

“My job isn’t to tell them what to think”: The Fear of Indoctrination and How it Shapes Education for Sustainable Development

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Abstract

Promoting education for that focuses on the intersection of the environment, society, and the economy (education for sustainable development, ESD) has captured the attention of the global community. The process of promoting ESD programs in universities represents a complex task and understanding the different elements required in ESD at the university level is needed to facilitate that promotion. The purpose of this study was to understand the interaction of personal factors that influence University professors’ ESD. This interaction was investigated through two case studies of environmental science professors at an American University. Data collection focused on individual university professors’ thinking, beliefs, and teaching philosophies, their practices regarding ESD, as well as an examination of the broader historical and cultural context in which this ESD occurred. The findings showed that although ESD was a goal for both professors, neither was effective in achieving this goal. We argue that these professors fear of indoctrination and their views of teaching and learning prevented significant movement toward ESD. We argue that being consciously aware of the boundaries of acceptable pedagogical practice is essential if these professors are to move beyond providing “facts” and supporting their students in making sense of scientific information.

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Introduction

An array of national and international organizations argue that environmental issues will be a central concern in the 21st century (OECD, 2006; UNCED, 1992). Sincere consideration of environmental issues requires new ways of understanding and resolving problems on local and global levels and pairing local and global issues is seen as a cornerstone of good global citizenship. This brand of citizenship requires a commitment to environmental literacy (Bowers, 1996; Brennan, 1994; David, 1974; Orr, 1992). The Environmental Literacy Research Group (2006) describes environmental literacy as the capacity to understand evidence-based arguments concerning interactions between human populations, technologies, and environmental systems and to participate knowledgeably in decisions based on those arguments. As such, good global citizenship

requires familiarity with the social processes that accompany most environmental issues as well as some understanding of methods associated with science (Brickhouse & Kittleson, 2006; Schneider, 1997).

In recent years, much discussion about environmental education uses *sustainable development* as a guiding notion (Bonnett, 1999). Sustainable development calls for a redefinition of human's relationship with the environment and a reconceptualization of economic development. It demands a radical transformation in people's perspectives, values, and lifestyles to ones that promote environmental care and sustainable living. Sustainability requires critical thinking, reflection and action to make life-long decisions about the nature of a better world (Fien, 1993).

Education intended to promote sustainability is known as *education for sustainable development* (ESD) (Fien, 1993; Orr, 1992; UNCED, 1992). ESD arose from the widespread concern about damage to the environment due to actions related to our daily lives. This concern served as a motivation to create educational experiences to allow students (and all citizens) to better understand humans' impact on the environment and how this influences both the quality of our lives and the future of life on the planet. The goals for ESD are for students to develop a deep concern about the welfare of the planet, its ecosystems, its cultures, and its people. This concern is to be fostered by allowing students to recognize the interconnections of different facets of a system. Three frames of reference—economy, society, and environment—can be used to understand interconnections within a system (Hart, 2000; Herremans & Reid, 2002; Mckeown, 2002). (See figure 1.)

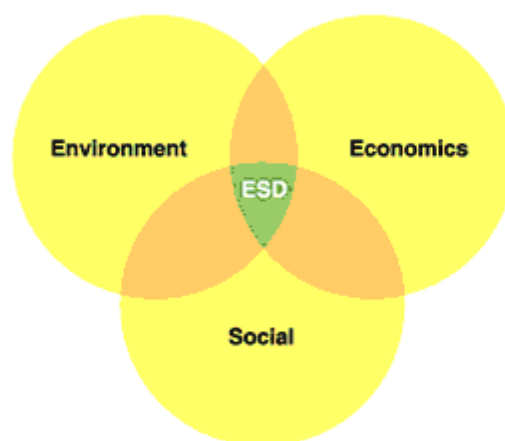


Figure 1. Three components of the Education for Sustainable Development Triad.

It is important for people to understand that they are part of nature and that they must view environmental problems holistically (Colucci-Gray et al., 2006). Current environmental education programs are largely focused solely on the environmental aspect

of the sustainability triad, thus equal consideration has not been focused on the social and economic strands or their interactions (Herremans & Reid, 2002).

A transformation is needed to move citizens toward considerations of sustainability. Universities must play an essential role in this transformation (Cortese, 2003; Fien & Maclean, 2000; Kirk, 2003; Wheeler & Byrne, 2003; Verbitskaya, Nosova, & Rodina, 2002). Corney and Reid (2007) argue that college and university professors are at the center of the environment education. However, college faculties are part of multiple contexts, and these contexts influence their teaching. For instance, Gess-Newsome, Southerland, Johnston & Woodbury (2003) note that a faculty member's teaching is influenced by myriad factors such as their knowledge and beliefs concerning teaching, learners, schools, and schooling, as well as a host of wider structural and cultural considerations.

The need to move citizens toward considerations of sustainability is in direct contrast with the fear of many environmental science teachers, who feel strongly that they should try to avoid influencing students' attitudes toward the environment, or imposing any kind of pro-environmental agenda upon their students (Cotton, 2006). Although ESD calls for a 'radical transformation' in students' understandings, perspectives and values with particular care in understanding the results of their personal and collective actions, many suggest that environmental educators must be clear to act as environmental educators, not advocates (Mappin & Johnson, 2005). For this, we describe the state of ESD in an American University and describe the personal factors that shape college professors' approach to ESD, recognizing that such factors are embedded in a broader societal and historical context. As the cases in this research will demonstrate, finding that acceptable ground between education and advocacy was particularly difficult for the professors in this study, as their fear of indoctrination served to shape much of their teaching.

Design and Method

In this study, using Cultural Historical Activity Theory (CHAT) (Engeström & Miettinen, 1999), we focused on two university professors and examined their instruction in relation to their thinking, beliefs and understanding of what it means to educate for sustainable development. We situated these findings in the historical and cultural contexts of these professors' work.

