice teachers to take coursework in the natural and social sciences; however, fewer than one third of the responding institutions give students a background in environmental issues (McKeown-Ice, 2000, p. 7).

An earlier study conducted by Champeau, Gross, and Wilke (1980) revealed that neither preservice teacher interest in EE, nor a lack of demand for this competency, is the key problem. They reported that “over 93 percent of the teachers surveyed felt that the achievement of environmental literacy should be a significant component of every student’s education” (cited in Wilke, 1985, p. 2). Although this is a positive indicator of teacher intentions, it does not address whether or not these teachers are equipped to carry out their intentions. Indeed, the above studies indicate that teachers are not well-prepared to integrate EE into their classrooms and that inadequate teacher training is the predominant reason K–12 teachers are not teaching EE (Gabriel, 1996). Furthermore, Volk (1982) notes that it is important that teachers not only support the goals of EE theoretically but that they feel a personal responsibility to implement EE in their classrooms. Two factors that may encourage this commitment are the availability of curricula and access to high quality teacher preparation (Volk, 1982).

Just what is the impediment to the inclusion of EE in higher education? Most recently, Plevyak attempts to understand this challenge and, in a sense, explain McKeown-Ice’s and others’ findings.

Including environmental education in preservice teacher preparation programs is a challenging task. Teacher education institutions are forced by state legislatures and state boards of education to include numerous courses in general and professional education, leaving little room for specialty areas such as environmental education. Moreover, finding a place for environmental education in preservice teacher instruction programs is difficult because instruction comprises not only the natural sciences, but also social, political, and economic concepts. Thus, environmental education content and methods usually are included in preservice curriculum within the context of science or social studies methods courses (Plevyak, 2001, p. 28).

In the literature there is limited description of the ways in which college professors currently integrate EE into the preservice curriculum. Lane, Wilke, Champeau, and Sivek, in their 1996 analysis of Wisconsin’s state-mandated EE requirement concludes that a more in-depth study should be performed to investigate the EE approaches and strategies used by teacher education institutions. The research that has been done in this area indicates that a more practical initial strategy for incorporating EE into the curriculum may be through integration into existing program formats rather than a radical restructuring to incorporate separate EE courses.

Although successful examples of EE infusion¹ can be found in “content” courses (courses that instruct students in the technical knowledge of a given subject area such as biology or American history) or in other types of methods courses (those courses in which preservice teachers learn how to teach or develop a pedagogy) such as Language Arts Methods, this study focuses on science and social studies methods courses. By focusing on one element of the preservice curriculum into which environmental education has been successfully integrated, educators can begin to develop an understanding of its role in the preparation of classroom teachers.

The research questions that guided the development of this study are threefold. With regard to preservice elementary education (K–6) science and social studies methods courses:

- In what ways are EE theory and practice currently incorporated?
- What do teacher educators perceive to be the barriers for incorporating EE?
- What action steps do teacher educators believe will encourage the incorporation of EE theory and practice into such courses?

Methods

I conducted telephone interviews in December of 2001 and January and February of 2002 with 18 faculty members from 10 states representing four geographic regions of the United States. Each faculty member teaches at least one social studies or science methods course each year and is known to incorporate some aspect of EE theory and practice into his or her teaching. To create a study sample and gain access to the study participants, I employed a snowball sampling technique (Patton, 2001, p. 243). I interviewed five known or referred faculty members from various regions of the United States and then asked them to refer two or three other faculty members and so on.

I developed the interview protocol on the basis of the input of a validity panel consisting of environmental educators, researchers, NAAEE board members, and education faculty. During the interview, I asked faculty to discuss their teaching practices and to provide their views on the issue of infusing environmental education into the preservice curriculum including their opinions about barriers, action steps, and necessary changes within their institutions.

I analyzed the open-ended questions on the basis of the three-step process for qualitative data analysis: (a) data reduction, (b) data display, and (c) conclusion drawing/verification (Miles and Huberman, 1994; Mills, 2000). I generated codes, and simple frequency counts helped to identify patterns (Glesne, 1999).

