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Education for Sustainable Development at the University Level: Interactions of the Need for Community, Fear of Indoctrination, and the Demands of Work

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EDUCATION FOR SUSTAINABLE DEVELOPMENT AT THE UNIVERSITY LEVEL: INTERACTIONS OF THE NEED FOR COMMUNITY, FEAR OF INDOCTRINATION, AND THE DEMANDS OF WORK

BY

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This dissertation is dedicated to my family. For always being able to count on your never-ending love, compassion, and support.

To my friend, Oula, who gave me the passion and support.

Thanks to you all.
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ABSTRACT

The goal of this study was to describe the factors that influence education for sustainable development (ESD) in American universities. Cultural Historical Activity Theory (CHAT) was employed as the theoretical lens to analyze the activity of ESD (Engeström & Miettinen 1999). Data were collected by focusing on two university professors through a series of interviews, classroom observations, and artifacts. The findings of the study demonstrated that both professors encountered serious contradictions in their activity of ESD. These contradictions were both contextual and personal in origin and caused the professors to reshape the object of their teaching activity.

The contextual contradictions originated from rules of the professors’ institution, their inner and outer communities, and the division of labor in their work environment. The thematic analysis of the data revealed that the contextual contradictions included demanding work responsibilities, emphasis on research over teaching, and lack of community to consider teaching in general and specifically for ESD.

The personal contradictions arose from the professors’ personal philosophies, perspectives, and visions of sustainable development. Again the thematic analysis revealed the personal contradictions arose from the professors’ conceptions of teaching and learning, fear of indoctrination, and again lack of community to support the consideration of teaching.

Due to these contradictions in their activity systems, both professors narrowed their sustainability objects to address only one side of sustainability paradigm (the science component), changing the outcomes of their teaching activity to that of preparing environmentally informed citizens. While one professor focused on his new object of delivering environmental knowledge, the other professor adopted a mitigation strategy of focusing on the dual object of sustainability and delivering environmental knowledge.

The study offers several strategies to resolve the personal and contextual contradictions identified in this study. Specifically addressed are strategies to alleviate their fear of indoctrination and to access surrounding teaching communities. It also offers strategies focusing on contextual contradictions: establishing ESD communities inside the university and changing faculty incentive and reward structures within the university.
CHAPTER 1
INTRODUCTION

Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. We the undersigned, senior members of the world’s scientific community, hereby warn all humanity of what lies ahead. A great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated (Suzuki, 1993, p. 4).

Suzuki’s comments reflect a growing concern that human behavior is contributing to severe and potentially irreversible changes to the biosphere. The influences of these behaviors have been greatly intensified in the wake of industrial, scientific, and technological revolutions.

Humans now appear to be the enemy of the natural environment in which are civilization is based (Hadisuwarno, 1997). Rapid population growth and over consumption of resources produce increasing pressures on the environment. These pressures are direct, in over–exploitation of non-renewable resources and their productive potential, and indirect, in the production of more waste products that can be absorbed and processed by the natural environment. The result is air and water pollution and the extinction of numerous animal and plant species (Environmental Protection Agency, 2003).

Paradoxically, although humans are often seen as an enemy of the natural environment, they are also the key actors in solving the environmental problems. However, before the problems can be addressed, we must acknowledge them, and this can occur only when we educate people about environmental quality and ecological balance. Environmental education is recognized as the most promising approach to increase environmental awareness and to produce a logical knowledge base on which
people can make intelligent choices among alternatives in environment protection (Desinger, 1982).

In recent years, much of the discussion of environmental action and education employs sustainable development as a key guiding notion (Bonnett, 1999). The growing consensus about the usefulness of this notion is reflected in a number of influential reports such as those of the Brundtland Commission, Our common future, the World Commission on Environment and Development, and the Rio Earth Summit’s Agenda 21 (UNCED, 1992).

The World Commission on Environment and Development (WCED) introduced the need for the integration of environmental concerns and development goals within the broader concept of sustainable development. WCED defines sustainable development as “development that meets the generation’s needs of the present without compromising the ability of future generations to meet their needs” (WCED, 1987, p. 43).

Sustainable development calls for a redefinition of our relationship with the environment and a reconceptualization of the process of development. It demands a radical transformation in people’s perspectives, values, and lifestyles to ones that promote environmental care and sustainable living. It is imperative, therefore, that countries examine and reformulate their development polices and implement ecological, economic and social reforms in the transition towards sustainability.

In its attempts to achieve sustainability, the U.S. government formed a President’s Council on Sustainable Development (PCSD) to facilitate the communication between the various sectors of American society across the country. The council describes that there is a real need for a citizenry with increased knowledge of the environment and the integrative skills needed for understanding the interdependent relationships between the environment and the economy (National Forum on Partnerships Supporting Education about the Environment, 1994). Moreover, in their reports, the council argues that the responsibility of promoting ESD rests on educational institutions (National Forum on Partnerships Supporting Education about the Environment, 1994).

One important factor in producing such an educated citizenry rests with higher education institutions; clearly, they are vital in producing an environmentally literate population that can advance the transition to sustainability (Cortese, 2003; Fien &
University professors, who are considered to be the cornerstones in preparing future generations, can play a crucial role in altering students’ behaviors and attitudes toward sustainable development.