Research Context

The research site was a Carnegie classified university in the southeastern United States. The campus was a traditional one, with a high percentage of the nearly 40,000 students living on or near campus. The university consistently secured more than 100 million dollars in external grant support and was consistently ranked among the top Ten American Universities in patents from faculty inventions. Science research, in particular, received strong emphasis at this site. The university was home to nationally and internationally-recognized scholars, particularly in the sciences, and several research facilities attracted top scholars from all over the world.

Research Participants

We purposefully selected two participants for this study. Dr. Smith was active in the environmental teaching program. Dr. Jones worked in an interdisciplinary research-oriented, graduate-only program. Both professors commonly taught environmentally related science classes as part of their undergraduate teaching responsibilities. According to their course syllabi, both professors sought to develop a level of appreciation about the environment in students and to foster students' understanding of the notion of stewardship, an idea closely related to ESD. Early interviews with both professors indicated that SD was a goal both held for their courses.

Dr. Smith. Dr. Smith was very interested and passionate about nature. He described that his love of the outdoors in his early years led him to study the environment. After earning a doctorate degree in Marine Chemistry, Dr. Smith became a faculty member in his current department. He has been teaching and conducting research for over 15 years. As evidenced by his curriculum vitae, Dr. Smith seemed to be very committed to his work, and in addition to his departmental responsibilities (i.e., attracting grants to fund his many graduate students, serving in many academic and professional committees), he published over 100 research publications in nationally recognized chemical and hydrological related journals. He was also active in his research community through acting as a reviewer for both journal articles and books.

Dr. Smith devoted a great deal of his time seeking grants and other sources of funds. He explained that he understood this funding to be necessary, as he considered part of his role as a faculty to secure support for his graduate students, as well as providing materials and resources necessary for his and their research. He was a recipient of both national and local awards for his environmental research as well as his environmental community service.

When asked why he chose to be an environmental professor, Dr. Smith replied:

I liked it as a young person. I liked chemistry and the outdoor environment, I liked being outside. I was looking for a career and something related to nature and this is why I did an environmental science major. (S, 01/05)

This enthusiasm for the environment was evidenced in his teaching. Throughout the spring 2005 semester, Dr. Smith appeared to be excited about teaching his "Environmental Science" course, a course for both graduate and undergraduate students.

Dr. Jones. At the time of this study, Dr. Jones was relatively a new faculty member in his department. He graduated from another American university with a doctorate degree in Geography. After a postdoctoral fellowship, he joined his current department as an assistant professor. As evidenced by his curriculum vitae, his research areas included human-environment relations, land-use change, conservation and development, and deforestation. Similar to Dr. Smith, Dr. Jones was also active in research and publications in geography-related journals.

What stood out about our early sessions with Dr. Jones was his interest in his teaching. He recognized his limited pedagogical knowledge and he continually pursued professional teaching development programs to broaden his knowledge. On his statement on teaching he indicated:

My graduate education included almost no explicit attention to pedagogical theory, but I took steps to rectify that lacuna. In the summer of 2002, I studied teaching theory and techniques in a geography faculty improvement program funded by the National Science Foundation. I made use of what I learned there. (J, Teaching statement)

Dr. Jones was very motivated to produce environmentally aware students, a motivation that seemed intrinsic:

I have a social obligation more than a professional one.....I am a public servant and I want to educate people and help them think effectively about the things that I teach.... another thing, there are rewards that are not from university... I have students who say that they appreciate my teaching and learn something and that kind of feedback or reward is meaningful to me. (J, 03/05)

The previous quote reveals the professor's belief of his "social obligation," that is his conviction that it was his responsibility to help students "think effectively." That belief was a strong motivation for Dr. Jones to refine his teaching toward preparing environmentally aware students. Indeed, during the timeframe of this study, Dr. Jones received a distinguished teaching award from the university.

Data Collection

Multiple data collection methods were used to collect data from both professors and both courses. The main method included semi-structured formal and informal interviews (Bogdan & Biklen, 1998) around themes of SD and ESD. The extent of the interviews varied based on their purposes and were conducted with the two professors and the students enrolled in their classes. These interviews involved structured or semi-structured interview protocols. The semi structured interviews provided an opportunity to get comparable data across participants (Bogdan & Biklen, 1998). All interviews were recorded and transcribed for in-depth analysis. (See table 1 for some selected interview topics.)

Table 1. *Major Topics of In-depth Interviews with both professors.*

Professors' teaching strategies.
Professors' teaching beliefs and philosophies.
Professors' perception of SD and ESD.
Barriers faced the professors in their ESD.
Resources needed to help professors address the connections between the components of sustainability triad.
Professors teaching artifacts and instruments.
Professors' goals of teaching their courses.

According to Bogdan & Biklen (1998), non-participant observation consists of observing the activities, people and physical aspects of the situation being studied. A third method of data collection was artifact analysis of personal, institutional, and national documents (e.g., course syllabus, course assignments, university's memoranda to faculty, faculty handbook, and website, local and state newspaper articles).

Data Analysis

Data collection and analysis occurred simultaneously throughout the study. Directly after each interview, the interview was transcribed and analyzed in three major stages; open coding, selected emergent themes, and focused coding (Emerson, Fretz & Shaw, 1995).

In the stage of focused coding, we subjected our data to fine-grained, line-by-line analysis on the basis of topics that we identified as of particular interest from the earlier open coding analysis. In the focused stage of our data analysis, we combined the coded data under our selected themes and wrote reflective memos on each theme (Bogdan & Biklen, 1998). The major memos led our further analyses were "Professors' demanding work load", "Professors' fear of indoctrination", and "Professors' conceptions on teaching and learning."

In reviewing our interview transcripts, we identified patterns or themes emerging from the data (Berg, 1995) and organized them into broad categories such as contradictions, beliefs. We carefully cross-checked the themes that emerged from each subject's transcripts to enable ourselves to link related data from different interviewees. Then we grouped them under one theme and marked them with accompanying interpretive notes.

