

## **Teaching for Sustainability in a Social Studies Methods Course: Opportunities and Challenges**

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The teaching of environmental sustainability was explored in five sections of an elementary social studies methods course with pre-service teachers. Using surveys and structured discussions, we identified pre-service teachers' beliefs about environmental sustainability in response to prior experiences, course readings, films, guest lecture, and group activities (e.g., simulations). Findings suggest the subjects' knowledge of environmental sustainability increased as a result of the course. They believed environmental sustainability is a significant global issue meriting attention in the elementary classroom; however, they felt ill prepared to teach sustainability issues to young children in developmentally appropriate ways. Finally, pre-service teachers expressed caring about improving their own consumer behaviors and sought concrete solutions from others in order to do so. Implications for elementary social studies education are discussed.

*Keywords:* elementary social studies, environmental sustainability, pre-service teachers, teacher preparation, sustainability education

Sitting in small groups, elementary pre-service teachers (PSTs) discussed their reactions to the documentary film *Bag It* and a subsequent guest lecture by a local scientist who researched plastic marine debris in the so-called "Great Pacific Garbage Patch" with Captain Charles Moore, the oceanographer who first discovered its existence in 1997. The largest of the world's trash vortexes, the Great Pacific Garbage Patch is located in the North Pacific Gyre. Due to powerful ocean currents, marine debris becomes trapped and accumulates over time. Because plastic photodegrades (rather than biodegrades), plastic breaks down into tiny pieces called microplastics. The Great Pacific Garbage Patch is comprised primarily of such microplastics, as well as other debris, 80% of which derives from a land-based source. This implies that an improperly discarded plastic bag in California, for example, could make its way into the Pacific Trash Vortex, ultimately harming the wildlife, ocean environment, and even humans who consume seafood that ingest microplastics, mistaking them for food (National Geographic Society, 1996-2015). "I feel kind of guilty," one student remarked. Another agreed: "It's one of those things where you don't really think about it until you're actually seeing it... that it's real life. I feel like everyone should have to watch [*Bag It*] to make it come to life for them as well."

As teacher educators, we seek opportunities to make global issues come to life in our social studies methods course. Situated near the Atlantic Ocean, our university houses a renowned marine research center and active student chapter of the Surfrider Foundation<sup>®</sup>. The teaching of environmental sustainability, thus, is a well-matched component of our elementary social studies methods course in relation to the local and university climate. In our course, we model pedagogical practices and use resources to teach systems thinking, to illustrate the causes and effects of human-environment interaction, and to explore opportunities for children to take

informed action in meaningful ways. As a result, pre-service teachers experience our approach as learners while also considering their future teaching.

We describe our efforts to infuse sustainability education, including opportunities for cross-subject integration, in our undergraduate elementary social studies course. Traditionally, the studies of sustainability issues and solution-oriented teaching have been consistently prominent in elementary science standards initiatives (e.g., Next Generation Science Standards, NAGS Lead States, 2013) and science education research (e.g., Forbes & Zing, 2011; Hidings & Frazier, 2009; Moseley & Utley, 2008). Environmental sustainability, however, also is located in the social studies curriculum. Sustainability topics, for example, are found in standards for geography, history, and global citizenship (NCSS, 2012). As integrated instruction often provides relevance for students' lives (Muthersbaugh & Kern, 2012), and environmental sustainability is interdisciplinary by nature (Kissling & Barton, 2013; Muthersbaugh & Kern, 2012), cross-subject integration affords elementary teachers the ability to address sustainability concepts and skills across traditionally discrete disciplines, which is a primary goal of our work as social studies educators. We assert the elementary social studies methods course, which brings together academic content and pedagogical practices, can offer a space for PSTs to consider how environmental sustainability can or should be taught (Heimlich, Braus, Olivolo, McKeown-Ice, & Barringer-Smith, 2004; Powers, 2004) in the elementary curriculum. pre-service teachers' beliefs, as suggested within the literature, significantly impact what they do in the classroom (Merryfield, 2012; Pajares, 1992; Sanger & Osguthorpe, 2011) We submit, therefore, that it is our duty to present pre-service teachers with experiences in sustainability education for the purpose of informing their habits and classroom practices before they become licensed teachers. We also aim to prepare educators as citizens who are (a) knowledgeable about sustainability issues (e.g., water use and sanitation; plastic pollution); (b) committed to exploring these issues with children using diverse approaches; and (c) empowered to take individual or collective action (Hicks & Holden, 2007).

Through an interdisciplinary course design, the elementary social studies methods course can position participants to identify and to articulate their beliefs about environmental sustainability. As documented by others (e.g., Corney & Reid, 2007; Muthersbaugh & Kern, 2012), social studies education is an ideal space for facilitating discussions of sustainability issues using a variety of texts. An elementary social studies methods course that infuses sustainability education throughout the curriculum and classroom practice can support such aims. The purpose of this study, therefore, was to examine elementary pre-service teachers' beliefs about environmental sustainability within the context of our elementary social studies methods course.

We designed multiple teaching and learning exercises about sustainability issues, including examining human-environment interactions using a systems approach and analyzing production and consumption. Since we acknowledge the pedagogical potential for using controversial issues (Hess, 2004, 2009) such as plastic pollution within a comprehensive study of sustainability education, we designed course experiences with plastic pollution that would increase pre-service teachers' knowledge expand their thinking about teaching sustainability with young children. Many course experiences contributed to this development. We selected two film texts, *Bag It* (Hill & Beraza, 2010) and *The Story of Stuff* (Priggen & Fox, 2007); hosted an expert guest lecture; organized simulations (e.g., of the causes and effects of local river pollution using a Population Connection<sup>®</sup> resource); analyzed related primary source documents; and read

children’s literature related to human-environment interaction and sustainability (e.g., *Common Ground* by Molly Bang, 1997). Pre- and post-survey instruments and structured discussions provided data regarding our students’ perceptions about environmental sustainability and specifically plastic pollution. Our teaching and research served two purposes: (a) to identify pre-service teachers’ perceptions of environmental sustainability and (b) to strengthen pre-service teachers’ content and pedagogical knowledge regarding the teaching of sustainability concepts in the elementary grades. We sought to learn: (a) What are elementary pre-service teachers’ perceptions of environmental sustainability? Did their attitudes and beliefs change as a result of social studies education experiences based upon the Sustainability Education Framework for Teachers (SEFT)? and (b) What are pre-service teachers’ beliefs about teaching environmental sustainability in the elementary grades?

### **Sustainability Education**

Sustainability generally is defined as a way of living that meets the physical and environmental needs of the current generation without depleting the resources available to future generations (Nolet, 2009). Factors contributing to environmental degradation include: overconsumption, diminishing non-renewable resources, and pollution. Sustainability education, then, involves a framework for teaching grounded in a “concern for the current state of the planet and human responsibility for the environment” (Hicks & Holden, 2007, p. 2). According to Victor Nolet (2009), sustainability education extends traditional environmental education to include examining social, environmental, and economic issues of local and global importance. Cause and effect relationships are examined, including human contributions to resource depletion and pollution (Wiek, Withycombe, Redman, & Mills, 2011).

