

Environmental Sustainability Education at Three Elementary Schools

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Abstract

Though often considered an area of importance and emphasis, the enactment of Environmental Sustainability Education can vary considerably across schools and settings. This study used a narrative approach to tell the story of Environmental Sustainability Education at three schools within a 10-mile radius of our institution: a public charter school, a public school with a magnet STEM program, and a private Friends school. Our findings are discussed using the NAAEE's Essential Underpinnings of Environmental Education, and shed light on possible future direction for pre- and in-service teacher education in Environmental Sustainability Education.

Keywords:

environmental education, education for sustainability, in-service teachers, teacher practices

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Introduction

Over the past several decades, efforts have been made at the global, national, state, and local levels to increase attention paid to environmental sustainability. Most notably, goal 7 of United Nations' Millennium Development Goals is to *Ensure Environmental Sustainability* (Sachs & Director, 2005). In order to meet these goals, we must first develop an environmentally-literate populace. Thus, a multitude of professional groups have provided guidance to support teachers in incorporating environmental sustainability education (ESE)ⁱ across the curriculum in primary and secondary classrooms. For example, the National Science Teachers Association (NSTA) provides a position statement that notes, “[environmental education] should be a part of the school curriculum because student knowledge of environmental concepts establishes a foundation for their future understandings and actions as citizens,” (NSTA, 2003). Likewise, Appendix J of the Next Generation Science Standards (NGSS) suggests that understanding the intersectionality of science, technology, and environment will, “help today’s children prepare for a world in which technological change, and the consequent impact on society and natural resources will continue to accelerate” (NRC, 2013, p. 3). The National Council for the Social Studies’ position statement on elementary social studies education shares a similar sentiment: “Social studies content allows young learners to explain relationships with other people, to institutions, and to the environment, and equips them with knowledge and understanding of the past. It provides them with skills for productive problem solving and decision making as well as for assessing issues and making thoughtful value judgments.” (NCSS, 2017).

This emphasis on ESE is multidisciplinary and foundational to the work of educators across the K-12 spectrum. The North American Association for Environmental Education (NAAEE) put forth a group of six essential underpinnings of environmental education. These are: Systems, Interdependence, The importance of where one lives, Integration and infusion, Roots in the real world, and Lifelong learning (NAAEE, 1999). We selected to use the NAAEE’s six essential underpinnings a framework for our work because it represents a broad and comprehensive view of ESE, rather than one tied to one specific discipline (e.g. science or social studies).

Our institution has responded to this emphasis on ESE in a multitude of ways including the development of a five-course minor in ESE for undergraduate preservice teachers and creating partnerships with Sustainable Jersey, an on-site non profit organization focused on greening schools and municipalities in our state. Yet, the extent to which ESE is implemented in classrooms and schools, despite the professional groups’ strong emphasis, varies considerably, even among the cooperating teachers who host our students during field placements. As a result, we decided to explore teachers’ perspectives on ESE in elementary classroom instruction at several schools from a variety of different philosophical and demographic backgrounds within the 10-mile footprint of our institution.

Review of Related Literature

Past studies show that teachers’ environmental literacy (defined as knowledge, attitudes, and behaviors) can influence their own pro-environmental behavior and therefore classroom practice (Pe’er, Goldman, & Yavetz, 2007). Yet, data regarding the exact relationships and correlations between practicing teachers’ knowledge, attitudes, and behaviors related ESE are mixed (Cheng & So, 2015). Pe’er and colleagues found that many preservice teachers held

positive attitudes about the environment, but these attitudes did not always relate to environmental content knowledge. Cheng and So, in a qualitative study reported that even a teacher with high environmental literacy in all three areas--knowledge, attitudes, and behaviors--engaged in fairly conventional or traditional instruction on ESE. The teachers highlighted in Cheng and So's study cited time and materials constraints as limiting their ability to implement ESE.