Currently, there is little research that deals specifically with university faculty’s attempts toward ESD. But there is some research that can be brought to bear on this issue. The research literature clearly articulates that university professors are surrounded with multiple contexts; personal and contextual. These multiple contexts influence their teaching. For instance, Gess-Newsome, Southerland, Johnston & Woodbury (2003) note that faculty’s knowledge and beliefs concerning teaching, learners, schools, schooling, and subject matter as well as a host of structural and cultural considerations do influence their teaching. Therefore, if we are to understand ESD at a university level, then it is imperative that such research takes into account not only the university professors’ personal characteristics (their beliefs and thinking), but also a close examination of the context in which such educational practices occur. It is my argument that to understand ESD, one must focus not just on the teachers but also on the broader system in which they work.

To address the paucity of research into ESD, this investigation is an attempt to understand the dynamics of ESD mindful of the multiple contextual facets of education by employing the cultural-historical activity theory (Engeström & Miettinen, 1999). The Cultural-Historical Activity Theory (CHAT) (Engeström & Miettinen, 1999) is a sound theoretical framework because of its capability to enable researchers to consider the multiple facets and elements that interact with the studied social phenomena. In this study, I selected CHAT for the theoretical frame by which to understand the ESD teaching activity, “as this frame requires the researcher to describe not only teacher beliefs and knowledge, but also requires a serious consideration of the other aspects of the activity system, including the structural, cultural, and historical features that shape the activity of teaching” (Kahveci, Gilmer & Southerland, in progress, p. 6) for sustainable development.

Another important aspect of activity theory is “the analysis of imbalances or contradictions in the overall system (Engeström, 1987; Roth et al., 2002), a search for
features of the system that are at odds with one another” (Kahveci, et. al., in progress, p. 6). Given its emphasis on contradictions in a system of activity, I argue that CHAT holds promise in helping illuminate the facets that are important in allowing for the activity of ESD as well as facets inhibiting this activity.

My purpose was to understand the broader activity of ESD. For this, I analyzed the university professors’ thinking, beliefs, and teaching contexts, with a particular emphasis on the types of contradictions the professors face in their ESD activity and their practices regarding education for SD. By analyzing the various components required for this activity, I sought to identify areas of contradictions in the current system that may be targeted for later transformation. I anticipate that my study will contribute to the educational literature by identifying the multiple elements that shape with the ESD activity system at the university level.

Statement of Problem and Purpose

Promoting ESD in schools and universities has captured the attention of global community. Given the role of universities in preparing the future teachers for school, we must pay particular attention to understanding ESD at universities.

The process of promoting ESD programs in universities represents difficult and complex task (Hungerford & Volk, 1990; McKeown, 2002). However, we need to understand the different elements that constitute the activity of education for SD at the university level (i.e., teacher beliefs and knowledge of teaching practices, cultural expectations and norms for environmental education courses, the tools available for such work) to facilitate that promotion. Indeed, it is not well understood what contextual elements are likely to support or inhibit university professors in their attempts to teach for sustainable development. What factors within the context encourage university professors to address sustainability issues in their teaching? What social and structural factors within teaching communities facilitate or constrain ESD? These questions need to be addressed to better understand the complexities involved in ESD.

The goal of this study was to identify these factors by employing the CHAT, a theory that forces particular attention on the multiple contextual elements involved in
their teaching. My focus on studying university professors stemmed from the belief that universities turn out graduates who often fill strategic roles in various fields of national, regional and local development. If these institutions do not help future economic, political, social and cultural leaders and professionals to think and act critically about sustainable development issues, then the goal of ecological security becomes even more difficult to attain. Furthermore, since the focus of this study was on ESD, it addressed an issue which is particularly relevant to the United States context, considering the state of the country’s environment and natural resources. The valuable information that generated from the findings in this study will contribute to the pool of knowledge on ESD not only in the United States but also in other countries as well.

The outcomes are of particular significance to the research site of this study in the formulation of ESD policies, the improvement of curriculum and pedagogy and in planning projects that promote ESD. More importantly, the findings could serve as background knowledge for teachers in their ESD as they discover the necessity of addressing issues of ecological security, economic development, and social justice. Finally, this study could provide valuable insights for international development agencies and institutions in the improvement and implementation of their ESD programs.

**Research Questions**

The following was the research question (and its sub-questions) that guided my research.

1. What are the influences on university professors’ education for sustainable development and how do these influences interact?

   - What is the state of education for sustainable development at a typical university environment-related science class?

   - How do features of the university context influence the manner in which professors teach for sustainable development?
- Which factors, both personal and contextual, support education for sustainable development and which factors inhibit it? How do these factors interact?

- What are the university professors’ perspectives in resolving the contradictions they face to achieve the object of ESD?

By answering these questions, I hoped to be able to understand the dynamics of ESD, an understanding that might prove to be useful in helping to better hone ESD efforts.
CHAPTER 2

REVIEW OF THE LITERATURE

This chapter presents a review of the literature on sustainable development and ESD. It traces the origin and the historical development of the concept, highlighting the global events that have taken place and the dilemmas and problems that have helped frame the questions of sustainable development and ESD. This chapter has six sections: 1) the current state of global environmental degradation; 2) the search for a new environmentalism; 3) the concept of sustainable development in the global context; 4) education for sustainable development in the global setting; 5) teachers and teacher thinking; and 6) beliefs and environmental education.

