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Research on environmental action projects in teacher education is limited. Furthermore, projects that emphasize the role of citizens and governments in environmental problem-solving are scarce. The purpose of this study was to explore how participating in a political environmental action project influenced pre-service teachers’ environmental citizenship. Following the steps of Project Citizen, an international civic education program, pre-service teachers learned about and proposed policy solutions to address excessive energy usage at their university. Analysis revealed growth in the pre-service teachers’ environmental citizenship, including their self-efficacy, values awareness, and ecological and civics literacy. Through critical appraisal of their local energy-yielding system, the pre-service teachers recognized energy conservation as a cultural problem with local and global implications, furthering their commitment to action-oriented environmental education.

Keywords: pre-service teachers; environmental citizenship; political engagement; Project Citizen

Introduction

Teachers have the potential to greatly influence students’ environmental citizenry, particularly their knowledge, values, beliefs, and actions toward the environment (Desjean-Perrotta, Moseley, & Cantu, 2008; Hungerford, 2010; Yavetz, Goldman, & Pe’er, 2009). However, because Environmental Education (EE) is not mandated in many places around the globe, integrating it into the curriculum relies on teachers’ discretion and is based on their personal experiences and beliefs (Hart, 2003). Teachers who have limited experience participating in environmental citizenship will likely not include it in their teaching. Therefore, it has long been argued that teacher educators must prepare pre-service teachers to teach for environmental sustainability (Beckford, 2008; Brinkman & Scott, 1996; Ferreira, Ryan, & Tilbury, 2006, 2007; Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009; Gooch, Rigano, Hickey, & Fien, 2008; Hopkins & McKeown, 2001; United Nations Educational, Scientific & Cultural Organization (UNESCO), 1978, 2005; United Nations Educational, Scientific & Cultural Organization-United Nations Environment Program (UNESCO-UNEP), 1990).

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Short (2010) proposed that the aim of teacher education programs “should be to objectively explore those pedagogical methods that are most likely to translate into a citizenry of thoughtful, effective problem-solvers who make significant environmental impacts later in life” (p. 9). But what methods are useful for exposing pre-service teachers to environmental problem-solving? And how can teacher educators create conditions for pre-service teachers to respond to the cultural, historical, economical, and political complexities of environmental issues and perspectives that may oppose dominant social paradigms?

Gruenewald’s (2003) notion of a critical pedagogy of place calls for educational approaches that “consciously blend” critical pedagogy with place-based practices. Through this approach, educators and students learn to “read the world” around them by perceiving and acting on the social, political, and economical complexities of environmental situations (Freire 1970/1995 as cited by Gruenewald, 2003). Because environmental problems and the deterioration of ecological systems are rooted in sociocultural patterns, political practices, and/or global economic interests, it is important for teachers and students to learn how to effectively civically engage in environmental problem-solving by recognizing different positions and identifying alternative approaches. How citizens address socio-ecological issues has to do with their positioning, not only their geographical location but also their culture and life experiences. “Being in a situation has a spatial, geographical, contextual dimension. Reflecting on one’s situation corresponds to reflecting on the space(s) one inhabits; acting on one’s situation often corresponds to changing one’s relationship to a place” (Gruenewald, 2003, p. 4). Although Walker (1997) argued that critical theory is inadequate for environmental problem-solving because of its irrelevancy to teaching and learning practices, a critical place-based approach can overcome such concerns through fully contextualizing place-appropriate actions and solutions.

While teacher educators have attempted to revitalize the image of EE in their programs through the inclusion of environmental content knowledge and place-based practices, projects that engage pre-service teachers in critical action on contentious environmental issues are limited (Cheong, 2005; Esa, 2010). EE should go beyond infusing standards-based knowledge into general academic content areas; EE should be positioned as a “transformative educational discourse practice” allowing for “cultural competency and political participation” (Gruenewald, 2004, p. 72). Pre-service teachers are, for the most part, concerned about environmental problems. However, this “emotive reasoning” or “care perspective” does not always translate into engaging behaviors or actions (Lee, Chang, Choi, Kim, & Zeidler, 2012, p. 931). The complexity and scale of environmental issues makes it difficult for teachers, or citizens for that matter, to identify an entry point or recognize how to engage in environmental action. Hence, a goal of this paper is to propose a method for engaging pre-service teachers and students in environmental citizenry through analyzing and proposing changes in public policy. Projects of this sort are complicated, messy, and tend to exhibit a great deal of uncertainty, but as Gruenewald (2003, 2004) argues, this type of critical inquiry is exactly what EE should do in order to break free of the standardized one-size-fits-all educational mode, that promulgates a disregard of people, place, and the environment.