Findings

Although opinions varied widely, every interviewee agreed or strongly agreed that “all preservice teachers should be prepared to infuse environmental education into their classroom teaching,” and that “environmental education should be an important part of elementary school children’s school curriculum.” Among the faculty interviewed, there emerged two distinct patterns. The first was a consistency in the ways in which EE is integrated into methods courses. The second was a high degree of uniformity in the perceived barriers to teaching EE. Additionally, respondents proposed many ideas for action steps toward greater inclusion of EE into the preservice curriculum.

Teaching Practices: Integrating EE into Methods Courses

Each of the following four themes was cited by 75% to 85% of respondents as a method they use to teach EE concepts to preservice teachers.

Teaching and learning outdoors. Use of the outdoors varied widely, from one faculty who leads a week-long summer science methods course that is largely based outdoors, to another with whom students access the outdoors only during an optional *Project Learning Tree* workshop each semester. More commonly, the methods professors take students on one or more outdoor field trips each semester. Faculty cited time as the foremost barrier to taking students outdoors. One said, “You can’t

teach science without being outdoors, but it's hard to get outside with the time restrictions in a college setting." Interviewees noted that one way to avoid this time crunch and still expose students to outdoor teaching is to select classroom placements in which teachers are studying life science, plants, and the like, and that have teachers who model the use of the outdoors.

Sharing EE resources. All but three interviewees relied on some sort of curriculum resources that related to EE. Greater than half of the interviewed faculty mentioned using *Project Learning Tree* and *Project Wild* as curriculum resources. At least four interviewees use an EE Resource Review activity with students. According to the faculty, it is through this activity that students are exposed to and have the chance to evaluate the types of EE resources noted in Table 1.

Modeling. Interviewees mentioned the importance of demonstrating model lessons that students can use later in their careers and modeling environmentally "friendly" behaviors ranging from a willingness to sit on the ground during an outdoor lesson to demonstrating curiosity rather than fear of insects.

Local community: Connecting to the "real world." A strategy for integrating EE into preservice methods courses that was widely discussed was the use of one's local community. This practice has been given many names: place-based education, service-learning, and real-world problem solving to name

TABLE 1. EE Resources Shared With Preservice Teachers

Printed resource	N
<i>Project Learning Tree</i> , WILD, WET	10
Ranger Rick's <i>Nature Scope</i>	2
Shelburne Farms' <i>Project Seasons</i>	2
David Sobel's <i>Mapmaking With Children</i>	2
Michael Caduto's series (<i>Keepers of the Earth, Animals ...</i>)	2
Local EE field trips, developed into curricula	2
<i>Green Teacher</i> magazine	1
<i>Science and Children</i> magazine	1
Vermont Institute of Natural Science's <i>Hands on Nature</i>	1
Teacher educators network for enriching EE	1
General energy resources	1
Children's trade books (nature books)	1
Chemical Society's <i>Wonder Science</i>	1
Issue investigation curriculum	1
Fish and Game Department's publications	1
Air pollution booklets	1
National Wildlife Foundation's pamphlets	1
Publications by local DEQ, metro water and sewage	1
GEMS, AIMS	1
PET (population activities)	1
Vermicomposting curriculum	1
Zero population growth publications	1
Staff and Martell's water quality manual	1
<i>Nature at Your Doorstep</i>	1
Second nature resources	1

a few. Faculty described a variety of levels of community involvement: a field trip to a local supermarket for a plant diversity survey; use of campus-associated field sites (botanical garden, geology museum, forested park, natural areas); and field placements in local elementary school classrooms.

Perceptions of Barriers and Challenges

Respondents generated a lengthy list of barriers to the integration of EE into preservice methods courses. The most frequently discussed challenges are shown in Table 2. The concrete barriers participants discussed range from a specific focus on preservice education itself to larger systemic issues such as the K–12 education system into which preservice teachers feed, as well as societal influences within which all of education is inevitably embedded.