As an instructional approach, sustainability education is relevant to the whole curriculum, rather than a single content area (Nolet, 2009). Interdisciplinary, there are substantial applications to all subject areas across all grade levels (McClanahan, 2014), with the most obvious application in social studies. There is no framework designed specifically for analyzing pre-service teachers’ perceptions and teaching beliefs related to sustainability education. The Sustainability Education Framework for Teachers (SEFT) (Arizona Board of Regents, 2014) offers a sound conceptual framework for examining sustainability education with elementary pre-service teachers. This framework includes the requisite knowledge, skills, and dispositions to confront and to develop solutions to sustainability issues such as plastic pollution. There are four interconnected approaches: Futures Thinking; Values Thinking; Systems Thinking; and Strategic Thinking, as outlined in Table 1.

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Table 1

*Sustainability Education Framework for Teachers (SEFT) (Arizona Board of Regents, 2014)*

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Approach	Abbreviated Descriptors
Futures Thinking	“Includes the ability to think systematically about the future and future generations” (p. 2)

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Values Thinking	Includes the ability to assess a problem and its context comprehensively and to describe how justice, equity, and social-ecological integrity vary across and within cultures, and how integrating these concepts contributes to solving sustainability problems (p. 3)
Systems Thinking	Includes an understanding and respect for both the limits and interconnectedness of the natural world and the root causes of complex sustainability problems. Skills include the ability to analyze systems with a holistic perspective and recognize patterns and underlying relationships among problems and possible solutions. (pp. 3-4)
Strategic Thinking	Includes finding opportunities for creativity, innovation, and learning, as well as creating new institutional frameworks for collaboration and better governance. Skills include the ability to recognize the “big picture” (e.g., overall themes, trends, goals) in light of specific, local problems and solutions and to collaboratively design and work to implement interventions/solutions that address sustainability problems. (p. 5)

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Given the lack of a framework designed specifically for elementary social studies education, we selected SEFT for use in our methods course. It aligns well with four thematic strands of social studies education (NCSS, 2012): (a) people, places, and environment, (b) production, distribution, and consumption, (c) global connections, and (d) civic ideals and practices. Two of the four approaches are central to teaching sustainability education in elementary social studies: systems thinking and futures thinking. Systems thinking is “the ability to understand the intermediate and root causes of complex sustainability problems” (Wiek et al., 2011, p. 6). Futures thinking involves deliberation of the consequences and solutions that result from past and present actions; there is an overarching quest for actions supporting sustainable living for the learner and the surrounding world (Arizona Board of Regents, 2014; Hicks & Holden, 2007). If we are to prepare elementary students for ecological citizenship (Kissling & Barton, 2013) by promoting systems and futures thinking, then a sustainability education framework should provide a comprehensive approach to issues of environmental significance, foster pre-service teachers’ thinking about environmental sustainability, and elicit their thinking about one’s own responsibility towards local and global sustainability. To this end, we suggest experiences in teacher education should mirror concrete work with environmental sustainability. Sustainability education can be positioned in teacher education as an interdisciplinary approach to teaching and learning related to sustainability issues, but also as a springboard for reform in how we teach and prepare teachers (Nolet, 2009). As Nolet (2009) asserts, “Sustainability education represents a new paradigm for the preparation of teachers. It can help new teachers develop a curricular vision that addresses the fundamental social purposes of education in the context of an uncertain 21st century” (p. 409). Some scholars stress that if fostering sustainable thinking is the chief purpose of what we do in the teacher education classroom, promoting a framework for sustainability education in teacher education is essential to preparing pre-service teachers (Santone, Saunders, & Seguin, 2014). Given the strong fit for sustainability education, we concur with others who assert it ought to be a shared value among the larger teacher education program rather than relegated to a single course or content area (Kennelly, Taylor, & Maxwell, 2008a).

One significant goal of sustainability education is to unpack the conflict resulting from the interconnectedness of issues (McClanahan, 2014; Nolet, 2009). Some social studies educators have suggested using structured discussions as a teaching method to teach controversial issues and to promote civic engagement (e.g., Crocco, 2007; Parker, 2001, 2003). In this study, we borrowed from the scholarship of Crocco and Parker to create structured discussions for small groups (8-10) following the guest lecturer. Each structured discussion occurred during class meetings and was facilitated by an instructor who opened and guided the discussion with a series of open-ended questions (e.g., “What do you think?”). Given that sustainability education also promotes democratic thinking towards sustainability issues (Kissling & Barton, 2013), we posited that structured discussions would be ideal for unpacking such issues. We, therefore, implemented structured discussions throughout the course as a means for facilitating this goal.

We also speculated structured discussions could engage pre-service teachers in thinking about their roles as citizens in combating sustainability issues (Arizona Board of Regents, 2014; Corney & Reid, 2007; Merryfield, 2012). We concurred “as leaders of environmental change in schools, teachers need to believe in their ability to promote environmental change so they can nurture that belief in their students” (Pe’er, Goldman, & Yavetz, 2007, p. 48). To this end, we used the social studies methods course to examine plastic pollution, map the interconnectedness of sustainability issues, and help pre-service teachers contemplate their roles as citizens capable of taking meaningful action. We also imagined an interdisciplinary approach to sustainability issues modeled in social studies education could help pre-service teachers broach more complex, interrelated concepts (Santone et al., 2014). In short, we believe sustainability education addresses many of the overarching goals of social studies education and is, therefore, an appropriate focus for our methods course.

### **Literature Review**

#### **Sustainability Education in Middle and Secondary Social Studies**

Scholarship related to sustainability education has been located in middle and secondary social studies as well as social studies education; thus, we draw on both in this literature review. Across middle and secondary social studies scholarship, researchers have articulated the importance of offering continual course experiences that are dedicated to sustainability issues for developing learners’ content knowledge. In describing a middle grades social studies teacher who designed an investigation of climate change, Daniel Kruidenier and Scott Morrison (2013) articulated the importance of in-depth, sustained engagement with sustainability issues to inform students and to prompt their thinking about taking action related to environmental issues. Their work illustrated the importance of student reflection, specifically that which helps students identify their value systems and whether those values inform their behaviors.

Other social studies educators (e.g., Shuttleworth & Marri, 2014) have explored the benefits of examining sustainability issues with strong political and economic ramifications. They examined how two secondary social studies teachers deliberated various “social issues of sustainability” (p. 329) such as wastewater use and sanitation using structured discussions aimed at challenging students’ personal actions. They concluded, given the clear opportunities for taking informed action, this work is inherently related to citizenship education. Similar to Shuttleworth and Marri, Mark Kissling and Calabrese Barton (2013) observed a middle grades social studies teacher who deliberated the implications of a nearby power plant. In the same vein

as Kruidenier and Morrison (2013), Kissling and Barton recognized the positive impact on students' content knowledge when provided sustained engagement with sustainability issues. Collectively, these three studies illustrate the work of social studies teachers committed to investigating sustainability issues with students through interdisciplinary classroom investigations.

Like these social studies teachers, we aimed to identify effective pedagogical strategies for sustainability education in the elementary social studies methods course. In our study, we identified plastic pollution as a controversial sustainability issue. Controversial issues are open issues, generally regarded as contentious topics, which are often catalysts for substantial disagreement among varying stakeholders (Hess, 2009). In social studies education, controversial issues are often authentically embedded in the curriculum, providing a ripe opportunity to examine issues as part of social studies instruction. Teachers who examine controversial issues generally employ deliberate instructional strategies such as structured discussions to evoke thinking about the world outside of the classroom (Hess, 2009).