The Current State of the Global Environmental Degradation

We live in a world where environmental degradation is pervasive and accelerating (Barber, 2003; Glasby, 2002). Among the various environmental issues, global warming is potentially the most serious global problem.

The influence of greenhouse gases on world climate has long been documented (Revelle, 1982). However, the most intense change in climatic conditions would take place if the greenhouse capacity of the atmosphere (i.e. the collective impacts of CO2, CH4, N2O and CFC’s) were to reach the CO2 equivalent of 750 ppm (Barber, 2003). This would result into a substantial weakening of the Atlantic conveyor circulation and disruption of the North Atlantic Bottom Water circulation (Broecker, 1997; Rahmsdorf, 2000).

Some scientists (Glasby, 1995) suspect that crippling the ocean’s conveyor system would lead to a cooling of Western Europe as a result of termination of the Gulf Stream and heating of the tropics with a resultant disruption of the monsoons. This would have a major impact on world agriculture and dire prediction emphasizes the need to limit inputs of greenhouse gases into the atmosphere. As global warming continues to intensify it is thought that many atmospheric extremes will lead to significant increases in the frequency and severity of heat waves, droughts, bush fires, tropical and extratropical
cyclones, tornadoes, hailstorms, floods and storm surges in many parts of the world (Glasby, 2002).

Another serious environmental problem that faces humanity is the loss of biodiversity (Glasby, 2002). At present, the rate at which species are disappearing is about 1000–10,000 times than normal and at this rate more than 25% of all species could disappear within the next two decades. This rate of collapse is unequalled since the extinction event at the Cretaceous-Tertiary boundary (Glasby, 2002). A diverse biosphere is, of course, essential to a sustainable environment for two important reasons; one is the intrinsic values of, which facilitate continued evolution and second for ecological services for humankind that have economic, aesthetic or recreational value (Quebec biodiversity website, 2005).

Although scientists suggest several ways to solve these problems (World Commission on Environment and Development, 1987; Brown, 1998), they are short on ways to implement these ideas effectively; thus the environmental degradation continues.

Despite of the prominence of indicators of environmental degradation, humanity’s global consumption and production of goods is increasing. According to the 1998 Human Development Report, global consumption expenditure doubled in the past 25 years (see Figure 1 for the global consumption expenditures in industrial and developing countires), reaching $24 trillion in 1998 (UNDP, 1998).

![Figure 1. Global consumption expenditures in industrial and developing countries. Source: UNEP (1998)](image)

This increase, linked with population growth and economic globalization, brings mixed responses of celebration and alarm. Some see such growth as indicating economic prosperity and wealth that may ultimately provide the financial resources needed for
environmental protection. Others warn that the ecological degradation and social inequity accompany blind economic growth. The previous description of the current global environment shows that humans are currently overtaxing the ecosystems on which we depend to survive. The global community, however, has begun to realize the urgent need to exercise restraint in the way we utilize the resources of this planet to regain our environmental balance.

To achieve that balance, the world’s leaders convened at the World Summit on Sustainable Development (WSSD) in 1987 searching for a new paradigm of environmentalism to help humanity reverse or at least slow the current consumption patterns. In the following section, I will explore these paradigms and the philosophical basis of each.

**The Search for a New Environmentalism**

The search for a new environmentalism was initiated after the United Nations conference on the human environment in Stockholm in 1972. That conference represents a significant landmark of national and international recognition of environmental problems (Barber, 2003; Glasby, 2003; Veeman & Politylo, 2002). The fundamental division that surfaced during the conference’s discussions was between those who adopted anthropocentric ecological perspectives and non-anthropocentric (ecocentric) perspectives. The anthropocentric perspective, described as the technocentric mode (Pepper, 1996), denies the non-human world any value and views the world as a collection of resources for human exploitation. Contrary to this view, ecocentrism argues for low impact technology and demands a code of behavior, seeking performance and stability based on ecological principles of diversity and homeostasis (O’Riordan, 1989; Pepper, 1996).

Currently the anthropocentric view is dominant, and proponents of this view place great faith in the promotion of economic growth directed by market mechanisms to reduce poverty and inequality. In contrast, the advocates of the new ecological paradigm claim that economic growth, high consumption and uncontrolled population levels generate lifestyles that deplete resources and bring disturbances to ecosystems that free markets can not protect.
The two paradigms are reflective of Orr's (1992) two perspectives of sustainability: technological sustainability, which is based on the premise that humankind is dominant over nature and will find a "techno-fix" for every problem we face, and ecological sustainability, which is based on the premises that humankind is part of nature and that there are limits to growth. In this latter paradigm, nature and consideration of carrying capacity should be considered in the design of housing, cities, neighborhoods, technologies and regional economies.

To better understand the previous environmental paradigms, O'Riordan (1989) presents a review of environmental ideologies categorized on a spectrum from technocentrism on one end and ecocentrism on the other, with other views represented on different points in this continuum that runs from light green to dark green (See Table 1 for perspectives on environmental politics and resource management). In O’Riordan’s classification, there are two major positions under each ecological orientation. Under the technocentric position are the cornucopian or “Neo-classical economists” and the environmental managers. Cornucopians have a view that the earth has infinite resources that benefit humanity. They argue that through technology, science, policies, and an ultimate pro-growth goal, humans can improve the world’s standard of living. Cornucopians believe that the economic growth and technological advances (such as green revolution) will create a less crowded, less polluted and more resource-rich world. In addition to that, they see that there is no historical evidence for the assertion that society will run out of resources. They believe that the resource prices and the market mechanism determine when and where natural environment should be preserved or modified (substitution, discovery, and technological change).