A body of literature (e.g. Heimlich et al, 2004; McKeown-Ice, 2000; Pe'er et al, 2007) suggests that teachers typically receive inadequate preparation in the area of environmental education, which begs the question: what are teacher education programs, both preservice and inservice doing to prepare teachers in ESE? Powers (2004) found that university elementary education faculty valued the importance of ESE preparation in science or social studies methods courses but, much like K-12 teachers, expressed constraints on their ability to engage in this preparation including lack of time, materials, and competent practicing teacher role models.

Yet, several studies suggest that practicing teachers who were exposed to intensive preparation in ESE report positive attitudes and comfort with ESE content. For example, Kennelley and colleagues (2012) studied first-year teachers' implementation of Education for Sustainability (EfS) after experiencing a 13-week intensive EfS module in their teacher preparation program. Teachers in this program cited the importance of content knowledge, pedagogical strategies, and practical outdoor education experiences in shaping their own development. Similarly, Ray and colleagues (2013) found that intensive place-based interdisciplinary professional development on garden learning led practicing teachers to report increased attitudes and comfort with ESE.

Given this reported disconnect in teachers' environmental literacy and varied pre- and in-service preparation in ESE, we seek to delve deeper into understanding practicing teachers' experiences with ESE. Our work examines practicing teachers' beliefs about ESE, and how those beliefs influence their practices by considering groups of teachers from three markedly different elementary schools within ten miles of our institution--all of which have positive working relationship with our institution and teacher preparation programs: an urban public charter school, a traditional K-5 public school with a STEM magnet program, and a private Friends school.ⁱⁱ

Theoretical Approach

To better understand the ways in which ESE was (or wasn't) put into action across each of the three school settings, we used a narrative inquiry framework, with each of the schools representing a unique case. Connelly and Clandinin (1990) describe narrative as both a phenomenon and a method: "Narrative names the structured quality of experience to be studied, and it names the patterns of inquiry for its study." (p. 2). Narrative inquiry privileges the voice of the practitioner, who first tells a story before it is interpreted or re-told by a researcher. Later, the voice of the researcher assists in interpreting and making meaning of the story. As Connelly and Candinin noted, "Narrative inquiry is, however, a process of collaboration involving mutual storytelling and restoring as the research proceeds." (p. 4).

As Riessman noted, "In narrative study, particularities and context come to the fore." (p. 13). It is through the revelation of these particularities that though case-centered, narrative inquiries can help the reader make sense of phenomena.

Methodology

Our study was driven by the following research question: *What are teachers' beliefs about the importance of Environmental Sustainability Education and how do these beliefs influence classroom practices?*

We used a qualitative, narrative qualitative approach (Reisman, 2008) to describe teachers' beliefs across each of the three schools. The schools were chosen purposefully because they each had a reputation for high achieving students, they were each choice-based schools (a public charter school, a public school with a specialized magnet program, and a private Friends school), had established relationships with our institution and teacher preparation programs, and because they represent a variety of different populations of students within 10 miles of our campus. Separate narratives are used to describe each school.

Focus groups were used because as Villanen (2014) noted, "Focus groups allow group interactions based on central prompts or topics to be the main data source rather than researcher-imposed questions." Focus group discussions were held with groups teachers from each school during the spring 2017 semester during mutual planning periods or after school. Each discussion lasted 30-40 minutes, and was conducted by one researcher (second author), audio recorded, and transcribed verbatim. All names and identifying information were removed before any analysis took place. Teachers were asked to describe their beliefs and teaching styles, factors that guide their instruction, and their views and classroom practices related to ESE. Prompts were used by the researcher to elicit this information, but the researcher allowed the general direction of the conversation to flow rather than using a scripted interview schedule, in order to capture a more natural discussion among the teachers.

Both authors read each focus group discussion transcript independently and discussed their reactions and interpretations (Corbin & Strauss, 2008). Salient points were then identified among the transcripts were identified by one reader; the second reader checked for face validity. All discrepancies were discussed until agreement was met, and brief narratives were crafted about each school. The data were then organized using on the elements of the NAAEE (1999) Essential Underpinnings to interpret and contextualize similarities and differences in ESE among and between each of the schools.