It is important to note that data of each participant was analyzed separately to avoid glossing over the uniqueness and complexities of the two cases (Stake, 2000). After generating a case for each of the participants, we compared across the two cases to determine which factors played a prominent role in shaping ESD for both professors. It is those themes that held explanatory power across each of these cases that we report here.

As far as the analysis stage of data gathered through observations, from the field notes we focused on the observation notes of our visits to each subject's classroom. We

integrated these observation notes on the activities, events and features of the physical setting with information drawn from the interviews and the conversations with the subjects.

With regard to the textual materials such as course syllabi, course texts, and other articles employed in the instruction in the courses, we analyzed these materials according to ESD content using Titscher, Meyer, Wodak and Vetter's (2000) method of text analysis and by comparing them to a recent environmental book, *Sustaining the Earth* by Miller (2004), that discussed the environmental issues in the lens of sustainability.

After analyzing all related data of each case study, we started building each subject's case while being careful to account for all of the data. Afterwards, we compared the two case studies searching for commonalities and differences between the professors' strategies and beliefs about educating for SD.

To establish rigor, we followed Patton's (1990) strategy of triangulation by supporting themes using different data sources (interviews, observations, and artifact analysis). Additionally, we shared the tentative results of data analysis with the research participants to ensure the meanings that we derived from the interviews matched their intentions, as well as sharing the full analysis with each of the participants (Glesne, 1999).

Results

Dr. Smith and Dr. Jones served as our "opportunities to learn" (Stake, 2000) about the enactment of ESD at the university level. In the following sections, we present description of their teaching in their courses. Next, we present factors that were influential in shaping these professors' approaches to ESD. To understand these cases the reader needs to understand the wider macro-context of the research because this context played a significant role in influencing participants' enactment of ESD.

Macrocontext of research

The university positioned itself primarily as a center for advanced graduate and professional studies while emphasizing research and providing excellence in undergraduate programs (Faculty handbook). University administrators explained that they chose the university's faculty members for their commitment to excellence in teaching, their ability in research and creative activity, and their interest in public service (University's mission statement). However, the reality of the university professors' experiences, as expressed in their interviews, reflected a mismatch between this broad mission as stated in the university mission statement and the reality of the work of faculty within this environment. The work lives of both **subjects** in this study had a strong emphasis on the quest for outside funding, for themselves and their students, and this quest often resulted in a much stronger focus on the research component of their work. This emphasis served to limit the time and energy they had to devote to reconceptualizing their teaching.

Describing the Professors' Environmental Courses

Goals. Both professors taught environmental courses. Dr. Smith's "Environmental Issues" course was offered to both graduate and undergraduate students. As stated in his course's syllabus, Smith intended to achieve several objectives from teaching his course (i.e., prepare environmentally knowledgeable students, boost students' decision making skills). Among these objectives, Dr. Smith had a sustainability objective that he phrased as "fostering an attitude of informed environmental stewardship."

Similarly, Dr. Jones taught "Environmental Science" for undergraduate students. He intended to cultivate several objectives, including sustainable development. Other objectives included building knowledgeable students, developing students' appreciations of environmental issues, and helping students understand the physical and social causes of some environmental problems and their impacts on the global environment.

Teaching Strategies. During the first two weeks of the semester, Dr. Smith gave two purely scientific lectures. During subsequent weeks, he dedicated the first portion of each class to students' presentations and the second half of the class to guest speakers. Each week three students had to present three different articles from their textbook. These presentations (typically 10-15 minutes in duration) largely revolved around summaries of the articles. (See Table 2 for topics of students' and guest speakers' presentations.) Following the presentations, he invited students from the class to ask questions of the presenters. Follow-up questions were common and were typically intended to clarify the content presented. Often, there were more questions than time permitted, and at that point Dr. Smith halted the discussion.

In the second portion of each class session, a guest speaker presented from some local environmental issue. The guest lecturers were not directly related to the topics addressed by the students in the earlier portion of the session, thus no single class session had a central "theme." (For a list of these topics see Table 2.)

Although some of the guest speakers presented various local environmental issues, most of their presentations revolved around the presentation of the findings of scientific research they conducted related to this issue. The titles of the guest speaker presentations varied and among the ten, some of them were "Research Findings of Gulf of Mexico Fisheries, Coastal Zone Dynamics, and Barrier Islands: Flood and Insurance Issues and Bats: One of Humankind's Best Friends." In terms of the ESD triad, only the environmental aspects were addressed during the speakers' talk.

Table 2. *Topics of students' and guest speakers' presentations in Professor's Smith class.*

Week	Student Presentation	Guest speaker presentation
1	<ul style="list-style-type: none"> • Dr. Smith: Climate change. 	Climate change
2	<ul style="list-style-type: none"> • Dr. Smith: Climate change. 	Coastal zone dynamics
3	<ul style="list-style-type: none"> • How many planets? • Forget nature. Eden is engineered. • Crimes of global nature. 	Research findings of Gulf of Mexico fisheries
4	<ul style="list-style-type: none"> • Making the global local: Responding to climate change concerns. • Population and consumption. • An economy for the Earth. 	Idiosyncrasies of marine creatures
5	<ul style="list-style-type: none"> • Factory farming in the developing world. • Common ground for farmers and forests. • Where the sidewalks end. 	Air pollution and allergies
6	<ul style="list-style-type: none"> • Beyond oil. • Powder keg. • Living without oil. 	Barrier islands: Flood and insurance issues
7	<ul style="list-style-type: none"> • Renewable energy: a viable choice. • Fossil fuels and energy independence. • What is nature worth? 	Potential karts aquifer pollution from the city of Tallahassee spray field
8	<ul style="list-style-type: none"> • Where wildlife rules. • Invasive species: pathogens of globalization. • On the termination of species. 	Barrier islands: Flood and insurance issues
9	<ul style="list-style-type: none"> • Where have all the farmers gone? • What is river for? • A human thirst. 	Decimation to possible annihilation of Albatross populations.
10	<ul style="list-style-type: none"> • Our perilous dependence on groundwater. • Oceans are on the critical list. • Three pollutants and an emission. 	Bats: one of humankind's best friends.
11	<ul style="list-style-type: none"> • The quest for clean water. • Solving hazy mysteries. • Feeling the heat: life in the greenhouse. 	Nature writing in the red hills bioregion