Examining the ecological approaches points to the sharp contrast in the different paradigms. Drenson (1995), who advocates for a paradigmatic shift from the technocratic to the ecocentric paradigm, explains that when paradigms are taken in an absolute fashion, it can lead to a condition of the mind which tends to reduce flexibility. For instance the technocratic paradigm encourages centralization and the application of technology to all human life.

Nature is viewed by technocentrics as an object and machine. On the other hand, the person-planetary paradigm underlines the interrelatedness of the biosphere. That
Table 1. Perspectives on environmental politics and resource management.

<table>
<thead>
<tr>
<th>Gaianism</th>
<th>Communalism</th>
<th>Accommodation</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faith in the rights of nature and of the essential need for co-evolution of human and natural ethics.</td>
<td>Faith in the co-operative capabilities of societies to establish self-reliant communities based on renewable resource use and appropriate technologies.</td>
<td>Faith in the adaptability of institutions and approaches to assessment and evaluation to accommodate to environmental demands.</td>
<td>Faith in the application of science, market forces, and managerial ingenuity.</td>
</tr>
<tr>
<td>‘Green’ supporters; radical philosophers.</td>
<td>Radical socialists; committed youth; radical-liberal politicians; intellectual environmentalists.</td>
<td>Middle-ranking executives; environmental scientists; white-collar trade unions; liberal-socialists, politicians.</td>
<td>Business and finance managers; skilled workers; self-employed; right-wing politicians; career-focused youth.</td>
</tr>
<tr>
<td>0.1 – 3% of various opinion</td>
<td>5 – 10% of various opinion surveys</td>
<td>55 – 70% of various opinion surveys</td>
<td>1- 35% of various opinion surveys</td>
</tr>
<tr>
<td>Demand for redistribution of power towards a decentralized, federated economy with more emphasis on informal economic and social transactions and the pursuit of participatory justice.</td>
<td>Belief in the retention of the status quo in the existing structure of political power, but a demand for more responsiveness and accountability in political, regulatory, planning, and educational institutions.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: O'Riordan, 1989

paradigm does not only recognize human values but also the intrinsic value of all organisms.

Likewise, Milbrath (1996) offers an analysis of two paradigms or beliefs or ways of thinking in relation to the environment and development (See Table 2 for competing social paradigms): the dominant social paradigm and the new ecological paradigm. The dominant social paradigm (DSP) reflects the dominant thinking in modern society that is
highly anthropocentric with its notion that humans exercise control and domination in the management of nature and resources to outfit their needs into the indefinite future. In contrast, the new ecological paradigm (NEP) demonstrates traces of the beliefs of early cultures in which the life patterns were thought to be attuned to the needs of nature and so presents a different view of the role of human beings with regard to the environment. This paradigm underlines human’s dependence upon other species and holds the view that although human affairs are affected by social processes, they are also affected by their biophysical environment that entails constraints upon human activities. In contrast to the dominant social paradigm, the new ecological paradigm does not accept that science and technology can provide all the answers to problems. Rather, a major facet of the NEP is that there are limits to the economic growth of human societies.

Table 2. Competing social paradigms.

<table>
<thead>
<tr>
<th>Dominant Social Paradigm</th>
<th>Alternative Environmental Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core Values</strong></td>
<td></td>
</tr>
<tr>
<td>- Natural environment.</td>
<td>- Natural environment (intrinsically valued).</td>
</tr>
<tr>
<td>- Valued as resource.</td>
<td>- Harmony with nature.</td>
</tr>
<tr>
<td>- Domination over nature.</td>
<td></td>
</tr>
<tr>
<td><strong>economy</strong></td>
<td></td>
</tr>
<tr>
<td>- Marked forces.</td>
<td>- Public interest.</td>
</tr>
<tr>
<td>- Risk and reward.</td>
<td>- Safety.</td>
</tr>
<tr>
<td>- Rewards for achievement.</td>
<td>- Incomes related to need.</td>
</tr>
<tr>
<td>- Differentials.</td>
<td>- Egalitarian.</td>
</tr>
<tr>
<td><strong>Polity</strong></td>
<td></td>
</tr>
<tr>
<td>- Authoritative structure (experts influential).</td>
<td>- Participative structures (citizen/worker involvement).</td>
</tr>
<tr>
<td>- Hierarchical.</td>
<td>- Non-hierarchical.</td>
</tr>
<tr>
<td>- Law and order.</td>
<td></td>
</tr>
<tr>
<td><strong>society</strong></td>
<td></td>
</tr>
<tr>
<td>- Centralized.</td>
<td>- Decentralized.</td>
</tr>
<tr>
<td>- Large-scale.</td>
<td>- Small-scale.</td>
</tr>
<tr>
<td>- Associational.</td>
<td>- Communical.</td>
</tr>
<tr>
<td>- ordered</td>
<td>- Flexible.</td>
</tr>
<tr>
<td><strong>nature</strong></td>
<td></td>
</tr>
<tr>
<td>- Ample reserves.</td>
<td>- Earth’s resources limited.</td>
</tr>
<tr>
<td>- Environment controllable.</td>
<td>- Nature delicately balanced.</td>
</tr>
<tr>
<td>- Confidence in science and technology.</td>
<td>- Rationality of ends.</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
</tr>
<tr>
<td>- Rationality of means.</td>
<td>1. Integration of fact/value thought/feeling.</td>
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<td>- Separation of fact/value thought/feeling</td>
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Source: Riley E. Dunlap, 2002
The Cornucopian’s perspective, which represents a type of DEP, faces many critiques. The purely cost benefit analysis principle supports one of these critiques. As Pojman (2001) describes this principle, the cost of restoring a degraded ecosystem is more than preserving it. Therefore, the benefit of restoring it is not justified. Another major critique of cornucopian is their neglect of the moral issue and the respect of the nature. Katz (1992) argues that the technological fix of nature raises a moral issue: How is a human made artifact morally different from a natural and wild entity? He argues that artifacts are human instruments; their value lies in their ability to meet human needs. Natural entities have no intrinsic functions; they are not created for any instrumental purpose. He continues that to attempt to manage natural entities is to deny their inherent autonomy: a form of domination. The moral claim of the wilderness is thus a claim against human technological domination. Therefore, Katz argues that we have an obligation to struggle against this domination by preserving as much of the natural world as possible.