School Context

Descriptive information, retrieved from publicly available school report cards and websites, from each of the three study schools is summarized in Table 1 below.

Table 1

Descriptive information for each school

School	Grades in the School	Languages Spoken by Students	Ethnicity	Economic Disadvantage	Number of students
Public Charter	1st-3rd	English 64.1% Spanish 32.4% Polish 3.5%	Hispanic: 61.1% Black: 32.6% White: 5.6% Asian: 0.7%	50.7% of school population	135 *20% more females than males
Independent Quaker	K-8th	n/a	Minority population (African, Asian, Middle Eastern, or Latino): 38% Quaker: 6%	n/a Financial aid tuition allows diverse population	125
Public	PreK-5th	English: 96.3% Spanish: 1.0%	White: 78% Asian: 10%	3% of school population	392
*STEM Magnet Program in grades 4-5		Hindi: 0.7% Other: 2.1%	Hispanic: 6% 2+ races: 4% Black: 2%		52% male 48% female

Findings

School Narratives

The way in which ESE plays out in each of the three schools is described below.

Charter School

Four teachers volunteered and participated in this discussion. One taught first grade, another taught third grade, and the other two were writing and mathematics specialists respectively. The conversation was dominated by discussion of content, specifically the school's strict curriculum driving many instructional decisions in the classroom. Preparing students for standardized assessments and assuring that each student is on grade level was of key importance for most teachers at this school. Yet, in a few cases teachers described places in which they could incorporate supplementary instruction based on student or teacher interests, specifically with regard to language arts instruction, which is the school's primary focus. For example, one third grade teacher noted, "every week is a set story that we cannot change, it is a set curriculum that

we have to follow...we just keep rolling with that, but if it is an area that [the students] show more interest in, we will delve more into that topic. Maybe we will watch videos or try to bring a better understanding of it... if we are reading a story about say earthquakes, [or] volcanoes we can bring the science into it [through a video.]”

When the Charter School teachers discussed their *own* beliefs and practices about environmental sustainability, and how those beliefs translated into ESE classroom practice, most shared that ESE was important, and described practical examples for how these beliefs were incorporated into classrooms. None of the teachers mentioned seeking or receiving professional development or preservice preparation related to ESE. For example one teacher described re-using scratch paper and another emphasized the importance of turning out the lights.

Some teachers also discussed informal education opportunities to expose students to ESE. For example, a writing specialist brings in a guest speaker near Earth Day. She noted that she initially made this invitation with hesitance, but in the end, it proved to be a meaningful experience for her students. Another teacher discussed a field trip to make observations on the beach, which turned out to be less successful. As she noted, “They looked for the tiny little shrimp. I wasn’t impressed. But they were they had the time of their lives. And I thought it could have been so much more for them. But they thought it was amazing and they were gathering up shells and I thought, ‘god forbid they leave these under their beds’ because they had crab carcasses. They were touching everything. They just wanted to explore.”

The teachers also expressed concern that their students’ home and school environments lack opportunity to explore the natural world--many live in row homes and the school itself lacks a playground or other outdoor area, without even a park within walking distance from the campus--as a result some teachers felt responsibility to instill a sense of care about their surroundings and “tug at the students’ heartstrings,” to inspire empathy for the natural world.

Public School

Four teachers and a principal participated in the focus group discussion at the public school. The teachers included a technology specialist, a literacy specialist, a special education teacher, and a fourth grade teacher working with the STEM magnet program. The school has a set curriculum, though includes opportunities for working outside of it. Teachers here discussed the importance of literacy instruction, but also shared some strategies for incorporating interdisciplinary learning and teaching based on interests. Several teachers talked about “borrowing minutes here and there,” or using literacy to allow students to read and write about topics of their own interests. For example, the special education teacher commented on a project in which all students chose to use the ESE topic of natural disasters: “This year when we did our research project they could choose whatever they want to write about they all choose weather or a natural disaster.” The principal shared that many teachers in their school use a “genius hour,” for choice based learning, “Some of the teachers here [incorporate ESE] by using a Genius Hour idea where kids have the opportunity to follow their passions while teachers connect it with what they are doing [in the curriculum].”