This paper reports on a political action project conducted by students enrolled in an environmental education course in a university in the Northern Rocky mountains region of the US. The project goal was twofold, it provided (1) an opportunity for pre-service teachers to personally engage in transformative environmental citizenry.
through sustained action and (2) a model for teaching students how to engage in critical pedagogy of place by considering the complexity and politics of a local environmental issue, an approach that they could implement during their professional careers. Utilizing the Project Citizen curriculum as a vehicle for facilitating the project and the Berkowitz, Ford, and Brewer’s (2005) framework of environmental citizenship to analyze the outcomes, this study explored the following research question: How does participating in a political action project influence pre-service teachers’ environmental citizenry and teaching practices?

Related literature

Action is at the heart of EE. Beginning with the 1977 Tbilisi Declaration, EE includes an emphasis on problem-solving and pro-environmental behaviors (UNESCO, 1978). EE focuses on developing learners who are not only knowledgeable about the environment, but who also possess the “practical skills required in the devising and application of effective solutions to environmental problems” (UNESCO, 1978, p. 14). Indeed, the ultimate goal of EE should be to cultivate active environmental citizens (Berkowitz et al., 2005; Short, 2010).

Defining environmental citizenship

Environmental citizenship includes an understanding of ecological issues (Gabrielson & Cawley, 2010; Gebbels, Evans, & Delany, 2011), the rights and responsibility of citizens within political communities (Clarke & Agyeman, 2011; Gilbert & Phillips, 2003; Latta, 2007), and action, to not only address environmental issues but also to promote positive and sustainable human interactions with the environment (Berkowitz et al., 2005; Ellis & Waterton, 2004). This study embraced Berkowitz et al.’s (2005) definition of environmental citizenship “as having the motivation, self-confidence, and awareness of one’s values, and the practical wisdom and ability to put one’s civics and ecological literacy into action” (p. 228).

Berkowitz et al.’s (2005) framework of environmental citizenship includes five overlapping components:

- **Civics Literacy:** understanding key social, economic, cultural, and political systems using requisite critical thinking skills.
- **Ecological Literacy:** understanding key ecological systems using sound ecological thinking, while also understanding the nature of ecological science and its interface with society.
- **Values Awareness:** awareness of personal values with respect to the environment, and ability to connect these values with knowledge and practical wisdom in order to make decisions and act.
- **Self-efficacy:** having the capacity to learn and act with respect to personal values and interests in the environment.
- **Practical Wisdom:** possessing practical wisdom and skills for decision-making and acting with respect to the environment (p. 230).

The framework illustrates the overlap between ecological literacy and civics literacy, which constitutes environmental knowledge, with the double arrows signifying how the development of environmental knowledge may also promote the wisdom...
and skills to act. The framework does not promote a particular sequence, rather it recognizes “multiple entry points for teaching environmental citizenship” (Berkowitz et al., 2005, p. 231). The framework was used to explore the environmental citizenry of pre-service teachers in this study. Action, the core component of Berkowitz et al.’s (2005) model, included the pre-service teachers’ participation in Project Citizen. In the following sections, initiatives and research related to EE in teacher education are reviewed and related to the components of Berkowitz et al.’s (2005) environmental citizenry framework.

**EE and environmental citizenship in teacher education**

Teacher education has been a priority in environmental and sustainability education for over 30 years (Gough, 2009). Early recommendations were made at the 1977 Tbilisi Intergovernmental Conference on Environmental Education underlining the “need for all teachers to understand the importance of environmental emphasis in their teaching,” thus recommending to member states that “environmental sciences and environmental education be included in curricula for pre-service teacher education” (UNESCO, 1978, p. 35). Again in 1990, the international community declared teacher professional development in environmental sustainability education as a “priority of priorities” (UNESCO-UNEP, 1990, p. 1), and in more recent years, recognition of the vital role of teacher education was asserted in the Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability (UNESCO, 2005).

Despite the claimed importance of the inclusion of environmental sustainability in teacher education programs, efforts across the globe have varied and for the most part have experienced a “universal lack of success” (Gough, 2009, p. 1). While some nations are making environmental and sustainability teacher education a priority, see, for example, Australia (Ferreira et al., 2006, 2007, 2009; Gooch et al., 2008), efforts in many countries, including the US, are limited to individual teacher education programs and a small number of courses within those programs. For the purpose of this article, a brief review of environmental and sustainability education approaches in teacher education are provided. In general, these approaches appear to possess one or more of the following: (1) promotion of ecological and environmental literacy, (2) emphasis of place-based practices, and (3) involvement in civic engagement and/or problem-solving.