Time

The most salient theme emerging from participants’ discussion of barriers was that of time constraints. Several respondents refer to this barrier as “the credit crunch” and, according to one Wisconsin respondent, in his state there is a push to decrease the number of credits preservice teachers need to earn to graduate, so rather than adding new courses or layers, they are attempting to skim off the nonessentials. A Missouri professor discussed a similar phenomenon occurring at her university because of a state-wide teacher shortage, and nearly every respondent mentioned a concern for the heavy course loads of their students. Not only do faculty run into a lot of opposition when suggesting a new layer or course, such as EE, in an already crowded curriculum, they are nervous to set a precedent for even more add-ons. “I’m reluctant to say that this is another layer we ought to add because then other factions will say, ‘Well there’s environmental education, we need to also add this other issue to the curriculum.’ As it is, my students can hardly even take one elective course,” reported a professor at a state college in the northeast.

Discipline Segregation

The predominance of academic subject segregation in the school system is a barrier in itself. One interviewee from Missouri used the term “bucket science.”

TABLE 2 . Barriers to the Integration of EE Into Preservice

Barrier indicated	N
Time pressures, students over-extended, credit crunch	8
Testing/standards/pressure on teachers to emphasize reading and math and to segregate disciplines	5
Politics, controversial issue, societal orientation/inaccurate reputation of EE; lack of research to improve reputation of EE	5
School placements, lack of inservice teacher role models	3
Pressures/competition of other “special interest” groups who want also to be represented in K–12 (and therefore preservice) curriculum	2
Disposition of preservice teachers	2
Knowledge on the part of faculty	2

Note. Total exceeds number of interviews because several interviewees discussed more than one type of barrier.

Another problem for trying to emphasize the environmental, issues-driven, morally-driven science education that I deeply believe in, is a technique the schools rely on: the bucket science method. If magnets come along in the bucket, that's what you teach. Some districts have science buckets that come through all the time, other districts have alternating science and social studies. Thus, the buckets define what is taught.

A Vermont science education professor noted the following: "The bulk of the effort in schools is on literacy and math. The whole morning is dedicated to those. And then, far down the line, is science or social studies or the environment."

Others reported that in the current "testing atmosphere" schools are feeling pressured to reduce science in favor of more testable disciplines.

Politics and Competition

Another barrier is that EE can be seen as one of many interests trying to make its way into the curriculum, both at the university level and in K–12 education. This challenge has two components: one is a legitimate acknowledgement that there are always competing ideas for what should be taught and how it should be taught. Interviewees mentioned diversity training, special education, authentic assessment, complex instruction, and EE (to name just a few) all of which are legitimate educational methodologies or content areas that need attention in the curriculum.

The other component to this challenge is political. "The reality is that all of a sudden every single interest group—environment, peace, animal rights, religion—is putting on all this pressure to get into the curriculum and it's a political battle as to which gets privileged treatment in the curriculum," explained one respondent. Respondents noted that if EE is seen as "yet another add-on" subject, and, perhaps more dauntingly, as the vehicle of a left-wing political agenda, there will be many systemic hurdles to surmount.

School Placements and Access to Role Models

Although many faculty would like to have more time to better integrate EE into the curriculum and place students in schools, the latter would not necessarily come without its own challenges. Several professors noted that offering students the opportunity to work with real elementary school students is a key factor. Some of these professors have that system in place as part of the methods course already; others do not. Those who already use school placements report that this practice inevitably raises challenges, the first of which is the difficulty in getting placements for all students. University students and professors, in most cases, cannot expect to find EE-focused teachers or an abundance of EE magnet schools at their disposal, nor can they expect to tell a cooperating teacher to teach certain subjects or use certain methods so that the preservice teacher gains the exposure. These factors limit the likelihood that preservice teachers will gain exposure to in-situ environmental education.