When discussing ESE directly, the teachers discussed several non-curricular school-wide elements such as composters in the cafeteria, school wide recycling initiatives, solar panels on the school’s roof, an EPA club, and school energy use monitoring. These larger elements were discussed at length before the standard practices of schoolwide recycling programs or re-use of paper. The technology teacher shared, “We’ve had a Green Team with maintenance workers just

working together to monitor how much electricity was being used...We would make signs on the school to power off when you are not using technology.” Some teachers identified ways in which these non-curricular efforts influenced their classroom practices. The fourth grade STEM teacher discussed how she connects these non-curricular elements to her science teaching on energy and renewable resources. As she noted, “we do talk about renewable energy, which I love, because the kids are not aware. They have no idea how to utilize the sun when you are building a home. You should place your home in a certain way to maximize what is already there. That is one place where I know that it is in there for us to talk about solar energy.” Likewise, the literacy support teacher discussed the ease of incorporating ESE into writing, “I think in the world of literacy you can find a book or write about any topic that you are passionate about. So that is the easiest way to weave my interests, students’ interests, and other teachers’ interests into the curriculum.”

The teachers shared that many of their students have close connections to nature through their school, which is close to a large state park and includes a garden and outdoor learning space, and homes, many of which are large and part of farming communities, as the special education teacher described, “Most of my students live on a lot of property; they have farms and animals.” The group agreed that this closeness with nature helps to facilitate student interest and learning in ESE. Several of the teachers reported having received some prior pre- or inservice professional development on ESE, but this was limited to a handful of workshops.

Friends School

Four teachers participated in this discussion, which emphasized the school’s focus on thematic and interdisciplinary instruction driven by teacher and student interest. The teachers represented four different subject areas including Art, Spanish, Science, and Reading. When asked about the school’s curriculum, often described as progressive, these teachers discussed a more generative process regarding curriculum, the art teacher shared, “I wouldn’t say necessarily say that we have a strict curriculum here. We basically invent the curriculum ourselves each year, whenever we want. We take our passions and build lessons from that.” Though some teachers expressed fear that their instruction was too compartmentalized, and all shared that language arts is the subject that receives the most attention, they described many instances of interdisciplinary instruction across the content areas. For example, the Spanish teacher discussed teaching through the perspective of science, “I have found that when I teach Spanish through the sciences, through math, I spark a curiosity in the kids that I cannot do in another way. I have tried- you know, doing readings and the grammar was so [big] years ago, and there is a new way to teach languages now. We touch on topics related to science.”

When asked specifically about ESE, the Friends School teachers emphasized the way ESE shapes interdisciplinary instruction. As part of service learning and Spanish class, several students participated in a trip to a sister school in Guatemala to help install energy efficient lighting, integrating science, technology, and Spanish. The science teacher also shared that his class includes focuses on place-based instruction such as on local farms, “I [focus on] food...with all the farms around here we discuss what’s on the food and how [farmers] may or may not spray it...[T]he farm right next door to [our school] is key with that [discussion, because of] their soy product. I hope that students gain that from the way I teach it is key to understand what is happening directly around us.”

The Friends School also makes many non-curricular decisions regarding ESE such as having students work in a school garden each week and keeping composters in each classroom. Its physical location is within the woods, and as the science teacher noted, this helps the students to see the environment as a learning tool. As the science teacher noted, “I feel almost a trained behavior or trained respect that even though we are a school that’s tucked here in the woods, like some students need to be taught and reminded that we are a guest in this space as opposed to the outdoors is actually a guest for us.” Friends school staff also emphasize personal decision making when it comes to more standard environmental practices in their school such as paper recycling. As the Spanish teacher said, “I say that processing colored paper takes a long time, so my students know we do not waste colored paper.” Likewise, the reading teacher added, “I think having our trash can be specifically smaller than our recycling can and our compost sends the kids messages that we want them to have little waste.”