Plastic pollution is an open controversial issue for two reasons. The first centers on the large-scale geographic impact of plastic pollution as it continues to expand in volume and range (5 Gyres Institute, 2014). The second hinges on presenting plastic pollution as an issue in need of solutions and how this suggests change is necessary for individuals and in larger communities and spaces. As sustainability education research in middle and secondary grades has illustrated (Kissling & Barton, 2013; Kruidenier & Morrison, 2013; Shuttleworth & Marri, 2014), instruction that includes controversial sustainability issues appears to support student engagement and increase content knowledge. In addition to increasing content knowledge and prompting thinking about sustainability, issues-centered discussions can foster two cornerstones of social studies education, democracy and democratic thinking (Hess, 2004, 2009; Parker, 2001, 2003). While challenges exist, situating controversial sustainability issues in social studies education is essential to developing teachers who can provide similar opportunities for their students (Hess, 2004).

### **Sustainability Education in Teacher Education**

In addition to research in middle and secondary education, sustainability education also has been examined in teacher education. Pre-service teachers' pedagogical knowledge, beliefs, and behaviors towards such issues (including plastic use) were examined with a questionnaire (Esa, 2010). Similar to Sara Pe'er et al. (2007), study findings included generally positive beliefs regarding sustainability issues but less positive personal behaviors towards sustainability.

In another study, one pre-service teacher's course experiences, resulting pedagogical knowledge, and evolving teacher identity while enrolled in a teacher education program with a strong emphasis on sustainability education were studied (Kennedy, Taylor, & Maxwell, 2008b). The subject took part in multiple course experiences with sustainability issues including teaching lessons within a school environment where her values related to sustainability education were shared. The authors concluded that the subject's values and program experiences seem to inform her identity and pedagogy. Further, Kennelly et al. suggest their subject's increased pedagogical knowledge towards sustainability does influence her future teaching, particularly when sustainability education is positioned as comprehensive approach. Similarly Graham Corney and Alan Reid (2007) found that using a variety of instructional resources for sustainability education promoted pre-service teachers' content knowledge. They also suggested that PSTs' personal

sustainability actions likely begin with increasing their content knowledge of related sustainability issues.

In a similar study, Pe'er et al. (2007) implemented pre and post questionnaires to measure pre-service teachers' attitudes towards sustainability education, including what factors have influenced their attitudes (e.g., the influence of prior experiences on their attitudes). In addition to pre- and post-questionnaires, other teacher educators have implemented guest lecture(s), films, and structured discussions to elicit pre-service teacher thinking about sustainability (Corney & Reid, 2007). Secondary pre-service teachers' use of images related to sustainability education in the methods course, for example, was examined in a study by Debbie Muthersbaugh and Anne Kern (2012). In the context of interdisciplinary lessons, the researchers found an interdisciplinary approach to teaching environmental sustainability using images proved successful and seemed to improve their subjects' attitudes towards teaching sustainability issues.

Two commonalities found in research on sustainability education in teacher education are the evaluation of pre-service teachers' knowledge, attitudes, and behaviors, and the tension between their stated beliefs and personal behaviors toward sustainability. The literature suggests when incorporating a controversial sustainability issue in the course design, pre-service teachers' content knowledge increases, particularly when using structured discussion to examine issues. As established in social studies scholarship (e.g., Kissling & Barton, 2013; Kruidenier & Morrison, 2013; Shuttleworth & Marri, 2014), the work described here illustrates how to teach for sustainability education through an approach that fosters pre-service teachers' thinking, furthers the scholarship of SE in teacher education, and provides a model for examining SE in elementary social studies. In summary, this manuscript aims to contribute to gaps in the literature. First, it addresses the need for research in elementary teacher education that outlines interdisciplinary course methods in sustainability education. Second, it couches such work specifically within elementary social studies, where little scholarship has been conducted on interdisciplinary sustainability education.

### **Method**

This mixed methods study (Creswell, 2003) was conducted at a comprehensive public university in the Southeastern U.S. during the Fall 2012 and Spring 2013 semesters. The case, or unit of analysis, examined here was the collective group of undergraduate pre-service teachers enrolled in five sections of the on-campus elementary social studies methods course. Therefore, the subjects shared experiences (see Table 2) were bounded within the implemented course design. Enrollment for each course was self-selected by subjects. Within their program of study, elementary pre-service teachers participate in a cohort program whereby they complete methods courses during their first semester of the senior year. This cohort-based semester immediately precedes the full-time student teaching internship. In addition to the social studies methods course under study, pre-service teachers are enrolled in science, language arts, cultural arts, and mathematics methods courses. They concurrently complete field observations and implement instructional lessons in these content areas in local elementary classrooms, totaling 120 hours. Due to their comprehensive fieldwork, there were 10 discrete course sessions during the semester, each lasting 2 hours, 45 minutes.

We collaboratively designed this course using the process of Backward Design (Wiggins & McTighe, 2005) whereby we first established our enduring understandings, essential questions, and the key content to be taught. To permit the natural integration of other content

areas during our course sessions, we structured the social studies methods course into units of study based upon three of the six-transdisciplinary themes of the International Baccalaureate Primary Years Programme (PYP) curriculum framework (IBPYP, 2005-2014). These themes taught in this order: (a) Who We Are, (b) Where We Are in Place and Time, (c) How We Organize Ourselves (IBPYP, 2005-2014), and, culminating with our original theme, (d) How We Can Take Action. The 10 National Council for the Social Studies (NCSS) thematic strands (NCSS, 2012) also were infused in the units of study.

Sustainability education topics and issues (e.g., materials economy; food and water security; marine pollution) were central to the course design and comprised approximately one-half of the course schedule. Using Google Drive™, we shared readings, videos, children’s literature, and other instructional resources during course sessions and for homework. We collaborated to source environmental sustainability-themed children’s literature and community resources to infuse into the units. We also met weekly to plan class sessions, share materials, report pre-service teacher responses to the sessions, and discuss preliminary data collection. The course units of study aligned with each of the four interconnected approaches as outlined in the Sustainability Education Framework for Teachers. Table 2 highlights sample components reflective of our course design.

Table 2  
*Social Studies Methods Course Design*

	Unit 1 Who We Are	Unit 2 Where We Are in Place and Time	Unit 3 How We Organize Ourselves	Unit 4 How We Can Take Action
SEFT Focus	Values Thinking	Futures Thinking	Systems Thinking	Strategic Thinking
Sample Big Idea	People are more alike than different.	Where we live influences how we live.	Making conscious choices locally can affect the environment and others globally.	Individuals of all ages can be positive change agents in their communities.
Sample Essential Questions	What are the visible and invisible features of culture?	How do geography, climate, and natural resources affect the way people live and work?	How can we take individual and collective action to promote sustainable systems?	What is the role of individual and collective action for local and global sustainability?