For instance, the presentation on bats consisted of the current technological advancements in researching bats and suggestions derived from the guest speaker's research findings to protect their natural colony sites and food resources. The guest speakers' presentations were followed by students' questions sessions, which revolved around the exploration of the technical and methodological issues related the research as well as clarification of the results of the presented materials. In the example above, much of the questions following the bat talk focused on the technology employed in the research.

Dr. Jones also commonly employed lectures in his teaching, summarizing the important information via PowerPoint. (See Table 3 for Dr. Jones's lecture topics.) After his lectures, he allowed a short period of time for his students to ask clarifying questions. In addition to his lectures, Dr. Jones conducted two student-centered classroom simulations. One of these simulations focused on global population and the second one focused on global carbon emission.

Table 3. *Topics of Dr. Jones's lectures.*

Week	Professor's Lecture Topics
1	Understanding Our Environment
2	Matter, Energy, and Life.
3	Biological Communities and Species Interactions
4	Population Biology
5	Human Population
6	Food and Agriculture
7	Pest Control and Environmental Health
8	Biodiversity
9	Land Use: Forests and Grasslands
10	Preserving and Restoring Nature
11	Climate and Air Pollution
12	Conventional Energy. C20 Sustainable Energy.
13	Water Use and Management and Water Pollution
14	Solid, Toxic, and Hazardous Waste
15	Urbanization
16	Carbon policy debate

After each simulation session, the professor conducted a comprehensive discussion with his students to help them make sense of the global environmental issues and the implications of those issues on human life.

Supporting Texts. An important feature of both courses was the text selected by the instructor. In both cases the selected text shaped the choice of lecture topics, and often it was the basis for student presentation in Smith's course. We argue that their selection of text can provide useful insight into their approaches to their courses. At the time of this study, there were several environmental science texts written to specifically address sustainable development. One of these was *Sustaining the Earth* (Miller, 2004), a book recognized by some specialists for its emphasis on sustainable development. Neither text was selected by Dr. Smith or Dr. Jones employing a sustainable development focus. Table 4 is a report of the content analysis of both professors' textbooks and Miller's (2004) text, *Sustaining the Earth*.

Overview of the Courses. The main focus of both professors' teaching emphasized the environmental component of the sustainability triad. Rarely did either professor focus on the economic, social, and cultural implications of the concepts they presented. As an example, during discussions of climate change both professors used a variety of means (i.e., lecture, video, guest speaker, hands-on students' activities,

students' presentations) to “deliver” content knowledge. The professors' choices of content were remarkably the same, with the bulk of both presentations focusing on the chemical aspects of carbon emission, oxides accumulation, and methane consumption.

Table 4. *A comparison of course text with a third, readily available alternative.*

Dimension Book	SIGNS: WHAT IS THE CONTENT OF THE TEXT?	STRUCTURE: HOW IS THE TEXT ORGANIZED?	INTENT: WHAT WAS THE INTENTION OF THE AUTHOR
Dr. Smith's Book [Annual Reports: Environment]	Presents one chapter that talked about sustainable development but offers no guidance for the reader to act sustainably.	Collected articles categorized under six units (e.g., global environment, energy, biosphere, population, and resources).	Presents selected environmental articles that address various environmental issues with one article that focuses on sustainability
Dr. Jones's Book [Environmental Science]	Presents environmental concepts that consider sustainability on a superficial level (i.e., a paragraph at the end of the article). Offers no guidance for the reader to act sustainably.	Has five major units (Environmental Science and Ecological Principles; Physical Resources; Society and the Environment; Food, Land, and Biological Resources; and Population, Economics, Policy and Health).	Presents issues through a solely environmental lens with little focus on sustainability issues.
The Alternative Textbook [Sustaining The Earth by Miller, (2004)]	Addresses mainly sustainability, the content guides the reader of how to function through sustainability, presents stories about successful sustainable behaviors and actions.	Comprehensive environmental topics organized under 14 units (e.g., environmental problems, their causes and sustainability, ecological concepts: species, succession and sustainability, sustaining terrestrial and aquatic biodiversity, sustaining soils and producing food...)	Presents the each environmental issue through the lens of sustainable development.

In Smith's class there was a brief consideration of the loss of glaciers and the implications of further increasing rates of global warming. Jones focused primarily on the water cycle and the biogeochemical cycle. Only toward the end of both classes, human influence on these cycles was explored. In Jones' class, this exploration was done through a PowerPoint slide defining sustainable development, with a brief mention of the Gaia hypothesis, followed by an early dismissal from the class. In Smith's class, this exploration was a concluding assertion that humans were increasing the concentration of

carbon dioxide (focusing back on the role of carbon in the biogeochemical cycles), an assertion not followed by subsequent discussion or explanation.

Climate change could have been a suitable topic for discussing economic and social consequences. Neither the professors, nor students' activities and the guest speakers addressed these dimensions to any significant degree. When these dimensions were mentioned, they were considered for only a fraction of class time. Echoing this, the questions and comments sessions that followed each classroom presentations largely revolved around clarifying the technical knowledge presented. In sum, the presentations remained largely didactic and science-focused, and the economic and social aspects of this topic were not addressed.