Researchers have studied pre-service teachers’ environmental knowledge in order to argue the importance of integrating ecological literacy into teacher education (Cutter-Mackenzie & Smith, 2003; Desjean-Perrotta et al., 2008; Effeney & Davis, 2013; Pe’er, Goldman, & Yavetz, 2007; Yavetz et al., 2009; Zak & Munson, 2008). For instance, Desjean-Perrotta et al. (2008) employed drawings and sentence completion tasks to investigate pre-service teachers’ understandings of environmental issues; they reported a lack of base knowledge that prevented these students from being considered environmentally literate. Others have confirmed these results, namely pre-service teachers’ deficient conceptual understanding of key ecological concepts (Cutter-Mackenzie & Smith, 2003; Zak & Munson, 2008). While these studies reveal a need to develop pre-service teachers’ scientific understanding of ecological systems, Effeney and Davis (2013) argue that pre-service teachers’ skills in accessing a wide array of information via the internet and through other technological means may make their lack of ecological knowledge less of a limitation than it
was in the past. In other words, framing projects for pre-service teachers to refine their skills in researching valid and reliable sources of information, such as presented in this study, may be just as important, if not more, than pre-service teachers’ possession of thorough background knowledge of key ecological topics.

Further, Berkowitz et al. (2005) emphasized the inclusion of humans within ecological systems. Teachers should become familiar with “unique organisms, biological communities, soils, landforms, climate, human institutions, and cultures near one’s home,” while also understanding how materials and resources are gathered and dispersed both locally and globally in order to sustain human existence (Berkowitz et al., 2005, p. 236). In recognizing humans as an integral part of ecological systems, teacher education initiatives should also promote a sense of place (Berkowitz et al., 2005). “Place-based” initiatives refer to programs that emphasize the inclusion of the immediate environment and/or community (Gruenewald & Smith, 2008). Integrating a place-based approach encourages pre-service teachers to (1) form a sense of identity with the ecological, social, cultural, and geographical aspects of their place and to (2) localize their lessons and units (Ebersole & Worster, 2007). For example, some programs require pre-service teachers to volunteer in community ecological settings in order to foster specific scientific knowledge and understanding of the culture (Borgelt, Brooks, Innes, Seelander, & Paige, 2009; Meichtry & Smith, 2007). Meichtry and Smith (2007) found that exposing teachers to the ecology and culture of a local watershed positively impacted their attitudes toward the environment and their confidence including place-based lessons in their teaching. Alsop, Dippo, and Zandvliet’s (2007) Global Community initiative, demonstrated similar results through teaching pre-service teachers to integrate the regional social and physical constructs into instruction. Place-based approaches in teacher education support future teachers in developing both a personal connection to their place and professional understanding of using place as a setting for environmental learning.

In surveying the literature on civic environmental action in teacher education, Chawla and Cushing (2007) argue that both an ecological understanding of place and civic literacy are essential for environmental action. Civic literacy includes an understanding of sociocultural and political systems and one’s ability to “participate in society responsibility” (Berkowitz et al., 2005, p. 231). Short (2010) further defined civic behaviors as those demonstrated in private and/or public spheres. Private behaviors stem from personal awareness of values and are demonstrated through consumer or ecosystem actions (i.e. buying green or recycling), while public behaviors tend to result in collective engagement and are frequently demonstrated through political or activist outcomes (i.e. participating in an environmental campaign). Both types of behaviors reflect environmental action; the first represents ongoing personal efforts and the latter is geared toward larger problem resolutions.

Research on civic environmental action in teacher education is scarce. Cheong (2005) employed Community Problem-Solving Projects with pre-service teachers. Project participation revealed growth in the pre-service teachers’ knowledge, skills, and actions for a sustainable environment; the pre-service teachers also reported positive changes in their environmental attitudes and behaviors. In Esa’s (2010) study, pre-service science teachers demonstrated a high level of self-efficacy in the integration of Education for Sustainable Development (ESD) practices; content knowledge was also an important element in accomplishing the ESD goal. Gooch et al. (2008) emphasized the importance of having pre-service teachers develop
integrated unit plans to promote action-oriented sustainable teaching practices. Their study revealed that pre-service teachers generally struggled with articulating their own beliefs and aligning their beliefs with outcomes that promoted sustainable behaviors. Thus, revealing a “clear need for pre-service teachers to receive explicit guidance in developing plans that empower students to act in environmentally responsible ways” (Gooch et al., 2008, p. 185).