Sample Course Experiences and Resources	Explore the visible and invisible elements of culture (Peace Corps WWS, n.d.) and apply to the cultural iceberg model (Virtue & Vogler, 2009). Analyze material culture artifacts and create a class “museum of family artifacts” (Singer & Singer, 2004).	Analyze population statistics and relationship to global issues (Population Education, 2014). Map the community (Jane Goodall Institute, n.d.) using digital technologies, identifying human, animal, and environmental features. Identify a local problem and work to resolve it.	Share <i>Common Ground: The Water, Earth, and Air We Share</i> (Bang, 1997); participate in Tabla model of concept development of “cause and effect” for environmental issues. Respond to a variety of film media (e.g., <i>The Story of Stuff; Bag It</i> ) that represent multiple perspectives of the materials economy.	Watch videos of children who have taken meaningful action locally. Determine opportunity for action; share on social media sites. View Midway Film (2012); hold Take a Stand discussion about banning of single-use plastic bags.
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A mixed methods study approach was deemed fitting (Creswell, 2003) because this study’s purpose was to determine the perceptions of elementary pre-service teachers regarding the concept and pedagogy for sustainability education during the social studies methods course

### Data Collection

In the five social studies methods course sections during Fall 2012 and Spring 2013, 81 enrolled pre-service teachers participated in this study. Data collection focused on the perceptions of elementary pre-service teachers regarding the concepts and pedagogy of sustainability education. Although sustainability concepts were woven throughout the course design, data collection occurred mid-course both semesters during the “How We Organize Ourselves” unit of study. At this time, we specifically addressed the interconnection of human and natural systems with emphasis on consumerism and plastic pollution. Survey and transcribed discussion data were collected with research phases as follows:

- (i) At the start of the unit: pre-service teachers completed an anonymous, electronic 5-item Likert scale (having ranked values 1-5, with 5 representing “Strongly Agree”) and 3-item open-ended survey to record their perceptions of environmental sustainability, including how to teach related concepts to elementary-aged children. A representative quantitative Likert-scale survey item included, *I believe that it is important to teach young children about environmental sustainability*; a qualitative item included *what does environmental sustainability mean to you?* (For the complete protocol, see Appendix A).
- (ii) During the unit: pre-service teachers watched the documentary film *Bag It!* and listened to an expert researcher speak on marine pollution and share water samples containing plastic pollution. The documentary film profiled plastic pollution across the globe, identified the impact on the earth’s oceans and marine life, and suggested

- specific individual and collective solutions for reducing plastics, particularly regarding single-use items (e.g., disposable grocery bags and plastic bottles). The documentary, moreover, positioned plastic pollution as a controversial political issue (Hess, 2004, 2009). The guest lecture focused on the ocean and marine life implications of plastics (Plastic Oceans Project, 2014) and contrasted this pollution with the local impact of plastics at the nearby state port and beaches, both located within just a few miles of the university campus. The coastal context of the university only further distinguished plastic pollution as an open issue (Hess, 2009). Afterwards, pre-service teachers engaged in structured discussions using the shared texts (Parker, 2003) of film and guest lecture. Sample prompts included: Please describe your experiences engaged in this film screening and expert researcher lecture. Did anything in the film or lecture impact your beliefs about environmental sustainability? If so, what? How? What questions do you have now?
- (iii) After the unit: pre-service teachers completed an anonymous, electronic 5-item Likert scale and 2-item open-ended post-survey (see Appendix B) to record their perceptions of environmental sustainability and the teaching of related concepts to elementary-aged children.

Structured discussions were audio-recorded and transcribed to increase the accuracy of coding in data analysis. In addition to these primary data collection sources, researcher memos were also recorded and we debriefed biweekly throughout the study design and implementation.

### **Data Analysis**

The research questions guided our constant comparative method of data analysis for open-ended survey items and transcriptions of the structured discussions (Glaser & Strauss, 1967; Strauss & Corbin, 1994). We analyzed pre- and post-survey Likert scale data using descriptive statistics to identify trends in subjects' perceptions of environmental sustainability. Quantitative survey data were calculated automatically through survey software. We then computed the mean differences between pre- and post-surveys. We used content analysis for the open-ended survey questions. We transcribed discussion data by first open coding the responses and then using constant comparative method to identify repeated themes (Glaser & Strauss, 1967). Example codes included *sources of knowledge* and *perceptions of environmental sustainability*. In subsequent readings, we focused on drawing recurring pre- and post-patterns or codes as data collection sources were compared. Examples of representative codes from the structured discussion transcriptions included *plastic pollution* and *teaching applications*. To address the first research question, we considered pre-service teachers' resulting attitudes and beliefs in relation to SEFT to identify examples of futures, values, systems, or strategic thinking. Finally, we organized emerging patterns into two categories of findings based upon our research questions.

## **Findings**

### **Pre-service Teachers' Shifting Perceptions of Environmental Sustainability**

The first two categories of findings align with research question #1: What are elementary pre-service teachers' perceptions of environmental sustainability? Did their attitudes and beliefs change as a result of social studies education experiences based upon the Sustainability Education Framework for Teachers (SEFT)? Across the pre-survey data, pre-service teachers demonstrated several common conceptions in their definitions of environmental sustainability.

Conservation, responsible human-environment interaction, and buying locally were cited frequently across the initial definitions. Post-survey data revealed subjects' definitions became more specific and elaborated as the course progressed. Following the course experiences, pre-service teachers expanded their definitions to include responsible consumption; waste reduction; reducing single-use items; maintaining a balance of consumption or preserving natural resources; and protecting the environment for future generations. In comparison to the subjects' initial definitions, their post-survey definitions suggested an increased use of systems thinking and futures thinking, two approaches from SEFT introduced and modeled in the course design. In relation to their perceptions of environmental sustainability, pre-service teachers also identified family, friends, and media as the three most influential sources of their knowledge.

The pre-survey suggested that upon entering the study, pre-service teachers felt informed about the impact of plastic pollution on health and the environment (mean scores of 3.57 and 3.58 out of 5.00, respectively). They perceived, for example, to be knowledgeable about the impact of plastic pollution, including the effects on the environment. Following course experiences specific to sustainability education, their responses illustrated that subjects felt more informed about environmental pollution and, therefore, their perceptions of the impact of pollution on the environment were more defined than before. Responses illustrating their awareness of the impact of pollution included: "Do you remember the statistic of how many bags one person uses per year? It's five hundred bags, eight hundred pounds of packaging waste" and "So the solution isn't as simple as, you know, one idea; it is going to have to take a lot of different ideas."

Participants also understood environmental sustainability as both a local and global issue. While their pre-survey responses did not indicate a collective awareness of local sustainability issues or the impact of individual actions for global sustainability, the structured discussions and post-surveys suggested that the course experiences affected their perceptions related to global sustainability. In a structured discussion, the subjects shared:

Anne: It's not just in the Pacific Ocean far, far away; that happens here too.

Georgia: That is why I think [we] need to focus on global awareness as well, because I had no idea that places around the world had started banning, like I thought of California for banning the bags. And seeing how each country affects another country's pollution you know? Maybe Hawaii isn't the one throwing all of the plastic away but they are still being affected by it. We need to realize that we need to work together as a world and not just a country because our country is going to affect other countries and other countries are going to affect others as well.

Stephanie: If you can see it in your environment, you're going to want to do something about it because it is obviously affecting you.

In summary, shifting perceptions illustrate the potential for applying a sustainability education framework like SEFT in social studies education.