Two instances ran counter to this almost singular emphasis on the environmental aspect of the sustainability triad, both of which were in Dr. Jones' course. One instance involved a class on environmental pollution and its consequences on the global environment. This class began with Dr. Jones' short lecture about the consequences of environmental pollution. Next, Dr. Jones divided the students into several groups and asked groups to select a country to determine the amount of pollutants emitted from each country. Dr. Jones gathered information from each group and graphed it in front of the class in an attempt to show students trends in carbon emissions. He asked students to arrange the countries in order from most to least amount of pollutant per capita. To close this lesson, Jones asked his students to suggest possible strategies to reduce air pollution.

Although the courses tended to focus on science content, both professors recognized the value of making students more knowledgeable about the environmental topics.

I believe that they need to have significant content in order to be environmentally aware ...so the main thing that I teach is content that is technical component. Like, you know, the idea that the ecosystem recycles matters and energy and those technical ideas related to the three laws of thermodynamics...That helps them understand ecosystem[s] ...(J, 03/05)

But while the professors were concerned with enhancing students' environmental awareness, they had an almost sole focus on the environmental aspect of the sustainability triad.

...[As an example] they [students] need to know that power plants release mercury and they need to know what is the effect of mercury on the environment. I need to educate them about just the facts of the environment. (S, 02/05)

Each professor argued that providing students with basic scientific knowledge about environmental issues *may* allow them to think about solving environmental problems by themselves. Both professors also explained that prompting students to consider possible solutions to environmental problems was not part of their responsibilities:

You [the professor] might have a certain point of view but it is better to let the [students] figure it out by themselves and search for the solution instead of dragging them to the solution that you want. There is a proverb that says, you can lead a horse to water but you can't make him drink. (S, 02/05)

Both professors emphasized the need to provide their students with basic environmental knowledge, yet they recognized that they largely omitted other aspects of the ESD triad: "This class has a place in the curriculum ...in which the [students] get the chance to learn the technical environmental stuff. The focus [in this class] is on the technical stuff even if it is the least important." (J, 03/05)

Barriers to ESD

Each professor explicitly considered sustainability issues, yet neither was successful in engaging students in such considerations. Both professors encountered serious barriers in their activity of ESD. These barriers had multiple origins, some originating from the wider context while others were derived from personal characteristics of the professor. The personal barriers, which are the focus of this study, arose from the professors' fundamental beliefs related to teaching and learning, and they served shaping their teaching priorities.

Fear of Indoctrination. Both Jones and Smith took great care to present "unbiased" materials to their students and they selected to accomplish this via the presentation of "solid scientific facts." However, the implications of these "facts" were not considered in either course. Instead, the professors expected students to employ this information in their own consideration of the material.

...I guess I want them to think for themselves, I just want to give them the facts and let them think for themselves and I don't think that it is my business to make them see things my way, but I want them to understand the way things are and give them an objective point and they can make their mind. (S, 02/05)

Smith's point that supporting these considerations was "not his business" is significant. In fact, both professors feared being perceived as indoctrinating students or forcing a singular point of view in the classroom. This fear caused them to rely on delivering environmental information, to focus on one part of the sustainability triad:

Telling them what [the students] have to do, the idea that [the students] know nothing and need to be treated like their brains need to be erased and rewritten. I don't agree with that. ...*I don't want to close their ways of thinking* [researcher emphasis]. (J, 02/05)

Dr. Smith explained;

.... a lot of the current problems that face our society I don't have solutions for them. Therefore, I try to make them (students) aware of these

problems..... it would be pressure for me to tell them about the solution. I could say “we need to do this and this”, [but] I am not a policy maker. [I don’t] have to push some agenda. I am here just make them aware of the problems. (S, 01/05)

Similarly, for Dr. his role was;

...I think my role is strictly content and in that way my students can trust what they hear from me, because it has been said that environmentalists are trying to obtain some political objectives and agenda and I don’t want to be accused of that. (J, 02/05)

The professors were comfortable presenting what they understood to be “objective facts” that describe “the way things are”. Thus, they understood their reliance on presenting “objective” “facts” to be an approach to preclude indoctrination. Fear of indoctrination, or telling students “what to think”, prevented these professors from taking active steps to support students’ consideration of sustainable development. Their fear of indoctrination caused both professors to house their teaching activities firmly in the scientific portion of the ESD triangle. To consider the intersections of science, economics and society was perceived as leading students toward ideas that were biased because sustainability has a clear message about human action. Indeed, Smith considered explicit teaching for sustainable development as a type of abuse of his position as a teacher:

I don’t preach but I do make a point. I don’t think that I can honestly teach them to be critical thinkers if I told them how to think. I need to give them room. It is important for me not to abuse my power and ask question in such a way that if they did not tell me what I want to hear they will get it wrong. (J, 02/05)

Indeed, he considered such “preaching” as disrespectful to his students. Instead, both professors “presented the facts” and hoped that their students would come to an understanding of the needed human action as they “made up their own minds” without instructor support.

Indoctrination is, in many ways, antithetical to the spirit of education. Cuypers and Haji (2006, p. 724) echoing Seigel’s (1991) earlier discussion describe that the purpose of education is to ensure that students are ‘able to assess beliefs, desires, actions...and be motivated by good reasons in belief-formation and actions’. In Seigel’s argument, ‘good reason’ would be the use of evidenced-based reasoning. Indoctrination, in contrast, occurs when students are taught to accept some knowledge claims unconditionally, to ‘believe’ in epistemological soundness of knowledge claims without evaluating the associated evidence, thus by-passing students’ free and uncritical deliberation of ideas (Huttunen, 2003). Green (1972) supports this with his contrast of teaching and indoctrination. In teaching, students are not only taught ‘what to do or to believe’, but ‘what to do or to believe *for some good reason*’ (p. 30). In indoctrination, the emphasis is on shaping belief without a corresponding emphasis on the reasons

supporting these beliefs. The two professors in this study balked at the notion of shaping students' beliefs, "I don't think that I can honestly teach them to be critical thinkers if I told them how to think", for fear they would be accused indoctrinating those students (persuading them without good reason).