This study extends the call to emphasize environmental action in pre-service teacher education by highlighting a method for engaging pre-service teachers in environmental citizenry through the monitoring and influencing of public policy. As Stevenson (2007) points out,

Environmental reform is political (no position is politically or socially neutral). Therefore, if students [and pre-service teachers] are to be capable of acting on their choices and influencing environmental decision making, then environmental education must incorporate the development of students’ knowledge of the political-legal process and skills in political advocacy. (p. 144)

**Project Citizen and environmental action**

In our EE course, we used Project Citizen as a critical place-based action-oriented approach for integrating environmental citizenship in teacher education. Project Citizen provides a method that allows students to grapple with the social, cultural, economical and political complexities of their place, while also forcing them to examine how their own experiences and background shape their engagement in democratic processes. Project Citizen has been used in over 30 countries worldwide, including emerging democracies, and promotes a sense of agency “by giving students a vehicle to influence and monitor public policy” (Center for Civic Education, 2009). Students first identify controversial issues in their community. They then gather background research, which includes understanding diverse perspectives and the various dimensions of a problem. The project results in a public policy solution that includes alternative approaches and a course of action. Figure 1 outlines the

![Figure 1](image-url)
steps of Project Citizen. Coupling place-based EE with civic literacy enables students to recognize ways to politically participate in environmental decision-making within a specific context.

**Research design**

A qualitative case study approach was used to investigate how pre-service teachers engaged in political action to address a community-based environmental issue during and following an environmental education course at a US public university. For this research, a case study was deemed appropriate given that we were investigating the implications of a particular project with pre-service teachers as a single unit of analysis (Merriam, 2002), also referred to as a “bounded system” of people and programs (Stake, 1995, p. 2). Additionally, case studies are generally selected because of the “experimental” or “unique” nature of a particular program (Merriam, 2002, p. 8). Our literature review revealed that limited research has been conducted on using Project Citizen as a method for influencing pre-service teachers’ environmental citizenry (Kvieskienė, 2006).

Furthermore, political positions, economic interests, and cultural practices of the particular place all factor into the uniqueness of this case. The study took place at the only four-year university in a politically conservative state, where nearly two-thirds of the state’s revenue is generated from energy production, mainly coal and natural gas. There is a growing market for wind energy; however, this has been controversial partially due to the unaesthetic appeal of large wind turbines in a state that prides itself on its natural beauty. A growing interest in natural resource management, particularly related to energy development, has been and continues to be a pressing issue among state lawmakers, political agents, and citizens. Within the state, there also exists a culture termed, “rugged individualism” which is reflected to a large extent in the state’s conservative political and social culture (Schuhmann, 2012). This western idealism implies less government, more self-sufficiency, and more responsibility for oneself. Within this individualistic culture, and given that a large percentage of university funding comes from natural resource revenue, a project aimed at addressing public energy usage carried a degree of controversy.

**Participants**

Participants included all of the undergraduate students enrolled in an environmental education course for teachers. Of the seven pre-service teachers enrolled in the course, one was majoring in secondary science education, while the others were majoring in elementary education with an emphasis in environmental studies. These pre-service teachers were unique in that they represented a small minority of education students who declared an environmental studies concentration in their program. The three-credit “Environmental Education for Teachers” course was the required capstone for those particular students; it was also offered as an elective. The class provided an introduction to the philosophy, methods, and content of EE, in addition to the political action project designed around the Project Citizen curriculum. At the beginning of the course, the participating students were informed about the purpose of the study; they completed and returned a project consent form approved by the university Institutional Review Board office.
**Methods**

The case study drew upon the qualitative approaches designated for studying educational programs described by Merriam (1998). Although quantitative measures (i.e., surveys, statistical analysis) may be used in case study research, our approach relied strictly on holistic qualitative methods in an attempt to view the “case as a whole” (Verschuren, 2003, p. 126). This approach took into account the open-ended nature of Project Citizen and how the group of pre-service teachers engaged in the process as a whole. In other words, it was not our attempt to segment or fragment the pre-service teachers’ experiences; rather, we recognized and sought to identify the inter-related experiences that influenced their environmental citizenry.

Merriam (2002) points out that it is not uncommon for case studies to be combined with other qualitative methods. In this study, narratives were used to tell the story of pre-service teachers’ experiences. Narrative data were collected through oral and written methods including writing prompts, group discussions, emails, focus group interviews, and observations. A variety of data sources provided a more holistic picture of their experiences.

At the beginning of each class, the pre-service teachers were provided with writing prompts for reflection. Balgopal, Wallace, and Dahlberg (2012) found that writing prompts promote a “higher level of ecological literacy” by encouraging pre-service teachers to think about and respond to environmental issues (p. 5). The three instructors (researchers) met between class sessions to discuss the outcomes of the previous class and to develop questions based on the pre-service teachers’ responses. For example, after interviews with community members were conducted during the initial steps of the project, the pre-service teachers were asked what they learned from their interviews and what information they still needed. Pre-service teachers were encouraged to reflect on the discourse of their actions, particularly the supportive and oppositional engagement with entities and people within the university setting. Through reflection, the pre-service teachers revealed the shifting nature of their positions, from being passive bystanders to active agents of environmental change. Writing prompts allowed for individual feedback prior to more in-depth whole-group class discussions.