### **Environmental Sustainability Knowledge and Action**

The participants clearly articulated an increased knowledge of environmental sustainability and related issues, yet they lacked feeling empowered to take individual or collective social action. While the pre-service teachers expressed interest in making a difference, they were unaware of specific, practical strategies to implement in their daily lives. Several external factors were identified as influencing and even hindering their personal actions. They reported financial and time constraints influenced the products they purchase (e.g., reduced

packaging available at local markets versus excessive packaging at one-stop supermarkets; the cost comparison of sustainable products versus one-time-use purchases). While some suggested solutions for more environmentally friendly shopping, many admitted making regular purchases contributing to the problem.

External factors also influenced subjects' actions regarding responsible waste disposal. Common barriers on campus and at home were described such as ineffective recycling initiatives and lack of receptacles to recycle common items. They discussed personal daily habits that contributed to excessive waste and trends in social behaviors that are not sustainable. Subjects admitted, for instance, their morning coffee routines and bagging purchases with single-use plastic bags were poor choices that could be avoided with prior planning and more conscious decisions or new habits such as a prior planning for meals and shopping trips. Though some pre-service teachers indicated solutions for single-use waste (e.g., bringing reusable mugs to the coffee shop; purchasing unpackaged fruits and vegetables; carrying a reusable shopping tote), clearly delineated plans for actions to be taken were not identified across the data.

Sometimes, generalized statements of a need for change were offered, yet PSTs lacked substance or concrete steps for change. One student, for example, offered, "I think it starts with small steps you know because obviously you can't take it on all at once because it would be a little crazy because it would take so much longer to shop." Others admitted they understood simple individual actions but failed to follow through. As another student explained, "I could just bring my own thermos or bring my own paper or plastic bags; I always think about that when I'm at the grocery store, I just don't really do it." Some pre-service teachers reported being overwhelmed by the magnitude of the issue. One suggested, "I always see a huge problem and think that it is too big for me, like I can't really make a difference." Others seemed to share the same quandary in regards to their new knowledge and subsequent behaviors:

Nikki: I don't know if it's my naiveness (*sic*), [but] I always knew about plastic bags but I just never recognized that everything is made out of plastic. When you go to the grocery store everything is made out of plastic. I'm just so overwhelmed by it.

Kate: I feel like especially in this country, it's all about convenience. And it is a pain to go out of your way to do something. We're constantly on the go. Sometimes we don't have all this time to bring our own utensils and wash them and it's easier just to grab and go and throw it away.

Though the subjects' reflections about personal behaviors represented systems thinking per our framework, they also illustrated the lack of strategic thinking. While these pre-service teachers appeared to gain a better understanding of environmental sustainability from course experiences, there was a noticeable discrepancy between their positive post-survey responses and discussions about being informed. Some students cited a lack of knowledge about the impact of plastic pollution on animal health and the enormity of pollutants in the oceans, while others recognized being uninformed about what facilities and programs are available at the university to reduce personal waste and dispose of recyclable materials. While many shared examples of new knowledge related to sustainability education, it is important to recognize some continued to identify areas where they still felt uninformed. It was reported by some that the concept of sustainability education challenged them to take personal action towards change but was discouraged by the apathy of others. Although most pre-service teachers could articulate potential individual or collective behaviors to combat pollution or reduce the use of non-

renewable resources, some admitted frequently selecting choices that they know are not sustainable.

Pre- and post-survey data yielded high mean scores (4.65 and 4.82 out of 5.00 respectively) for the Likert-style item *I believe that environmental sustainability is an important issue today*. The increased mean score on the post-survey suggests that the course influenced existing attitudes about the importance of sustainability education. Still, the data analysis revealed though pre-service teachers' content knowledge of environmental sustainability increased, they did not articulate intentions for individual or collection action. As scholars have previously suggested (Kissling & Barton, 2013; Kruidenier & Morrison, 2013; Pe'er et al., 2007), pre-service teacher' knowledge or attitudes do not necessarily result in individual sustainable behaviors. The absence of an explicit call to action may have stunted the potential to move from an informed citizen to an active citizen (Westheimer & Kahne, 2004). A researcher memo drawn from one course session reflects this notion:

As one who is impassioned to find solutions to the devastating effects of plastic pollution, I deliver course content about this issue with genuine enthusiasm. I attempt to elicit emotion in my students by showing stark photographs of animals harmed by our consumption and disposal of plastics, including those by renowned large format photographer Chris Jordan. During one particular course session, I showed the film trailer to Jordan's documentary *Midway*. Students were left stunned; many of them cried. As a result, I felt successful delivering this important message. My perceptions of success were quickly diminished after our mid-class break, however. One-by-one, students returned to class with a myriad of disposables: plastic soda bottles, potato chip bags, disposable coffee cups with plastic lids. Although students appeared genuinely concerned about the global issue of plastic pollution during class, their consumer choices and behaviors did not appear to change. It was then that I realized I had much more important work to do with my pre-service teachers.

### **Pre-service Teachers' Beliefs about Teaching Children about Environmental Sustainability**

The third category of findings relates to research question #2: What are PSTs' beliefs about teaching environmental sustainability in the elementary grades?

Survey and structured discussion data revealed that pre-service teachers believed sustainability education is an important, interdisciplinary subject matter for elementary students. They identified the documentary film and the guest lecturer as effective tools for teaching sustainability issues to diverse audiences. Although the subjects said course experiences resulted in greater awareness of the issues under study, they continued to feel inadequate in their ability to address sustainability issues in the elementary setting. Throughout this study, pre-service teacher expressed a strong desire to enhance their content and pedagogical knowledge in order to teach sustainability concepts in developmentally appropriate ways in the elementary setting.

The participants' responses to close-ended survey items indicate they believed that "it is important to teach young children about environmental sustainability" with *strong agreement* selected both before (4.73 out of 5.00) and following (4.85) the documentary film screening and guest lecture course experiences. Table 3 provides illustrative examples on the pre- and post-surveys where subjects posted responses under *Additional Comments* (Note: Responses are not individually matched as the subjects completed the surveys anonymously).

Table 3

*Pre-service Teachers' Survey Responses Related to Teaching Environmental Sustainability with Children*

Example Pre-Survey Responses	Example Post-Survey Responses
I know it is important and have become aware of ways to change our "footprints" but I don't think I know enough to teach on it or to help students understand that what they do really does affect our environment.	I feel if I continue to learn and educate myself about the subject at hand I can better prepare myself for teaching my students.
I believe that if we don't teach children about sustainability then they will not know how to conserve resources which is crucial to establishing positive environmental change.	This video and speaker has shown me how I can use documentaries and local sources to educate my future students on important issues.
I am not confident in teaching children about the effects of plastic on the environment because I : do not know the full effects of it, do not know how to teach it, do not know where to find the information, and do not know how to apply it to meet my curriculum I am teaching in my classroom	I would like to know a few more activities that I could do with my future elementary students!

The structured discussions following the documentary film screening and guest lecture further reinforced pre-service teachers' views of sustainability education in the elementary setting. A common theme was their belief that sustainability education has natural connections across disciplines. This is particularly important in relation to elementary social studies, often taught using an interdisciplinary approach. One subject, for example, described how her 5th grade field experience classroom is learning about biomes. Teaching about sustainability would be a natural fit, she explained: "They're about to write stories from the animals' perspective and could address what is happening to the animals' environment." Others gave examples of related concepts, such as life cycles, human-environment interaction, or mathematics skills (e.g., calculating one's daily trash) that are naturally taught across the elementary years. "I think it's pretty applicable across the board," another participant concluded.