Unlike cornucopians, the environmental managers hold the view that although there can be economic growth and resource exploitation by humanity, there needs to be at least a minimum level of environmental quality. This can be achieved by compensation for those adversely affected, including all stakeholders in the decision making process, and consensus building, just to name a few.

The communalist/ecosocialist (red-green) and Gaianist/Utopian (Dark green) perspectives belong to the ecocentric path. Lying between a light green and dark green environmentalism, the communalist/ecosocialist red-green position brings in strands of the technocentric view of improved legislation that reflect ecologically sustainable development concerns as means to improve economic conditions and sustain equitable living. The Gaianist dark green position, drawn from Lovelock's Gaia Hypothesis (Barnaby, 1988) of the earth as a single organism, proposes the view of the oneness of people and nature or the earth. Ecosocialist beliefs underscore such views suggesting that the environment is a social construction and environmental politics are a process with all members of society participating, because social systems cause the environmental problems, humanity is capable of solving these environmental problems.

From among all these environmental perspectives and paradigms, sustainable development is the most significant strategy that attempts to redefine the relationship
between human and the environment (WCED, 1987). Sustainable development is an environmental position that seeks to balance between both social and environmental development.

In the following section, I explore the concept of sustainable development, its history, meanings, and its relationship with other related social and environmental concepts.

The Concept of Sustainable Development

The concept of sustainable development is not new. Literature on the subject suggests that it may have served as a challenge to early societies like the ancient Sumerian, Mayan and Mediterranean civilizations (Nath, 2003; Samson, 1995). The term, however, is of recent currency (Glasby, 2002). Its recent origins can be traced to the pre-Stockholm negotiations in which the Third World coalition sought to have their concerns reflected in the 1972 United Nations Conference on the Human Environment (UNCHE) agenda (Reed, 1996; Williams, 1993). This conference established the term "Sustainable Development" and although the concept is being interpreted in a number of different ways, it is essentially thought to be "a pattern of development which is not harmful to the environment" (Williams, 1993, p. 18). With the publication of the World Conservation Strategy in 1980 by the International Union for Conservation of Nature and Natural Resources (IUCN)-The World Conservation Union, the United Nations Environment Program (UNEP) and the World Wildlife Fund (WWF), the term gained currency in international environment and development circles (Trzyna, 1995). The concept came into common usage with the publication of the Brundtland Commission Report (WCED, 1987), which defines the term as development that "meets the needs of the present without compromising the ability of future generations to meet their needs" (p. 43).

Although the commission's definition enjoys widespread acceptance, it draws several criticisms from other development thinkers. Norgaard (1994) claims that sustainable development provides a criterion for what is sustainable development, but he is critical in pointing out that there is no indication on how this could be achieved. He argues that because it does not define needs and does not stress that they be efficiently
met, it leaves the impression that the present generation could live beyond its needs as long as future needs are met.

Despite the various criticism of the concept of sustainable development, the concept itself has become further popularized by the major international document, Agenda 21 (UNCED, 1992). Agenda 21 defines the concept of sustainable development in a number of different ways and along different streams of thought. The views manifest significant points of convergence and divergence, so the concept continues to generate varied interpretations. Rowlands (1992) illustrates this point thus: “In 1986, one report presented a variety of definitions in which over twenty different interpretations of the term sustainable development was presented. Today, the degree of diversity is just as wide” (p. 386).

It is argued that the concept of development, which has long been associated with economic growth, requires a redefinition as it undermines the sustainability of the planet and its resources. Although some local and international agencies incorporate sustainable development in their political decisions, the concept seems to be misunderstood by many people. Trzyna (1995) argues that in attempting to respond to the issues of sustainable development, leaders and experts end up debating and arguing about its meaning often without coming to a consensus. Temple (as cited in Davis, 1996), complains that the word "sustainable" is being overused as it is found in sustainable agriculture, sustainable growth, sustainable societies, and many others such that it has come to mean too much and nothing at the same time.