During (video-recorded) class group discussions, the pre-service teachers further debriefed their progress and sought feedback from their peers and course instructors. Whole class discussions provided a supportive environment amidst the difficulty in gaining complete information from university representatives in their data collection on energy use by the institution. Often there was ambiguity in what to do next, whom to talk to, or even how to approach informed parties. New understandings were gleaned through sharing their experiences. Class discussions also served as a means to frame further questions and plan for subsequent project activities.

Along with group discussions, emails were used as a data source, as well as a communication tool between the pre-service teachers, the course instructors, and members of the university community. Between class sessions, it was not uncommon for a pre-service teacher to email one of the instructors in order to seek guidance and reassurance about project-related initiatives.

Two semesters after the course concluded, four of the pre-service teachers volunteered to participate in three follow-up focus group interviews. Now juniors or seniors, these four pre-service teachers expressed a keen interest in continuing to pursue action related to the project. Thus, these (video-recorded) focus groups were
held informally with the researchers, and provided the opportunity for the pre-service teachers to debrief the project experience, express their ongoing interest, and devise action-related measures to further pursue problem solutions. In turn, the meetings provided a means for the course instructors to support the pre-service teachers in subsequent project-related initiatives, including a presentation at a regional environmental justice symposium.

In a qualitative case study, researchers are frequently immersed in the field observing and interpreting the “workings of the case” (Stake, 1995, p. 8). As the course instructors and researchers, we were positioned to not only facilitate the pre-service teachers through the process of Project Citizen, but also to pose critical questions, affirm their continued participation, and encourage the refinement of their environmental citizenry. Although the goal was to provide the pre-service teachers with a sense of autonomy and ownership as they navigated through the project, our support was crucial in steering the pre-service teachers through the socialcultural and political dimensions of environmental and civic problem-solving.

**Data analysis**

Berkowitz et al.’s (2005) framework for environmental citizenship (Figure 2) was used as a framework to explore the pre-service teachers’ environmental citizenry. Utilizing what Saldaña (2009) refers to as domain coding, the three researchers individually categorized the data, both written and oral responses, into the pre-established domains of the model (i.e. civics literacy, ecological literacy, values awareness, and self-efficacy). The fifth domain, practical skills and wisdom, was demonstrated through activities such as interviewing, taking notes, and developing visual and oral presentations throughout the pre-service teachers’ participation in Project Citizen. Therefore, this domain (practical skills and wisdom) of the environmental citizenry model was woven throughout the results. During analysis, and as indicated in Berkowitz et al.’s (2005) definition of self-efficacy as one’s “capacity to learn and act with respect to personal values and interests in the environment,” we

![Figure 2. Overlapping components of environmental citizenship (adapted from Berkowitz et al., 2005, p. 230).](image-url)
recognized the difficulty in separating the pre-service teachers’ values from their self-efficacy (p. 230). Therefore, data that fit into these two categories were combined in order to show how the pre-service teachers’ self-efficacy evolved in this case through the clarification of their own values and the values of others.

Because of the overlapping nature of the environmental citizenship framework, it should be noted that much of the data could easily fit into more than one domain. Differences in categorization were discussed and negotiated among the researchers. Through a second cycle of coding, the various sources of data were compared to analyze the consistency of responses from individual participants and to compare responses among participants in order to identify common themes within each domain.

Results

Civics literacy: understanding of public policy and civic responsibility

What is public policy? Who can give me an example?

When the instructors introduced public policy to the pre-service teachers, their initial silence indicated that they had limited exposure to this concept. Only two of the pre-service teachers attempted to engage in the discussion, responding that public policy entailed a “collective impact” and included “the rules of the town, like city council.” The class was also asked to consider how policy was determined at their university. Although one pre-service teacher replied “the university council,” there was uncertainty regarding who represented the council, how decisions were informed, and what the policy process entailed.

In the “political approach” to environmental problem-solving, citizens work “within the political system to improve decision-making” (Stevenson, 2007, p. 143). The pre-service teachers initially lacked full understanding of their local political systems, and previous educational experiences had never allowed them to approach environmental concerns through political processes.

The pre-service teachers broke into small groups to brainstorm local public policy problems. Personal concerns were attached to the initial problems identified. One group explained the lack of a city recycling program, “they don’t do pick-up and for a lot of people that is just too much of a hassle to find a drop-off location.” Another group discussed bike lane accessibility. One noted that riding a bike around town “gets a little sketchy. You are not supposed to ride on the sidewalk, and it is difficult to ride in the winter.” Conserving energy on campus was the third problem identified. The group argued that “new buildings should be constructed with motion-detector lights” because it would save energy and money.