The pre-service teachers also expressed the importance of making sustainability issues concrete and relevant by reinforcing the interdependence of our natural systems. The documentary film should "be something that they show [in every grade]; even if they can't spend that much time on the unit, just to introduce students to the idea and keep it ingrained in their heads and their memories so that they take that with them in their future." Another agreed: "Make it relevant for them." "It is good for students to see that it happens here," one remarked. "It's not just the Pacific Ocean far, far away...so it makes it easier for [students] to relate and understand that it happens here, too." Yet another concurred: "If you can see it in your environment, you're going to want to do something about it because it is obviously affecting you."

Resources, comparable to the documentary film and the guest lecture, were deemed effective by pre-service teachers for use in the elementary classroom. "Throughout...I was

thinking about what I could do when I have my own classroom,” one remarked. Due to the sensitive nature of some content depicted in the documentary film (such as animals harmed or killed from ingesting marine debris), others expressed concern with appropriate ways to address the content with young children. One student posed:

How can we teach this issue to younger children and not horrify them? Is it ok for them to be upset, because I get upset when I learn about the harm plastics can do to humans and animals. I just want to know how to teach this concept in a way that it stands out and shocks them, but not so much that they go home crying. Or is that ok? I need to find a middle ground.

While tensions about how to teach sustainability education were not fully resolved at the study’s end, their survey and discussion responses suggested that many felt it was important to teach “the truth” about sustainability issues. Lastly, pre-service teachers believed it is important to involve families and the larger community in such work. One explained, “I guess it’s never too early to start educating the students ‘cause they can teach it to their families and that’ll really help.”

Another reinforced the power of family involvement by sharing:

When I was little I would make my family do things that we were learning about in class I thought that it was my job to make my family take on this task so I feel like a lot of students would do that if we get them excited enough about making this change and inform them about why it needs to be made.

### **Discussion**

The course design described here illustrates one approach to sustainability education in elementary social studies education. Through an interdisciplinary application of the Sustainability Education Framework for Teachers, specific strategies promoted pre-service teachers’ thinking and content knowledge. The documentary film and guest speaker, for example, appeared to elicit insights about environmental pollution. Other class experiences (e.g., reading practitioner articles and children’s literature; engaging in photo analysis and simulations) encouraged investigation of sustainability issues. Through the course, pre-service teachers’ views about sustainability education expanded, including how environmental pollution impacts human and other animal health. Their awareness of local and global sustainability issues also appeared to be strengthened because of specific course explorations, validating prior research (e.g., Corney & Reid, 2007; Muthersbaugh & Kern, 2012).

#### **Impact of Course Experiences on Pre-service Teachers’ Knowledge and Beliefs**

The study participants clearly demonstrated marked development in their knowledge and beliefs about sustainability and articulated how their daily personal habits contributed to environmental pollution. While their development suggests our approach was effective, several suggested they still felt uninformed about particular aspects of sustainability education and unempowered to take meaningful action in response to sustainability issues. We speculate this discrepancy resulted from pre-service teachers viewing the documentary content and realizing the extent of environmental threats and implications for sustainability. Therefore, it is possible the film may have overwhelmed many and influenced their perceptions of being informed. As the structured discussions occurred following the films, this seemed like a realistic cause for the conflicting responses, which may be related to the constructive nature of small group dialogue (e.g., pre-service teachers deliberating the extent of environmental impact) in contrast to anonymous survey responses (i.e., ranking how informed one is). In either case, the subjects

appeared un-empowered to take individual or collective action. This suggests that in social studies education, methods courses exploring sustainability education ought to join knowledge formation exercises with overt calls to action.

Participants also articulated the importance of sustainability education, discussed applications for their own teaching, and identified their reservations about teaching sustainability. They discussed at length the use of films and guest lecture for achieving such aims. Though we consistently modeled classroom approaches for sustainability education across approximately half of the course meetings (with some full class meetings devoted entirely to the elementary level), the findings suggest these pre-service teachers did not feel confident in teaching environmental sustainability to young children.

While we believe this approach was a meaningful application of the Sustainability Education Framework for Teachers for fostering pre-service teacher thinking about sustainability education in elementary social studies education, the study revealed shortfalls in the course design. Though numerous, sound opportunities to explore sustainability issues were embedded, the course did not culminate in planning, taking, and reflecting upon personal actions. This may be related to a gap between pedagogical knowledge in the methods course and actual teaching application in the field. Their field hours at this point in the program have been under 150 hours with only one required lesson in social studies. Factors related to actual engagement in the classroom with children (or lack thereof) may have influenced ratings of confidence in teaching environmental sustainability with young children.

### **Relevance to Elementary Social Studies Scholarship**

In conjunction with presenting an interdisciplinary approach to sustainability education in elementary social studies, this study contributed to elementary social studies scholarship in three ways. First, it outlined a comprehensive approach to teaching sustainability education using the Sustainability Education Framework for Teachers, which appeared to enhance pre-service teacher awareness of sustainability issues. Second, it identified how pre-service teachers perceived teaching environmental sustainability to children. Third, this study confirmed prior social studies research related to using guests lecture, documentary film, and concrete sustainability issues within a comprehensive study of sustainability education. We also identified several challenges for teaching for sustainability education, including teaching for conceptual thinking in elementary education (Brophy & Alleman, 2007; Young & Knestrict, 2012) and the interconnected nature of sustainability education (Arizona Board of Regents, 2014). Such challenges were evident as pre-service teachers indicated they were not knowledgeable enough to apply sustainability education in appropriate ways with young children. This may be related to the conceptual nature of sustainability education, as similar findings with pre-service teachers in mathematics suggested they may struggle to move from very concrete understandings of content to conceptual thinking (Young & Knestrict, 2012).

Our study offered an interdisciplinary approach to sustainability education in elementary social studies, an approach that has not been examined at length in social studies literature. To this end, it emphasized the significance of sustainability education in the national social studies standards (NCSS, 2012) and illustrated it as interdisciplinary work with pre-service teachers. It articulated how applying the Sustainability Education Framework for Teachers in social studies education can foster pre-service teacher thinking regarding sustainability education and contributed to scholarship by illustrating an interdisciplinary approach for elementary social studies education. Therefore, this research builds on prior scholarship in teacher education



focused on interdisciplinary methods courses (Christou & Bullock, 2014). Though other scholarship investigating sustainability education in teacher education exists, this study extended the work to elementary pre-service teachers in the social studies setting. We built on the work of Kissling and Barton (2013) and Shuttleworth and Marri (2014) who also examined classroom investigations of sustainability issues couched within an interdisciplinary approach. Finally, in relation to addressing gaps in social studies scholarship, we examined the implementation of a course designed with specific aims in sustainability education grounded in SEFT, work that is not evident in earlier social studies scholarship.