Disposition

Several faculty members felt that a complex hurdle in this system is the nature of the preservice teachers with whom they work. They admit to generalizing, but claim that, on the whole many of the preservice teachers with whom they work are hesitant about engaging in science. One respondent stated that students begin their coursework

... afraid of any science. So simple experiences with constructing their own understanding across a range of topics (physical science, living creatures, etc.) takes precedence as does what I consider

a moral purpose of mine—that they see themselves as able and willing to engage children in learning about the natural world.

Respondents reported that with this aversion to science often comes a lack of experience with and comfort in the outdoors, often a key component of EE. One respondent described students' understanding of and experience with science as "fear-based." When college students come to their preservice training with many years of attitudes and preconceptions instilled within them, it tends to be a great barrier to the successful inclusion of EE in preservice.

Action Steps and Ideas for Greater Inclusion of EE in Preservice

On the basis of almost unanimous agreement that "the integration of environmental education into preservice education should be actively promoted," participants were asked to discuss potential strategies for integrating EE more systematically into the preservice curriculum. The following five themes emerged most consistently.

Faculty development. Respondents recommended increasing the capacity of faculty over time so that they are capable of and inspired to include environmental education in their courses.

The role of professional organizations. NAAEE, it was suggested, could increase overtures to include participants in their conferences who are not traditionally deemed as environmental educators, including education faculty from teacher training programs. Environmental education researchers should seek to publish beyond the journals that are read primarily by EE practitioners.

Emphasis on EE as a vehicle for teaching all subjects. More research is needed to demonstrate links between EE and the achievement of multiple educational goals. Cooperation is needed among environmental educators, teachers, and school administrators to document the educational benefits of EE.

More practice in the classrooms. Through hands-on immersion, prospective teachers can feel and be motivated by the energy and enthusiasm children have for the natural world.

Testing and standards. When a state's framework of standards includes the expectation that teachers will educate students about their local communities, this can translate into administrative support for local examples on tests, for instance, and thus into a more institutionalized expectation for EE.

Discussion and Conclusions

Although there is clearly a need for further research on the impacts of EE on student achievement, environmental health, and community vitality, EE has been shown to be an effective means of teaching students across disciplines and dispositions (Lieberman & Hoody, 1998). Understanding the perspectives of faculty who educate preservice teachers is one important step in the effort to understand how best to infuse EE into the educational system.

This study elucidated ways in which university faculty incorporate EE theory and practice into their methods courses, the numerous perceived barriers to including EE in preservice, and strategies

that faculty see as action steps toward increased infusion of EE into preservice education. The following findings are the five most significant ones hailing from the study.

- Limited time was cited as the biggest constraint to infusing EE to a greater extent.
- Student disposition, in particular an aversion to science and to being outdoors, was cited as a barrier.
- Infusion of EE into methods courses is preferred to offering a separate course.
- A large portion of respondents use prepackaged, nationally-disseminated curricula to introduce students to EE.
- Interviewees perceived preservice as an important place in the system to initiate integration of environmental education, but a systems approach was cited as equally important.

There was clear agreement that EE is not most effectively taught as a particular subject area, nor are preservice programs poised to integrate a new subject into their curriculum. In practice this is happening in some science and social studies methods courses as true infusion (for instance, modeling a mathematics lesson via a schoolyard plant inventory involving creating transects, measuring, counting, and graphing plants), and in other cases as an “add-on” (for instance, modeling a 3-day unit on the Tropical Rainforest).

Respondents also agreed that the infusion of EE offers the opportunity to move away from teaching very specific educational strategies, and toward developing broad and comprehensive educational philosophies in preservice teachers that empower them to design longer-term units with roots in their local place. It was suggested that preservice EE has the power to encourage teachers to define ways to teach social studies, for instance, through the context of the local environment, rather than showing teachers a curriculum that deals with a specific—and at times abstract—environmental topic to be tacked on to a social studies unit. In this way, preservice education begins to move away from teaching very specific educational strategies, and toward developing broad and comprehensive educational philosophies in teachers that motivate and empower them to design longer-term community based units that involve in-depth study of local environmental issues and result in students taking action to resolve those issues. One lack of alignment in my findings is the responding professors’ clear interest in using the local environment and local community as a vehicle for teaching, and, simultaneously, their impressively consistent use of the national curriculum guides, *Project Wild* and *Project Learning Tree*.²

Interviewed faculty were inclined to speak at length about their perceived barriers to including EE in the preservice curriculum, highlighting the fact that preservice education is embedded in a complex system. It was lamented that there is limited incentive for individuals, departments, or institutions of higher education to emphasize EE within the curriculum when the K–12 school system itself does not create a demand for the methodology.