In his attempts to clarify the ambiguity that surrounds “sustainability concept”, Venetoulis (2001) identifies three different but related approaches to sustainability: ideal, strong, and weak. His idea stems from both Baker (as cited in Venetoulis, 2001) who focuses more clearly on the political and economic implications of weak, strong, and ideal sustainable development, and Common (as cited in Venetoulis, 2001) who clearly draws the distinction between weak and other forms of sustainability. One thing that these three approaches to sustainability have in common is that the use of natural services and capital beyond renewable rates are considered not to be sustainable.

An ideal approach to sustainability is premised upon the following contention: Living within the means of nature is sustainable when all consumption and absorption of
ensuing waste occurs in the place where consumption directly occurs (Venetoulis, 2001). The ideal approach implicitly holds that the allocation/availability of natural resources to support a population is predetermined by the “place” they live. So, the endowments of a place provide the empirical ecological limiting factor.

In contrast, the strong approach to sustainability considers individual ecological impacts associated with consumption within the context of global carrying capacity. To be strongly sustainable, then, members regardless of location would have to have an environmental impact that on average is the same or less than the global amount of ecologically productive land (nature) available on a per global citizen basis (Venetoulis, 2001). In essence, advocates of strong sustainability argue that the world's stock of natural capital is irreplaceable and must be maintained. Renewable sources of electricity such as wave and wind power are acceptable; burning fossil fuels is not.

The weak approach of sustainability assumes that economic sustainability can occur between natural scarcities and humanly introduced "substitutes" that changes natural environment by technology (e.g. biotechnology), or capitalized human interventions. Advocates of this approach agree that the capital stock must be maintained but argue that artificial capital can act as an alternative for natural capital. A country which has a single major natural resource such as oil or gas may exploit that resource to promote sustainable development in agriculture and other areas.

The report of the World Commission on Environment and Development, Our Common Future (1987), is the most important international document that puts the environmental agenda at the forefront of development issues. The Commission, which was created by virtue of General Assembly resolution 38/161 adopted by the United Nations in 1983, sought to formulate a global agenda for change. Chaired by Gro Harlem Brundtland of Norway, the Commission functioned as an independent body and came up with an analysis and several insights into sustainable development issues. The report presents the possibility of change and the necessity for all countries, whether rich or poor, to cooperate and work together in resolving environmental and development issues.

Sustainable development has emerged as a more heated element in the broader development debate. Representatives from poor countries have been struggling for a more equitable share of the world's assets, while those from the high consumption
countries ignore the calls in the World Commission on Environment and Development Report for compromise of their high life styles. In this report, the commission presents the possibility of change and the necessity for all countries, whether rich or poor, to cooperate and work together in resolving the world’s environmental issues and establishing a middle ground between both sides. Devlin and Yap (1994) argue that a middle ground between rich and poor can be reached that fulfills both environmental goals. However, they conclude that attainment of these goals is easier said than done as government leaders, lending institutions and nongovernmental organizations have failed to resolve the issues of environmental sustainability, economic growth, and participatory politics. Thus, humanity has still a very long way to go along the path of sustainability.

**Sustainable Development and Sustainability**

In recent years, the term *sustainability* has been increasingly used instead of *sustainable development*. Munro (1995) explains that the term sustainability comes from the term "sustainable development” and that both have been used "to characterize almost any path to the kind of just, comfortable and secure future to which everyone aspires" (p. 27). Elaborating on the explanation of sustainable development, the UNEP’s document "Caring for the Earth: A Strategy for Sustainable Living” focuses on the ecological, social and economic factors in determining sustainability. The document, however, defines sustainability as a continuous or iterative process through which experience in managing complex systems is accumulated, assessed and applied. In the same sense, Viederman (1995, 1996) considers the UNEP’s document as a vision that offers direction in focusing attention on a set of values and moral and ethical principles to guide actions of individuals as well as governmental or nongovernmental institutional structures.

Many theorists explain that global problems are, in effect, issues that relate to sustainable development. It can be argued that the structure of North-South relations causes the current environmental problems of the third world (i.e., population pressure, poverty and environmental degradation). The interrelationships between population and the earth's carrying capacity as well as environmental degradation and the depletion of natural resources along with threats to food security and the planet's health affect the
sustainability of both North and South (Dahlberg, 1996; Ehrlich, 1996; Norse, 1993; Skinner, 1993; Smith, 1994).

Defining sustainability as "non-declining utility of a representative member of society for millennia into the future," (Pezzey, 1992, p. 323) brings forward the main issue that Pezzy feels has been neglected in the literature on sustainable development: an evolutionary perspective on the anthropology, history, psychology, morality and technology of sustainability. He believes that such a perspective could lead to an interdisciplinary analysis of the potential of sustaining industrialized society. Although this potential is highly uncertain, Pezzy argues that policies could be formulated to make technology work more efficiently. He foresees that global cooperation among very unequal nations will be essential in making policies towards sustainability work effectively.

The process of achieving effective sustainable development has different approaches. Some writers view it as an ongoing process rather than an end product (Carley & Christie, 1993). Another approach is the populist perspective that regards management as teamwork based on continually evolving consensus toward sustainability. Pirages (1996) expresses the conviction that becoming more sustainable is a long term process because of the constant change of the conditions that shape humans; therefore, alternatives must be explored so that sustainability could be approached in diverse ways such as the creation of new institutions and value systems.