### **Implications**

Given the magnitude of sustainability education and how entrenched its concepts are within the elementary social studies curriculum, this study suggests implications for social studies education practice. This work illustrated how elementary social studies teacher educators can model teaching methods for the materials economy, citizenship, and global connections through an overarching sustainability focus. It also revealed limitations of such work in elementary social studies education. We recognized, for example, pre-service teachers' claims of increased knowledge did not necessarily translate to pro-environmental behavior, a mismatch between attitudes and behavior discussed by Anja Kollmuss and Julian Agyeman (2010). In this study, the subjects were not engaged in a clinical field placement so, classroom context to teach young children about sustainability education and further reported lacking confidence to apply their learning to their teaching. Understanding these experiential and dispositional realities, social studies teacher educators may consider how to narrow the gap between methods experiences, fieldwork, and pre-service teachers' confidence in teaching sustainability education while still expanding their perceptions. Social studies teacher educators may. For example, situate sustainability issues as relevant examples within larger social studies units of study. Examining both the local and global significance of such issues also may address the gap. Finally, creating specific course opportunities for teaching sustainability concepts with children through deliberate field experiences (e.g., required lesson planning and teaching on an environmental sustainability concept) also may help to narrow the gap between the methods course and their confidence in teaching sustainability issues.

This work suggests implications for the design of elementary social studies methods courses. Implementing a comprehensive and interdisciplinary approach to sustainability education appeared to continually promote pre-service teacher engagement. In earlier work, Kissling and Barton (2013) noticed similar trends in their classroom observations when environmental issues were couched within an interdisciplinary approach. In this study, an interdisciplinary approach required a continued focus on sustainability and related issues inspired by the Sustainability Education Framework for Teachers. This continual thread of sustainability education throughout the course appeared to influence pre-service teachers' perceptions and knowledge of sustainability education. Following numerous course experiences, pre-service teachers in this study clearly understood the issues as meriting local and global significance. Despite this systematic design, the course lacked a field experience specifically designed to extend their methods course work through classroom teaching. It, therefore, is unclear whether the course experiences influenced pre-service teachers' classroom practice. Understanding this, we submit future research of sustainability education in elementary social studies education that is longitudinal in design (e.g., extends past coursework into internship and first years of

teaching) may explain whether pre-service teachers transfer their course experiences into their own teaching.

While extensive classroom engagements with aspects such as human-environment interaction are critical for challenging perceptions of sustainability education, this study revealed a comprehensive approach should also include planned action such as individual, small group, or whole group projects that involve pre-service teachers responding to sustainability issues they identify in their local area with solution-focused action. Future research examining the elementary social studies methods course, therefore, should investigate pedagogical approaches for moving pre-service teachers from concerned citizens to citizens involved in action. Potential approaches might include planned individual action or collective action incorporated into the course. While the design illustrated here offered a thorough experience with systems thinking and values thinking, we posit that a more thoughtful application of strategic thinking and futures thinking within SEFT might promote pre-service teacher action. For example, teacher education experiences with sustainability education might include concrete opportunities for pre-service teachers to facilitate teaching sustainability education with children. Such experiences may include practicum teaching with a course peer or planning and implementing a unit of study about a sustainability issue. It could also include applied learning with children in response to their own research about local issues. Whatever the approach, this study revealed pre-service teacher engagement with sustainability education in social studies education should continually involve a transfer to future teaching. As sustainability education is embedded in the elementary social studies curriculum, social studies teacher educators must consider this factor when designing methods courses and presenting the work of interdisciplinary education within the larger context of elementary teacher education. Finally, this study is an outcome of our commitment to examining the effectiveness of a collaborative course design approach. As Kennelly et al. (2008b) emphasize, sustainability education should be infused across courses and disciplines, and we aim to model how this can be effective in our program in an attempt to encourage colleagues to join in this effort.

### **Conclusion**

If pre-service teachers' beliefs significantly influence what they do in their future classrooms (Pajares, 1992; Merryfield, 2012; Sanger & Osguthorpe, 2011), then their perceptions of sustainability education are likely to influence if and to what extent they teach sustainability issues. We posit that the elementary social studies methods course is an ideal context for examining sustainability education with pre-service teachers in order to expand their related content and pedagogical knowledge. As sustainability education scholars suggest (e.g., Nolet, 2009; Shuttleworth & Marri, 2014), doing such work in the context of a comprehensive unit can provide a deeper and more consistent engagement with sustainability issues. Lastly, this study offers practical strategies for investigating sustainability education in elementary social studies education as it relates to multiple social studies concepts and strengthens the case for an interdisciplinary approach.

### References

- Bang, M. (1997). *Common ground: The water, earth, and air we share*. New York, NY: Blue Sky Press.
- Brophy, J. E., & Alleman, J. (2007). *Powerful social studies for elementary students* (2nd ed.). Belmont, CA: Thomson-Wadsworth.
- Christou, T. & Bullock, S. M. (2014). Learning and teaching about social studies and science: A collaborative self-study. *The Social Studies*, 105, 80-90.
- Corney, G. & Reid, A. (2007). Student teachers' learning about subject matter and pedagogy in education for sustainable development. *Environmental Education Research*, 13, 33-54.
- Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage.
- Crocco, M. S. (2007). *Teaching The Levees: A curriculum for democratic dialogue and civic engagement*. New York, NY: Teachers College Press.
- Esa, N. (2010). Environmental knowledge, attitude, and practices of student teachers. *International Research in Geographical and Environmental Education*, 19, 39-50.
- Forbes, C. & Zint, M. (2011). Elementary teachers' beliefs about, perceived competencies for, and reported use of scientific inquiry to promote student learning about and for the environment. *Journal of Environmental Education*, 42, 30-42.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago, IL: Aldine Publishing Company.
- Heddings, K.S., & Frazier, W. M. (2009). Shrinking our footprints. *Science Teacher*, 76, 25-28.
- Heimlich, J., Braus, J., Olivolo, B., McKeown-Ice, R., & Barringer-Smith, L. (2004). Environmental education and pre-service teacher preparation: A national study. *The Journal of Environmental Education*, 35, 17-21.
- Hess, D. E. (2004). Controversies about controversial issues in democratic education. *PS: Political Science and Politics*, 37, 257-261.
- Hess, D. E. (2009). *Controversy in the classroom: The democratic power of discussion*. New York, NY: Routledge
- Hicks, D. & Holden, C. (2007). Remembering the future: What do children think? *Environmental Education Research*, 13, 501-521.
- Hill, M. (Producer) & Beraza, S. (Director). (2010). *Bag it: Is your life too plastic?* [Film]. US: Reel Thing Production Films.
- Kennelly, J., Taylor, N., & Maxwell, T.W. (2008a). Addressing the challenge of preparing Australian pre-service primary teachers in environmental education: An evaluation of a dedicated unit. *Journal of Education for Sustainable Development*, 2, 141-156.
- Kennelly, J., Taylor, N., & Maxwell, T.W. (2008b). A student teacher's personal pathway to education for sustainability. *Australian Journal of Environmental Education*, 24, 23-33.
- Kissling, M. T. & Barton, A. C. (2013). Interdisciplinary study of the local power plant: Cultivating ecological citizens. *Social Studies Research and Practice*, 8, 128-142.
- Kollmuss, A., & Agyeman, J. (2010). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behaviors? *Environmental Education Research*, 8, 239-260.
- Kruidenier, D. & Morrison, S. (2013). Avoid the banking model in social and environmental justice education: Interrogate the tensions. *Educational Studies*, 49, 430-442.
- Merryfield, M. (2012). Pedagogy for global perspectives in education: Studies of