Many faculty expressed that change has to come from “all angles” in a system as complex as that of education. Still, many emphasized that whereas ensuring that EE is a part of children’s schooling can come from anywhere—a principal, teacher, parent, the state—teacher education is imperative. One respondent said, “It’s a process. But preservice plants the seed.” The study’s findings indicate that although many faculty are thinking about systemic change, they are also working daily—in spite of numerous barriers—to systematically include EE in their own science and social studies methods courses.

NOTES

1. Infusion: “. . . incorporating environmental content and methods in existing or planned courses of instruction in the teacher education program. The secret of the success of any infused programme lies in collegiate administrators and pro-

fessors/instructors who are able and willing to make infusion work.” (Hungerford, 1988, p. i).

2. Although the two factors—interest in place-based education and use of national “packaged” curricula—are not necessarily mutually exclusive, there is a degree of inconsistency, and perhaps they point to a potential opportunity. It would seem that the increased availability and accessibility of place-based learning guides would aid professors in their efforts to integrate EE into education programs, and to do so using their local communities.

REFERENCES

- Champeau, R., Gross, M., & Wilke, R. (1980). An assessment of teachers' understanding and use of 'Goals for curriculum development in environmental education.' In A. B. Sacks et al. (Eds.), *Currents issues VI: The yearbook of environmental education and environmental studies*. Columbus, OH: ERIC/SMEAC Information Center.
- Gabriel, N. (1996). *Teach our teachers well: Strategies to integrate environmental education into teacher education programs*. Boston: Second Nature.
- Glesne, C. (1999). *Becoming qualitative researchers* (2nd ed.). New York: Longman.
- Hungerford, H. R., & Volk, T. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education*, 21(3), 8–12.
- Lane, J., Wilke, R. J., Champeau, R., & Sivek, D. (1996). Wisconsin environmental education mandates: The bad news and the good news. *The Journal of Environmental Education*, 27(2), 33–39.
- Lieberman, G. A., & Hoody, L. L. (1998). *Closing the achievement gap: Using the environment as an integrating context for learning*. San Diego, CA: State Education and Environment Roundtable.
- McKeown-Ice, R. (2000). Environmental education in the United States: A survey of preservice teacher education programs. *The Journal of Environmental Education*, 32(1), 4–11.
- Miles, M. B., & Huberman, A. M. (1994). *An expanded sourcebook: Qualitative data analysis* (2nd ed.). Newbury Park, CA: Sage.
- Mills, G. E. (2000). *Action research: A guide for the teacher researcher*. Upper Saddle River, NJ: Prentice Hall.
- Patton, M. Q. (2001). *Qualitative research and evaluation methods* (3rd ed.). Newbury Park, CA: Sage.
- Plevyak, L. H., Bedixen-Noe, M., Roth, R. E., & Wilke, R. (2001). Level of teacher preparation and implementation of environmental education: Mandated and non-mandated environmental education teacher preparation states. *The Journal of Environmental Education*, 32(2), 28–36.
- Volk, T. L. (1982). *A national survey of curriculum needs as perceived by professional environmental educators*. Unpublished doctoral dissertation, Southern Illinois University, Carbondale.
- Wilke, R. J. (1985). Mandating preservice environmental education teacher training: The Wisconsin experience. *The Journal of Environmental Education*, 17(1), 1–9.

Copyright of Journal of Environmental Education is the property of Heldref Publications and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.