The fear of indoctrination seen in these two professors is echoed in other environmental education research. Although much of the existing quantitative research evidence suggests widespread agreement among teachers for advocating and promoting positive environmental attitudes (Ballantyne, 1999; Grace & Sharp, 2000; Lee, 1993; Tomlins & Froud, 1994), the teachers in Cotton's (2006) study felt strongly that they should try to avoid influencing students' attitudes toward the environment, or imposing any kind of pro-environmental agenda.

Indoctrination and the Wider Culture. A teacher's work is shaped by the context in which it is embedded (Gess-Newsome et al., 2003). In the United States, the Constitution protects and fosters independence of thought and speech of all individuals regardless of their race, religion, and political affiliation (Steve, 2001). There are several other examples of explicit efforts to guard against indoctrination. The American Association of University Professors (AAUP), an organization began in 1915 to maintain academic freedom in the work of professors, currently maintains that

[P]rofessors should not take unfair advantage of the student's immaturity by indoctrinating him/her with the teacher's own opinions before the student has had an opportunity fairly to examine other opinions upon the matters in question, and before he/her has sufficient knowledge and ripeness of judgment to be entitled to form any definitive opinion of his/her own (American Association of University Professors, 2005).

Another example is the Academic Freedom Bill that was proposed to the House of Representatives by Bill Baxley of the Florida State Legislature. The Academic Freedom Bill states that "academic freedom is most likely to thrive in an environment that protects and fosters independence of thought and speech" (Florida House bill no. 837, p. 1). Toward those ends this bill sought to assure "Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion" (p. 1). The bill also suggested that faculty and instructors have a right to academic freedom in the classroom in discussing their subjects, but they must make their students aware of serious scholarly viewpoints other than their own (Baxley, 2005).

For another marker of the seemingly privilege of pluralistic discussion in American education one can look to the former president, George Bush, and his own position on the teaching of intelligent design in American schools (Associated Press Notice, 2005). President Bush suggests that both evolution and intelligent design should be considered by students studying biology, explaining, "I think that part of education is to expose people to different schools of thought" (p. 1). Clearly the spirit of education champions the consideration of multiple points of view. Many educational organizations (such as AAUP) actively work to maintain a broad perspective in education, and thus

limit instances of indoctrination. Given this widespread cultural distain of what is seen as indoctrination, it is not surprising that we see these sentiments reflected in the professors who are at the heart of this study. As shown in the case studies, both professors shared and reflected their society's rejection of indoctrination.

However, it is necessary to analyze this rejection. The Bush administration's endorsement of 'multiple points of view' in terms of intelligent design and evolution and their 2003 critique of the Environmental Education seems to limit teaching to the presentation of 'points of view' and stops helping students make sense of and compare knowledge claims. In this conceptualization, indoctrination is seen as any form of teaching that has at one of its outcomes (intended or otherwise) persuasion of the student, with or without the presentation of evidence as a means of this persuasion.

'Presenting the facts' without analysis of the epistemological merits of these facts resulted in the disappearance of the critical analysis in the two professors' classes. Although both professors hoped that their students would critically discuss the presented material in the light of the three dimensions of sustainability--environment, society, and economy—their teaching practices did not foster these analyses in their classes. As evidenced by the classroom discussions, the professors' sole reliance on the science aspect of the sustainability triad led students to make decisions regarding the environment as all citizens do. Although the students held positions on sustainable development, the courses were ineffective to explicitly require the students' careful consideration of these positions.

Professors' Beliefs about Teaching & Learning. At several points during this study, we asked the professors to discuss their beliefs about learning and pedagogy. Both demonstrated similar pedagogical beliefs about the process, method, and objective of their courses. They conceived learning to be the straightforward assimilation of information, where the teacher is the main actor in delivering that information. We saw evidence of their beliefs about the process of learning throughout the interviews. Favoring lecturing as his main teaching method, Dr. Smith explained;

...I tend to think that lecture is a good way to convey knowledge ...and in my opinion you can spend along day to learn a concept using other new ways but in a lecture you can say it quickly. It is effective. (S, 03/05)

As a professor, Dr. Jones also thought that his role is to deliver the information to his students; "I was trying to convey information about the foundation of ecosystems and the organization of energy and matter on planet." (J, 02/05).

Both professors repeatedly used the term "convey" in interviews when we discussed teaching, and it proved to be an apt description of their beliefs about teaching and learning. In justifying his need to convey, Dr. Smith explained his intensive use of lecture by comparing the amount of knowledge and information that he and his students have: Dr. Smith explained "I tend to lecture a lot and that comes from the thought that "I have the info and they don't know and I need to tell them" (S, 03/05). Moreover, the perception of how students should be taught limited the professor's use of classroom

discussion as a potentially innovative tool of teaching: "...For me I haven't done that much discussion in the class because I know more than them and they know nothing [about this material] so there is no reason for them to talk. I need to tell them the information. (S, 02/05)

Furthermore, his belief halted his desire to broaden his approaches to teaching:

...I have not had the interest to look to innovative teaching ways because I tend to think that lecture is a good way and I think that a lot of innovation [focuses] on self discovery and in my opinion they are very slow and time consuming. (S, 03/05)

In contrast, Dr. Jones demonstrated an enthusiasm to learn more about teaching and was anxious to participate in workshops devoted to the use of innovative teaching strategies, but to date was unsuccessful in finding many meaningful approaches:

I want to know more about learning styles and pedagogical stuff. I need that stuff. So that would be the most important thing for me. There are programs on campus and I have gone to most of them but most of them are technologically oriented and full of technology and less appreciation of humanity. (J, 03/05).

Jones was attempting to broaden his understandings of teaching, as reflected by the two activities he conducted in the classroom, however, at the time of the study, the movement was modest, and he continue to rely on traditional patterns in teaching and learning to a large degree.