- teachers' thinking and practice. *Theory and Research in Social Education*, 26, 342-379.
- Moseley, C. & Utley, J. (2008). An exploratory study of pre-service teachers' beliefs about the environment. *The Journal of Environmental Education*, 39, 15-29.
- Muthersbaugh, D., & Kern, A. (2012). Pre-service teachers' use of images in integrating environmental sustainability lessons. *Journal of Teacher Education for Sustainability*, 14, 67-79.
- Nolet, V. (2009). *Preparing sustainability-literate teachers*. *Teachers College Record*, 111, 409-442.
- Parker, W. C. (2001). Classroom discussion: Models for leading seminars and deliberations. *Social Education*, 65, 111-114.
- Parker, W. C. (2003). *Teaching democracy: Unity and diversity in public life*. New York, NY: Teachers College.
- Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62, 307-332.
- Pe'er, S., Goldman, D., & Yavetz, B. (2007). Environmental literacy in teacher training: Attitudes, knowledge, and environmental behaviors of beginning students. *The Journal of Environmental Education*, 39, 45-59.
- Powers, A. (2004). Teacher preparation for environmental education: Faculty perspectives on the infusion of environmental education into pre-service methods courses. *The Journal of Environmental Education*, 35, 3-11.
- Priggen, E. (Producer) & Fox, L. (Director). (2007). *Story of stuff* [Film]. US: The Story of Stuff Project.
- Sanger, M. N., & Osguthorpe, R. D. (2011). Teacher education, pre-service teacher beliefs, and the moral work of teaching. *Teaching and Teacher Education*, 27, 569-578.
- Shuttleworth, J. M. & Marri, A. R. (2014). Teaching sustainability as a social issue: Learning from dialogue in the social studies classroom. In H. E. Muga, & K. D. Thomas (Eds.), *Cases on pedagogical innovations for sustainable development* (pp. 328-347). Hershey, PA: IGI Global.
- Singer, J. Y., & Singer, A. J. (2004). Creating a museum of family artifacts. *Social Studies and the Young Learner*, 17(1), 5-10.
- Strauss, A., & Corbin, J. (1994). Grounded theory methodology. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research*, (pp. 273-285). Thousand Oaks, CA: Sage.
- Virtue, D.C., & Vogler, K.E. (2009). Pairing folktales with textbooks and nonfiction in teaching about culture. *Social Studies and the Young Learner*, 21(3), 21-24.
- Westheimer, J. & Kahne, J. (2004). What kind of citizen? The politics of educating for democracy. *American Educational Research Journal*, 41, 237-269.
- Wiek, A., Withycombe, L., Redman, C., & Mills, S. B. (2011). Moving forward: On competence in sustainability research and problem solving. *Environment Magazine*, 53, 3-12.
- Wiggins, G., & McTighe, J. (2005). *Understanding by design* (2nd edition). Alexandria, VA: Association for Supervision and Curriculum Development.

### Web-based References

- 5 Gyres Institute. (2014). *5 Gyres: For a planet free of plastic pollution*. Retrieved from <http://5gyres.org>
- Arizona Board of Regents. (2014). *Sustainability Education Framework for Teachers (SEFT)*. Retrieved from <http://sustainabilityscienceeducation.asu.edu/course/sustainability-competencies/>
- Center for Global Initiatives. (n.d.). Culture kits. Retrieved from <http://cgi.unc.edu/navigators/resources/culture-kits>
- International Baccalaureate Primary Years Program (IBPYP). (2005-2014). Primary Years Programme Curriculum Framework. Retrieved from <http://www.ibo.org/pyp/curriculum/index.cfm>
- Jane Goodall Institute. (n.d.). Community mapping. Retrieved from <https://www.rootsandshoots.org/mapping>
- McClanahan, L. G. (2014). Essential elements of sustainability education. *The Journal of Sustainability Education*, 6. Retrieved from <http://www.jsedimensions.org/wordpress/wp-content/uploads/2014/05/McClanahan-Lauren-JSE-May-2014-PDF-Ready.pdf>
- Midway Film. (2012). *Midway: Message from the gyre*. Retrieved from <http://www.midwayfilm.com/>
- National Council for the Social Studies. (2012). *National curriculum standards for social studies*. Retrieved from <http://www.socialstudies.org/standards/strands>
- National Geographic Society. (1996-2015). Great Pacific Garbage Patch. Retrieved from [http://education.nationalgeographic.com/education/encyclopedia/great-pacific-garbage-patch/?ar\\_a=1](http://education.nationalgeographic.com/education/encyclopedia/great-pacific-garbage-patch/?ar_a=1)
- NGSS Lead States. (2013). *Next Generation Science Standards: For states, by states*. Retrieved from <http://www.nextgenscience.org/search-standards>
- Peace Corps World Wise Schools. (n.d.). Culture: Building bridges for young learners. Retrieved from <http://www.peacecorps.gov/wws/lesson-plans/culture/>
- Plastic Oceans Project. (2014). *Plastic Oceans Project, Inc.* Retrieved from <http://www.plasticoceanproject.org/#/>
- Population Education. (2014). Curriculum and resources. Retrieved from <https://www.populationeducation.org/content/curriculum-and-resources>
- Santone, S., Saunders, S., & Seguin, C. (2014). Essential elements of sustainability in teacher education. *The Journal of Sustainability Education*, 7. Retrieved from <http://www.jsedimensions.org/wordpress/wp-content/uploads/2014/05/Santone-Et-Al-JSE-May-2014-PDF-Ready.pdf>
- Young, T. & Knestrict, T. (2012). Preparing better teachers: Using collaboration in pre-service education. *New Horizons for Learning*. Retrieved from <http://education.jhu.edu/PD/newhorizons/Journals/Winter2012/Young-Knestrict>

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**Appendix A**  
Pre-Study Survey

1. Enter your name. \_\_\_\_\_
2. Please rank your perceptions according to the scale (1) Strongly Disagree to (5) Strongly Agree. Please provide additional insights in the Comments Box.

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	1	2	3	4	5	Comments
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
I believe that environmental sustainability is an important issue today.						
I am informed about impact of plastics on human and animal health.						
I am informed about the effects of plastics on the environment.						
I believe that it is important to teach young children about environmental sustainability.						
I feel confident teaching young children about environmental sustainability.						

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3. Additional Comments:
4. What does environmental sustainability mean to you?
5. What/who has informed your beliefs or ideas about environmental sustainability?
6. What questions or concerns do you have related to environmental sustainability and the impact of plastics on human and animal health and the environment?

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**Appendix B**  
Post-Study Survey

1. Enter your name. \_\_\_\_\_
2. Please rank your perceptions according to the scale (1) Strongly Disagree to (5) Strongly Agree. Please provide additional insights in the Comments Box.

	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Comments
I believe that environmental sustainability is an important issue today.						
I believe that documentary film is an effective method for teaching environmental sustainability.						
I believe that guest lecture is an effective method for teaching environmental sustainability.						
I believe that it is important to teach young children about environmental sustainability.						
My teacher preparation program has prepared me to teach children about environmental sustainability.						

3. Additional Comments:
4. What does environmental sustainability mean to you?
5. Did anything in the film, lecture, or discussions with peers impact your beliefs about environmental sustainability? If so, what? How?
6. Following this experience, what questions or concerns do you have related to environmental sustainability and the impact of plastics on human and animal health and the environment?

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