Their first assignment included conducting five surveys to gather public opinion about their problems. These surveys were used to determine how their fellow students, faculty, and community members perceived the issues and whether or not they should be addressed through the private sphere or governmental agencies (Center for Civic Education, 2007). Based on their findings, the pre-service teachers voted to pursue the issue of energy usage on campus “because it was on a smaller scale,” concluding that, “bike lanes did not seem attainable,” and community recycling appeared unresolvable at that time. They also identified potential support from on-campus groups, including student and faculty sustainability committees, the School of Environment and Natural Resources, and physical power plant personnel.
At first, some pre-service teachers were reluctant to buy into the project, but as they gathered information through interviews, they were triggered into action by enthusiastic faculty and staff environmental advocates.

[My] interview went well, had lots of knowledge about residence hall lighting … very informative … gave good suggestions on how to create change and where it is needed.

On the other hand, some students’ interactions with others were not so encouraging, perhaps because of their selection or reticence of interviewees, or their lack of experience with this type of critical engagement.

I feel like time is running out fast, and people are not responding …. The process is important because an interview, with the correct people, gives us reliable resources.

In this case, we found that students’ past experiences fed into their variant approaches to reading the world around them. However, all of the students experienced some challenges in the processes of civic and political engagement.

At first I was tossed around a lot between people, before I was helped by one.

By working together through uncertainties, such as brainstorming interview questions in class, the pre-service teachers carved their way through the complexities of environmental problem-solving. At the same time, they gained practical skills in interviewing through realizing that although some questions could be planned ahead, more often than not, new questions arose during conversations.

It is all about learning and it has a domino effect – one question leads to new information, new ideas and more questions!

Initially, the pre-service teachers believed that their proposed policy should address logistical matters such as installing new energy-efficient light bulbs and motion-detector lights. After further investigation, they learned that this policy already existed; however, what was needed was an educational policy that promoted energy-saving behaviors among university students, faculty, and staff. Taking an active role within the public sphere (Short, 2010), the pre-service teachers devised a plan that supported upgrading technology and also included education, as outlined in their policy proposal (see below). At the culmination of the project, they presented their policy to university decision-makers, which also included defining the energy usage problem, analysis of alternatives, and their course of action.

We support the current work that is happening, the physical plant is currently changing light bulbs and ballasts. They are also installing occupancy sensors that detect when people are not in an area and turn the lights off … This is a good start, but it does not address the issue of wasting energy … [Our] proposal would include a short lesson … on simple ways to save energy and the consequences of using energy. This lesson would enlighten every incoming freshman on things they can do every day to help reduce the energy at the university. This lesson would also be presented at faculty retreats for every department … [Our] proposal … includes an advertisement campaign that would set posters out across the campus to reach … all of the people of the university … to always remind people of their obligation to help the planet.

The pre-service teachers strategically wrote an educational policy that included a plan to reach various sectors of the university community. The aim was to weave lessons into faculty, staff, and student orientations, so that all would receive tips on energy conservation. Although the outcome of the project resulted in a policy
proposal, one pre-service teachers’ final reflection indicated that she had not fully grasped the scope of public policy.

I believe in less government, and so I think it was a great idea to address this project from an education perspective. This does not require laws and policies; it requires people to take responsibility themselves, rather than relying on others to do it for them.

Her questioning of the relationship between policy and education may have been due to her limited experiences with this type of political engagement, or, perhaps, this comment demonstrated her cultural/political position within the ideals of “rugged individualism.” (Schuhmann, 2012).

**Expanding ecological literacy**

At the beginning of the project, the pre-service teachers had a general understanding of key ecological systems, particularly by identifying coal as a nonrenewable resource and understanding how energy production and its use is related to local and global environmental concerns.

Our use of energy is not a renewable source. It will soon run out. When we drill for these fuels we destroy the wilderness around us. This drilling removes the habitat … where animals and plants live. When we burn these fossil fuels to create energy we cause global warming … There might not be enough fossil fuels for the next generation.

While the concern, echoed by most of the pre-service teachers, reveals what Lee et al. (2012) referred to as “emotive reasoning” toward energy development, the comment also seems somewhat placeless, in that it could be generalizable to a number of locales within our industrial world. Initial understandings did not yet demonstrate the complete picture, or the many parts that comprise their local structure.

Through engaging in project-related research, the pre-service teachers were positioned to grapple with the energy system at their university, including the technological, economical, and human components.

Before I did not know where the electricity came from and how much was used on lighting.

The pre-service teachers learned that the campus’s primary fuel source was coal, with the university consuming approximately 23,000 tons of coal annually to operate its steam boiler system. One instructor was surprised as she began to take notice of the large trucks that delivered coal daily to the university physical power plant. Along with understanding how energy was produced, the class learned how energy was dispersed and conserved through lighting technology, motion-sensor detectors, and other university facilities’ initiatives.