As has been reflected in these two case studies, teachers' beliefs and thinking affect their implicit perceptions, plans, and actions in classroom (Haney, Czerniak, & Lumpe, 1996; Pajares, 1992). The literature on teachers' beliefs emphasizes the strong relationship between teachers' beliefs and the teaching methods and strategies that they use inside their classrooms (Brickhouse & Bodner, 1992; Cronin-Jones, 1991; Dickinson, Bums, Hagen, & Locker, 1997; Hammrich, 1997; Laplante, 1997). It is also important to recognize that the teaching culture and environment also influence the way teachers teach (Gess-Newsome et al., 2003; Hargreaves, 1994). Several particular features of the cultural contexts of teaching play significant roles in shaping the process of teaching itself. These features include the nature of faculty collaboration (Fullan & Stiegelbauer, 1991; Hargreaves, 1994), professional development experiences (Ball, 1990; Little, 1995), the perception and definition of group goals (Hargreaves, 1994), and the influence of administrative leaders such as the department chair (Siskin, 1991).

In the case of this study, the teaching context of both subjects more highly valued research than teaching. This context did not support the professors in an exploration of new innovative teaching strategies aside from providing technological aids nor did it foster a close consideration of their own assumptions about teaching and learning. As importantly, the lack of community between faculty members limited their chances of discussing and developing their teaching beliefs and practices.

The Interaction of Professors' Beliefs. The two themes outlined (fear of indoctrination and beliefs about teaching and learning) interacted to shape both professors' activities of education for sustainability. It is not surprising to see that the professors' beliefs fundamentally shaped their teaching. Their traditional conception of the process of teaching and learning shaped their choice of teaching methods. Lecture was viewed as the easiest way to deliver information, and this approach was supported by the professors' beliefs that learning was a relatively straightforward process that simply required an engaged learner. They also favored the use of lectures as they were familiar with and prepared for this approach, thus negating the demands required adopting a new, more interactive, multi-focused teaching approach, as would also be required by ESD.

In connection with their beliefs about learning, the professors' fear of indoctrinating their students prevented them from leading students to critique and analyze the presented information in the light of sustainability paradigm. Given the professors' beliefs about teaching and learning, they understood their responsibility was to provide students information that students could assimilate, without reflecting on the meaning that knowledge might have for them personally. The university context, which heavily privileged the act of knowledge production over teaching, ensured that this traditional approach was not problematized personally or institutionally, even though the professors recognized that they were not achieving the ESD aspect of their instructional goals.

The science education literature is replete with many classroom-based studies that illustrate how different aspects of teachers' beliefs about science, and about science teaching and learning, influence teaching methods and strategies (Brickhouse & Bodner, 1992; Cronin-Jones, 1991; Dickinson, Bums, Hagen, & Hammrich, 1997; Laplante, 1997). The relationship between beliefs and practice is dynamic; that is, teachers' beliefs influence their practice, but experiences may also lead to changes in and/or additions to teachers' beliefs (Bullough & Baughman, 1997; Richardson, 1996; Smith, 2002). In these cases, the belief systems of the professors allowed for and were supported by their practice.

Recall that both professors indicated a desire for students to gain an appreciation of environmental stewardship, which is related to ESD. According to Calderhead (1992) and Thompson (1992), teachers' perceived beliefs may not match their practice. What teachers say may or may not be reflective of their true beliefs, it may be a reflection of what the teacher believes is appropriate to say, or what the teacher would hope for. For professors in this study, although they expressed that addressing the three components of sustainability triad as a teaching goal, they understood that the only defensible manner in which to work toward this goal in the context of a university environmental science course was to help develop a strong environmental knowledge base in their students:

I believe that [my students] need to have significant content in order to be environmentally aware citizens and the citizenship requires an understanding of the various aspects of the environmental issues.....I am not going to do lots of preaching to them. (J, 01/05)

The intersection of their belief of teaching as telling, learning as the assimilation of that knowledge by an engaged learner, and their perception that a clear call for action would result from any close consideration of an environmental issue, left scant room for supporting students' consideration of material if they were to avoid indoctrinating students.

Discussion and Implications: Resolving Barriers to ESD

Researchers working in the K-12 arena recognize that the traditional approaches to environmental issues, especially those described in the reform documents and standards themselves (AAAS, 1990, 1993; NRC, 1996), fall far short of building upon advances in both scientific and educational research (Anderson, Mohan & Sharma, 2005). Educational institutions such as universities and schools can serve as a 'home' for generating, accumulating, and circulating ESD curricula and discussions (Luke, 2001). In spite of their potential to provide both foundational knowledge and skills for students and the generation of new scientific knowledge for further understanding, universities seldom reach these potential (Luke, 2001).

In many educational institutions, the environmental knowledge fostered has as its core local environmental issues that are the charge of the everyday citizen (i.e. should I use paper, plastic, or cloth bags?), but these local decisions are presented isolated from modern economies, modern science, and concerns of the larger society (Luke, 2001). More encompassing, complex views of the environment (i.e., what are the environmental and economic costs of an oil based economy) are often presented as highly technical, complex and out of the bounds of the common citizens. This research shed light on the reason for this pattern.

The central goal of this research was to craft an understanding of the influences on two university professors' approaches to ESD. This effort resulted in the identification of the personal barriers to ESD, derived from professors' fear of indoctrination as well as their more fundamental beliefs about teaching and learning. If we are to move toward ESD in university classrooms (Cortese, 1999; Filho, 1999; Orr, 1992), then we argue that we must move toward resolution of the barriers identified in this study.