Discussion

Across the three schools, ESE came across quite differently. To frame these comparisons, we consider the six essential underpinnings of environmental education described by NAAEE (1999), as they represent broad and overarching ideas that cross traditional disciplinary boundaries. These are: Systems, Interdependence, The Importance of Where one Lives, Integration and Infusion, Roots in the Real World, and Lifelong Learning.

Systems

The NAAEE guidelines note that, “Systems help make sense of a large and complex world. A system is made up of parts. Each part can be understood separately. The whole, however, is understood only by understanding the relationships and interactions among the parts. (p. 2; NAAEE, 1999). Systemic factors influenced instruction at each of the three schools considerably. For example, at the Charter school, teachers often discussed the way in which they were limited in their ability to incorporate ESE more broadly by the school’s heavy curricular mandate on literacy and language arts. As the third grade teacher noted during the focus group, the curriculum is a “set story.” One teacher explained that they sometimes had to choose between teaching science or practicing phonics using a school-mandated program, “I feel like that [phonics] program in itself is what takes the science out of the day. And you just have to flip and choose. Are you going to teach science today, or are you going to teach [phonics program]? It’s kind of bad that you have to choose between the two, but it is what it is.” This intense focus on the language arts was echoed in the other schools’ discussions, yet there was less attention paid to the limitations of the systemic influence, and more to the possibilities for working within constraints--through “genius hour” and choice-based instructional activities at the public school or by taking advantage of the teacher-created curriculum at the Friends school. Yet, there was a generally understanding of the importance of literacy, as one Public school teacher shared: “literacy [is the school’s biggest focus] because reading is involved with everything. In order to do the math problems, you gotta know how to read. Especially the younger grades too, you have to have those strong skills in order to be successful everywhere else.”

Interdependence

The NAAEE (1999) emphasizes the, “inextricable link” between humans, the systems we create, and environment when describing interdependence. During some of the focus groups, the interdependent nature of systems came across. Yet, the idea of the interdependence between humans and nature or environment came across most clearly in the Friends school. Connecting

scientific and engineering concepts through service learning at their sister school in Spanish class allowed students opportunities to make multiple connections across content areas and geography. Similarly, working closely with a local farm in science class connected children to farming practices, social sciences and nutrition. Some of this notion of interdependence also came through in the discussion at the Public school, namely when the fourth grade teacher shared the way in which she integrates the school's energy monitoring into her science instruction as well--emphasizing the way humans can use the Sun's energy in their own design. These types of interdependent relationships were not shared during the Charter school discussion.

The Importance of Where one Lives (Place)

The NAAEE (1999) guidelines note that learners must first explore and connect with their immediate surroundings before understanding larger systems. The idea of place as an influence on ESE came across strongly in all three focus group discussions. At the Charter school, the teachers had no access to outdoor space or park within walking distance. This limited the teachers' abilities to connect children to their environment through instruction. Yet, the teachers each focused on ways in which the children could care for their place at school and reduce waste. The mathematics teacher noted, "I think we talk a lot in this school, that this is more than just a school. It is your home away from home so taking care of, and being aware of how you are treating our environment here, because as the kids get older their behaviors change a little than when they are younger." On the other hand at the Friends school, the teachers connected frequently to place, especially through science with outdoor instruction at a local farm or stream. The science teacher shared, "When I go out to the stream to teach, I have to get them to understand that this is our classroom, some students pick up on that and they know that they are in someone else's home." Likewise place was seen as important at the Public school, where many of the teachers noted that many of their students grew up on a lot of land or farms, and teachers agreed that there was value in planning instruction that built on this home-based knowledge.