Process was not just the goal or outcome but it was what we learned about lights and wattage, the science. Incredibly changed my understanding! From different types of light bulbs to change use of fixtures, technology I was unaware of, and how easily caring can make a difference.

Their ecological literacy grew not only in terms of the science, but also in terms of human investment. In the comment above, the pre-service teacher began by describing her growing awareness of innovative technology and ended by revealing how caring necessitates the move toward sustainable advancement (Berkowitz et al., 2005).
In their policy analysis, the pre-service teachers also weighed the economic and environmental costs of energy use.

The university … spends about six million on electricity each year. For every 1000 watts of lighting used, 2.5 to 3 lb of carbon is released into the atmosphere.

When presenting their proposal, the pre-service teachers argued the importance of their policy by comparing existing energy costs with potential savings, should the university community commit to energy-reducing behaviors.

The project placed the pre-service teachers in a position to interrogate the complexities of their university energy-yielding system. Although they did not become energy experts, political engagement coupled with new ecological understandings were sufficient for developing an educational policy and campaign. Furthermore, as their civic and ecological literacy grew, they became more aware of their own values and willingness (self-efficacy) to engage in energy-conserving behaviors.

**Developing values awareness and self-efficacy**

From the onset of the project, the pre-service teachers’ personal values helped determine their problem selection and the effort they invested.

My own values have shaped this project because since I have been at the university I have noticed that lights are being overused.

Several pre-service teachers lived in the dorms and wondered why the hallway lights remained on throughout the night. Additionally, they questioned why stadium lights were left on in the absence of people and activity. One pre-service teacher reflected on how childhood experiences shaped her engagement.

This project affected my values. I remember being given the job of turning off the lights in my house when I was little so that value of light energy was instilled in me. Therefore, my approach to this project was a bit because of that. It gave an active approach to personal use.

Through interviewing community members, the pre-service teachers gained insight into other perspectives and behaviors toward using energy. They identified opposing viewpoints, clarified their own, and eventually formed partnerships with people who promoted energy-reducing behaviors.

You have to put it into perspective where people are experiencing the energy issue. I had one interview that said it is not a problem; he is in a new building on campus.

This pre-service teacher recognized that her interviewee’s perspective was based on being housed in a “green” building. Others were more concerned about energy because they worked in campus buildings that operated on older technology (i.e. fluorescent lights and boiler heating systems). Still other community members supported the pre-service teachers with their project because of their passion for the environment.

Realizing people’s passionate view on greenness, also, the ability for a group to voice their opinion on a subject and have support from all different people.

The pre-service teachers formed partnerships with like-minded community members. A physical plant employee volunteered to co-present with the pre-service
teachers at an environmental justice symposium. He provided a demonstration on energy-reducing behaviors, which was video-recorded for future educational use.

Similar to findings from other environmental action projects in teacher education, we found that through action the pre-service teachers clarified their own values and made commitments to change personal behaviors (Cheong, 2005).

It was hard for me to get involved in this project because I have not often been concerned about turning out the lights, but I quickly changed my viewpoint. I learned how important saving energy is and how easily energy is wasted. I now turn off the lights and unplug things a lot more.

This project has gotten me to change the things I do. I never use the elevators … I think I am already making a difference.

Project engagement allowed the pre-service teachers to move into a critical pedagogy of place, in that through examining their own position and the position of others, they began to question their local culture, which is why they developed an educational policy (Gruenewald, 2003).

Collecting information really allowed me to see that this really is a problem, and a cultural problem. It allowed me to see and notice every time energy is being wasted and change my ways and others … Simple things such as turning off lights when you no longer need them and unplugging computers can greatly reduce the amount of energy being consumed. These are some of the points we would like to educate people about.

Two semesters after the EE course concluded, four of the seven pre-service teachers demonstrated their continued enthusiasm for the project by volunteering to present at a local environmental justice symposium. During their presentation, the pre-service teachers demonstrated what Stevenson (2007) termed a “socially critical approach” by comparing the unequal distribution of energy resources between the US and developing countries. Framing energy use as both a public policy problem
and a social justice issue fueled their determination to educate others about ways to conserve energy. Figure 3 illustrates the evolution of the pre-service teachers’ values and self-efficacy.

*Education for the environment*

Although the scope of the research did not allow for a thorough study of the pre-service teachers’ professional practices within K-12 schools, their final reflections suggested their commitment toward including this type of project in teaching. Furthermore, all of the pre-service teachers voiced how Project Citizen could engage students in environmental citizenry in their school or community. Others recognized the value of “real world” problem-solving, making “a difference,” and fighting passionately for “what they want.”