In this research, one of the most significant personal barriers to ESD was the fear of indoctrination. The critical pedagogy for environmental education advocated by Fien (1993) and Breiting and Mogensen (1999), among others, seems far removed from these teachers' pedagogy. Their beliefs about the appropriate role of a teacher in American society took precedence over the more radical aims of environmental education, even when these aims are specifically advocated by the syllabus. In this way, the teachers' beliefs acted as a critical mediating factor between the syllabus and the classroom (e.g. Ball & Bowe, 1992; Brown & McIntyre, 1993; Cotton, 2006).

Fear of indoctrination interacted with professors' conceptions of teaching and learning and prevented them from supporting students' deep analysis of environmental issues required for ESD. This fear has long been echoed by others in the environmental

education arena (Ashley, 2005; Bonnett, 1999; Jickling, 1992, 2001). Mappin and Johnson (2005, p.1) argue that one of the major challenges that environmental education must address is growing public concern that environmental education has become blurred with advocacy. This conversation echoes that in the broader arena of education in which a committee of the American Association of university professors (Finklin et al., 2007) ask “How is education to be distinguished from indoctrination?” and in science education when Smith and Siegel (2004) ask “What is an appropriate goal of science education?”

Ashley (2005) and Tan (2004) argue that despite the nearly ubiquitous American position on indoctrination, some types of indoctrination are still accepted parts of our everyday lives. They discuss that children are indoctrinated into the values and beliefs of their families, and as they mature they are indoctrinated into the value system of their wider community, and finally the society in which they live. But in education, Finklin et al. (2007, p.1) suggest that “it is not indoctrination for professors to expect students to comprehend ideas and apply knowledge that is accepted as true within a relevant discipline”, and they go on to explain that “it is a dereliction of professional responsibility to fail to do so”. But as Smith and Seigel (2004) are quick to point out, there is a difference between understanding a knowledge claim and belief in that claim, or even acceptance of that claim as the most useful scientific explanation of a phenomenon. They suggest that the former, understanding, is an acceptable goal of education, while belief or acceptance is beyond the appropriate purview of the educator.

Crossing the boundary between indoctrination and education seemed to be the core of the fear that shaped these professors’ teaching. It is important to recognize that teachers’ requirement that students analyze the merits of knowledge claims does not constitute indoctrination; instead, indoctrination occurs when teachers insist on the truth of knowledge claims and refuse students the opportunity to analyze and contest them.

The discussion about indoctrination and education brings up an important question about the purpose of education in liberal societies. According to Bell (2004), the purpose of education in democratic and liberal societies is to prepare children for citizenship in a society of free and equal citizens, each with the capacity to form, revise and pursue their own doctrines, and the ability to live by principles of justice appropriate for such a society. That understanding of the purpose of education harmonizes with Rawl’s vision of education in liberal societies. Rawl (1993) (as cited in Bell, 2004, p. 39) argues that education should promote ‘freedom’ by teaching children that they have the right to choose how to live their lives (within the limits of justice) and by ensuring that they have the necessary skills to support themselves in a modern society. Likewise, Ashly (2005) explains that education should provide individuals with the needed basic knowledge and cultural aspirations and values to foster their critical thinking skills.

We argue that educators need to inculcate, as Siegel (1991) describes it, a generative core of beliefs around ESD so that students will eventually gain professional autonomy. However, with regard to resolving these professors’ concerns about the indoctrination and education for sustainable development, it is helpful to look to the work of Fien (1993) and many other accounts of the critical pedagogy of education for the environment. These theorists recommend several strategies as safeguards against

indoctrination while still seeking to support student analysis and application of ideas. Examples of these strategies are inquiry learning, political literacy, and action research via community problem solving. By using these strategies, teachers can guide their students in a journey of analyzing and critiquing the wide array of community-based environmental problems to build their professional autonomy. Indeed, Fien (1993) and Jensen and Schnack (1994) outline the pedagogical processes for facilitating student action in the community and provide careful principles for teaching democratically for environmental citizenship.

Additionally, Scott (2002) explains that while environmental educators have a responsibility to avoid indoctrination, they have four kinds of responsibilities along these lines. One of these responsibilities is to help learners understand why the idea of sustainable development ought to be of interest to them; the second is to help students gain multiple perspectives on issues from a range of cultural stances; the third is to provide opportunities for an active consideration of issues through appropriate pedagogies that, for example, might begin from students' and teachers' different interests, helping students understand what they are learning and its significance; and the last one is to encourage students to continue to think about what to do, individually and socially, and to keep their own and others' options open. However, Scott (2002) emphasizes that doing less than this seems neglectful; but doing much more runs the risk of indoctrination.

By following the aforementioned recommendations and strategies, professors can ensure that their mission of the education for sustainability is not to indoctrinate but to educate people who are able to evaluate the utility of knowledge claims and act to maintain the best of what we have, to challenge the unsustainable, and to build the desirable (Hoepper, 1993; Orr, 1992).

As Snook (1972) argues, there is a thin and sometimes difficult-to-delineate line between education and indoctrination, but a thorough analysis on this issue and reflection upon one's current teaching practices in relation to the many practices described in the literature is a fundamental requirement of moving toward ESD. We argue that the professors' positions on indoctrination were drawn largely from cultural norms and expectations, as such these positions seem kin more to beliefs about education rather than reasoned, closely examined knowledge of education (Southerland, Sinatra & Matthews, 2001). The thorough analysis of the goals of their teaching and their own classroom practices called for in this research would allow these professors (and others) to consciously build a reasoned and articulated positions on the role and nature of indoctrination in their classroom. We argue that being consciously aware of the boundaries of acceptable practice is essential if these professors are to move beyond providing "facts" and supporting their students in making sense of scientific information. We argue that if students are to become scientifically (and specifically environmentally) literate and become responsible global citizens, then they must become adept at making informed decisions informed by diverse perspectives. To achieve this goal, we must begin to structure and support such careful considerations in our science classrooms. And we must recognize that structuring for opportunities to weigh the merits of knowledge claims is not 'telling students what to think' but allowing them the opportunity to practice critical thought.

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