The complexity that surrounds achieving effective sustainable development could be attributed to the complex interrelationships of the concept itself with other social and economical issues as all the issues are intertwined. However, there is a prominent line of thought that asserts that sustainability could be achieved when all societies’ members collaborate and empower each other. Dovie (2002) argues that women, as the dominant users of environmental resources, are the milestone in the path of achieving sustainability.

Women, Environment and Sustainable Development

A significant issue in the field of sustainable development is the role of women. Although women make significant contributions to the economic support and care of
their families and participate strongly in resource use and production, many ignore their role in achieving sustainable development. As well, women do not seem to benefit from the process of development because they often fail to have access to resources and technologies. Hence, poverty among women is widespread (Mehra, 1996). As Topouzis (1990) reported in her article, "The Feminization of Poverty," with the worsening economic situation in Africa, those who are getting poorest are women. She claims that women's poverty had been due to both government neglect and broader cultural factors. Ruether (1996) expresses a related view as she maps out the symbolic and social connections of the oppression of women and the domination of nature. Explaining that ecofeminism emerged from the union of the radical ecology movement or "deep ecology" and feminism, she suggests that in ecofeminist culture and ethic, mutual interdependency "replaces hierarchies of domination as the model of relationship between men and women, between human groups and between humans and other beings" (p.330).

Ecofeminism aims to expose, challenge and change dominant power structure in order to transform an unfair social order. Ecofeminism criticizes other ecological and environmental movements for their carelessness toward women. Ecofeminism focuses on women’s role in the transformation process and argues that ecofeminism is the most holistic theory and practice of liberation of both women and all humanity (Braidotti, Charkiewicz, Hauser, & Wieringa, 1994). To attain the transformation of society, ecofeminism promotes the transformation of “male” or patriarchal values, which are dominant in most societies, into feminine ones. Ecofeminism argues that women’s capacities such as empathy, caring, and their realization of connectedness of all things can help to develop new, better, less violent and more sustainable ways of living and relations.

In recent years, however, increasing evidence indicates that women's participation and involvement is also critical in many conservation and development projects. Mehra (1996) presents the view that failure to recognize the role of women in development projects means losing a chance to enhance women’s economic opportunities. She stresses the importance of integrating women into community-based resource conservation projects, and giving them equal access to resources and services.
Although ecofeminism grants women a place in the transformative process, the main question is whether the values of ecofeminism would be sufficient to overturn the dominant hierarchies. Another critical point of debate in the area of SD is the lack of action in its social movement. Brammer (1998) argues that the common view is that social movements engage in protest and direct action; however, ecofeminism calls for consciousness raising, healing, and a communion with nature. Others call for intellectual work to form a holistic conception of ecofeminism (Diamond & Orenstein, 1990). Thus, there is little direct action. Furthermore, there is no group of ecofeminists, no declared leader, and no form of organized activity (other than a few intellectual conferences and books). A few organizations have included the word "ecofeminism" in their title, such as Ecofeminists for Animal Rights, but these are not a subgroup of the larger Ecofeminists (Morgan, 1992). Too, most groups that can be identified as ecofeminist in nature do not identify themselves as ecofeminist.

Moreover, Davion (1994) argues that although ecofeminists are correct in challenging dualism such as human/nature, reason/emotion, and masculinity/femininity, the solution does not lie in simply valuing the side of the dichotomy that has been devalued in Western patriarchal frameworks. Indeed, this author suggests that simply beginning to value the devalued side reinforces the harmful dichotomies ecofeminism must overcome.

**Sustainable development and Globalization**

Another recent movement that affects achieving sustainability is globalization. Several writers have explored the impact of globalization on the environment (Goldsmith, 1996; Goodland, 1996; Khor, 1996). These authors argue that transnational corporations that are resulted from globalization have contributed to the depletion of resources and the pollution of land, water and air in host countries (Dahlberg, 1996; Lehman & Krebs, 1996). In addition to these disadvantages of globalization, it causes the homogenization of cultures (Barnet & Cavanaugh, 1996), which ultimately alters people’s activities and encourages them to accept the dominant western unsustainable lifestyle.
Globalization’s advocates do not consider resource depletion a problem (Speth, 2003). Rather, they argue that global economic expansion will provide the wealth needed both to alleviate poverty and the look after the environment.

On the other hand, advocates of the new environmental paradigm of sustainability argue that the sustainability paradigm requires integrating different perspectives and insights of varying cultural and civilization contexts. This insight recognizes that sustainability values exist in all cultures and civilizations. For instance, in ancient Greek vision “Gaia” as the Goddess of the Earth, from which all things spring and to it all things that die returns (O’Riordan, 1993). First nation’s people worldwide have emphasized the values of living in harmony with and sacred respect of mother earth (Knudtson & Suzuki, 1992).

Turning to some religions and faiths in diverse regions and civilizations, it is also apparent that environmental value and wisdom are also present in the teachings and doctrines. Green Christian theologians like Thomas Berry, Vincent Rossi, Wendell Berry and David Haenke describe that the Bible contains key values of stewardship, ecological justice and caring for creation over the unsustainable principle of dominion over God’s creatures (Barbour, 2000). Too, the Islamic Sharie’ah, which regulates every aspect of human life, contains issues related to environmental protection. The Qur’an upholds the vice-regency of human beings, whereby it considers humans to be God’s trustees who should take care of the earth and its inhabitants (Khalid, 2002).