The value is teaching through process – students fully experience what it takes to create policy – therefore they understand more thoroughly. I would encourage my students to observe within the classroom or the school and develop ideas about environmental changes they would like to see implemented. Then I would work through the process with them, while making connections with various other subjects.

The reflection above belonged to a pre-service teacher who took her experience one step further in facilitating Project Citizen with fourth-grade students, while student teaching, to address littering on school grounds. She made connections across the curriculum through critically engaging students in state environmental issues, surveying and calculating degrees of community concern, and observing congressional decision-making at the state capital. Perhaps, this is what Grunewald (2003, 2004) envisioned in education that extends beyond the scope of “placeless” standardized instruction.

Finally, as their policy focus became clearer, the pre-service teachers clung to the importance of environmental education. Although the policy they proposed was not officially adopted, they continued advocating for energy conservation beyond the course requirements. Indeed, this demonstrated their environmental education resilience in their ongoing commitment to critically interrogating the implications of cultural patterns and political practices (Grunewald, 2003).

**Conclusion**

This study resulted in four major outcomes that attest to the positive impact of engaging in political action on the pre-service teachers’ environmental citizenry and professional development.

First, in the area of civics literacy, the pre-service teachers learned how public policy could be used to address an environmental issue through the processes of (1) seeking public opinion, (2) engaging with officials to understand existing policies, (3) developing a new policy, and (4) presenting their plan to decision-makers. Through their interactions with others, the pre-service teachers gained confidence, which allowed them to authentically engage as informed citizens at their university.

Second, through critical inquiry, the pre-service teachers’ ecological literacy evolved from a generalized to a place-specific understanding, particularly in regards to the social, economical, political, and cultural intricacies of their energy-yielding system and the human roles within that system. For instance, they questioned
university energy usage that could be eliminated or at least reduced. They learned how economic interests weigh into proposed solutions. Furthermore, disparities between privileged and underprivileged cultures helped them to recognize energy consumption as an environmental justice issue, which furthered their passion to educate community members to consciously commit to energy-saving behaviors.

Third, through project participation, the pre-service teachers became more aware of their own values and the values of others, which prompted their sustained action on behalf of an environmental problem. Evidence of their genuine involvement extended beyond the project framework, with the pre-service teachers personally committing to energy-saving behaviors such as taking the stairs instead of the elevator, turning off lights, and riding bicycles. Furthermore, after the course concluded, they sought additional opportunities to teach others about energy-reducing solutions through presenting at an environmental justice symposium and producing an educational video to extend their outreach efforts.

Fourth, the pre-service teachers indicated their professional commitment toward action-oriented EE by devising an educational policy and campaign. All the pre-service teachers reflected on the value of implementing environmental action projects in their classrooms. One demonstrated her commitment through facilitating a project with fourth-grade students.

Further implications

Research on environmental action projects in pre-service teacher education is limited. Furthermore, projects that emphasize the role of citizens and government in environmental problem-solving are scarce. This study expanded the literature by outlining a method that prompted pre-service teachers to engage in critical appraisal of energy usage and policy at their university. The Project Citizen framework provided an entry point for engaging pre-service teachers in environmental citizenry and provided a model that they could use throughout their professional careers. As the results of this study showed, and Berkowitz et al. (2005) pointed out, it is through taking action that one’s values and commitments and self-efficacy to act are refined. While Project Citizen provided the pre-service teachers with the means to initiate action, their action did not end at the conclusion of the project. Instead, their political participation was combined with a social critical perspective, through listening to a variety of viewpoints, proposing local policy solutions, and framing their issue as environmental justice in a global context.

As in all teaching/learning experiences, we noted that among the pre-service teachers there were varying degrees of understanding, commitment, and participation. Grasping the concept and role of public policy was challenging, especially given the fact that none of our pre-service teachers had ever been exposed to this type of political participation. However, in the end, all grew in environmental citizenry, and their combined efforts produced a compelling and informed public policy.

Furthermore, the results of this study reveal the possibilities of transformative environmental education for preparing teachers to move beyond the standardized one-size-fits-all curriculum. If we want teachers to connect students to the natural environment and their communities, then it is important to expose all future teachers to community action projects that prompt them to critically appraise the complexities, cultural patterns, and politics that promulgate ecological problems. Based on
our experiences using Project Citizen in teacher education, first in this EE course, and later in a case study of humanities methods course where we engaged pre-service teachers in facilitating projects with elementary students, we strongly believe that this type of engagement helps pre-service teachers discern their own values and actions in regards to local environmental issues. We argue that pre-service teachers should be exposed to these types of projects, which permits them to participate in authentic democratic processes, understand the role of government in environmental problem-solving, engage in critical pedagogy of place, and embrace their responsibilities as environmental citizens.

Disclosure statement

No potential conflict of interest was reported by the authors.

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