Integration and Infusion

On page 3 of their guidelines the NAAEE (1999) described integration and infusion and suggested, "Disciplines from the natural sciences to the social sciences to the humanities are connected through the medium of the environment and environmental issues." Despite the expressed importance of language arts that each of the three focus groups discussed, they all noted examples of how integrated instruction provided opportunities for incorporating ESE along with teachers' passions and student interests. One charter school teacher shared, "I can pull an activity based out of science if I choose to- so I could make the kids write about the planet, write about how they are going to save the planet and I could use an opinion piece to have them write about recycling, even a persuasive piece." Similarly, a Public school teacher shared "Yesterday we were growing potatoes and I asked the kids what they wanted to grow, and I just think it's such an important skill, and people might ask how we have time for this, and you just have to plug it in somewhere during the packed day- to the 5 seconds you have here and the 2 minutes you have there and the morning meeting." This idea of integration and infusion came across clearly in the Friends school discussion, especially with regard to teachers' passions, as the Spanish teacher discussed her personal passion for science driving many of her of her instructional choices.

Roots in the Real World

In their description of the idea of roots in the real world, the NAAEE guidelines noted, “Investigation, analysis, and problem solving are essential activities and are most effective when relevant to the real world.” (p. 3) Through developing a sense of place, teachers at each of the three schools engaged in decision making that provided authentic real-world examples. At the Public school in particular, the teachers expressed an interest in helping children develop stronger connections to the real world around them, as the principal said “I think the challenge we have is the awareness of it so the kids put down the video games and do go outside. I think there is not a child who doesn’t have some sort of access to nature or peace there; it is just getting the appreciation and the understanding for what it is so they can really dive in.” Likewise the Friends school teachers tried to help the students understand some global differences to develop a deeper connection to the real world. For example, the Spanish teacher, when discussing a trip to their sister school in Guatemala explained, “we went back to Guatemala at the Sister School with the 8th graders. One of the things we did as we worked at the Sister School was we switched the normal lights to LED lights. The reason we did this at the very beginning was because my goal was to reduce the cost of electricity in the school. Electricity in third world countries is very expensive...when our idea was to switch the lights and reduce the electricity- it turned out that the lights we installed gave out twice the light that they used to have.”

Lifelong Learning

The NAAEE (1999) guidelines offer that habits of learning to facilitate lifelong learning, such as collaboration and problem solving are essential to environmental education. Though they might seem like small things, the non-curricular practices shared in discussions at all three schools such as recycling or turning off lights could provide the foundation for lifelong skills that children could carry with them into the future. Likewise the focus on things like energy use in schools at the Public school and connection between people and farms at the Friends school planted seeds for children to consider as they grow older and become decision-makers. The Charter school, though limited in their own outdoor space emphasized field trips and guest lectures to children who have little exposure to nature. These types of activities provide at least a minimal initial exposure to nature and environment, which could also serve as a seed for continued learning and action throughout the lifespan.

Conclusion

Across the three schools, ESE was valued and implemented, though in vastly different ways. The NAAEE framework for essential underpinnings revealed however, that each school was working along a trajectory to incorporate each of these six key areas. Though our findings aren’t terribly surprising--one might expect that a well-resourced private Friends school might engage in more sophisticated ESE practices than an urban rim Charter school with fewer resources--they do paint a picture of the variety of ways ESE plays out in elementary schools. These clear differences could be used to provide suggestions for future professional development efforts around ESE at each school- tailored to individual contexts and needs.

Much like the body of past research, we’ve found that the degree to which ESE is implemented in K-12 settings varies considerably, even among three schools that are choice-based, are near to one another geographically, and share reputations for excellence with regard to student achievement. Our study sheds light on beliefs and practices of teachers across three

different of schools, providing critical information about shaping future education for preservice and practicing teachers to develop strategies to engage in ESE effectively.

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ⁱ We use the term ESE to describe instruction that falls under any of the 15 currents in environmental and sustainability education identified by Sauvé (2005).

ⁱⁱ For the purpose of anonymity, we will refer to these schools simply as Charter, Public, and Friends