In parallel ways, other faiths have also reminded their followers of the centrality of living peacefully, non-violently and sustainably with the environment, such as the Buddhist teaching of the eight-fold path; kindness towards animals and nature in Judaism; the Hindu belief in the unity of all Creation; the Jainist commitment to non-harming of all beings; the belief of Baha’i in respect and loving kindness to every creature and nature; and the Daoist principle of yin and yang based on harmony with all beings and the cosmos (Nath, 2003).

Summary

Throughout the past decade, the World Commission on Environment and Development (WCED) has laid out the framework of the problems facing the global
community. Sustainable development has captured people’s attention and acquired the status of a global buzzword. Indeed, today nearly all political leaders, policymakers, and program administrators can speak the language of sustainable development and many are incorporating its ideas into their future policies. Sustainable development is offered by some as an alternative to past models of development that had focused primarily on economic growth and had addressed environment, social, and health concerns on an individual and often contradictory basis. Defined as “development that meets the need of the present without compromising the ability of future generations to meet their needs” (WCED, 1987, p. 43), sustainable development recognizes the interlocking and systematic nature of these concerns. In this manner, SD offers a unique possibility to move beyond viewing the different crises as challenges to the current system and instead, toward seeing these same crises and challenges as opportunities to reorient and reorganize society around a different paradigm.

To comprehend this paradigm, the concept of SD should be holistically and critically understood and contrasted to alternative approaches to the environment. However, to realize the shift to SD, education has to play a vital role. The role of teachers and educators is crucial in helping students to think and act critically. Educators need to make links among ecological issues, the community, and the economy to foster students’ understanding and acceptance of sustainable development.

The following section discusses and elaborates on the role of education and educators to realize the shift for sustainability.

**Education for Sustainable Development**

Agenda 21 (UNCED, 1992), the international document describing the need for sustainable development, underscores the salience of education in promoting this concept and improving the capacity of people to address issues relating to the environment and development. As argued by the authors of Agenda 21, education can make the needed transformation in students’ values and attitudes, skills and behavior by broadening and deepening their understanding of sustainable development issues and concerns. Sustainability demands a shift in people’s thinking and lifestyles; this shift is difficult
because it demands a corresponding change in the way we view the world. Similarly, a necessary shift in people’s views concerning their relationship with other humans and biosphere must be made. This also demands a strong commitment from all sectors of society since it will involve a kind of revolution in institutions, systems, lifestyles and values (Fien & Trainer, 1993).

**Origin of Education for Sustainable Development (ESD)**

Unlike most education movements, the launch of ESD was not created by the education community. The international political and economic fora (e.g., United Nations, Organization for Economic Co-operation and Development) have been the pioneers in conceptualizing ESD. In many countries, governmental ministries such as environment and health started to develop the content and concepts of ESD and then delivered it to the educational communities. Many world leaders crystallized the idea of the concept of sustainable development and pursued as a global goal. Afterward, the UN General Assembly in 1987 endorsed the concept of sustainable development as well as the parallel concept of education that supports the realizing sustainable development. From 1987 to 1992, the concept of sustainable development matured as committees discussed, negotiated, and wrote the 40 chapters of *Agenda 21*. Consequently, the concept of ESD appears in a separate chapter of *Agenda 21*, called “Promoting Education, Public Awareness, and Training” (UNESCO, 1992).

**The Importance of ESD**

Following consultation with the international environmental education movement, *Agenda 21* recognizes the importance of education for achieving sustainable development (UNCED, 1992). It underscores that preparing sustainable people can be done through education. That transformation in values and attitudes, skills and behavior are achieved through a broadened and deepened understanding of sustainable development issues and concerns. In the quest for sustainability, the transition period is a very critical one. This is because the shift to a new way of life demands a corresponding change in the way we view the world. Likewise, a necessary shift in people's views concerning their relationship with other humans and the biosphere must be made. This also demands a
strong commitment from all sectors of society since it will involve a kind of revolution in institutions, systems, lifestyles and values (Fien & Trainer, 1993).

Education for sustainability must promote an understanding of our ecological dilemma. Fien (1993) argues for a sustainability education that develops critical thinking, reflection and action skills needed to make life-long decisions about the nature of a better world. Likewise, Orr (1994) insists that education should focus upon encouraging students to think out of the traditional “box” if they are to fit into the technological society of tomorrow, be successful as adults, and have the ability to achieve a sustainable future through informed and effective decision-making. Knowing the roots of many environmental problems could bring about the need to participate in their solution. Orr argues that the attention that focuses on the nature of our present society with its consumerist orientation and the lifestyles it promotes is not compatible with the goals of global sustainability.

Education for sustainability also demands that we have an awareness of how the global system works and how all the parts are interconnected (Fien, Kumar, & Ravindranath, 2001). This entails having a deep concern about the welfare of the planet, its ecosystems, its culture and its people. It is important that people understand that they are part of nature and we are part of a larger system, therefore, we need to view our problems holistically.

In a related aspect, Fien (1993) has identified three approaches to environmental education and their ideological bases. These approaches include education about the environment, education through the environment and education for the environment.

Education about the environment is the most common form of environmental education. Its emphasis is on knowledge about natural systems and processes and the ecological, economic and political factors that influence decisions about how people use the environment. Resolving environmental issues demands an adequate knowledge of the interactions between the natural and social systems.

Education through the environment is a learner-centered approach to environmental education. It makes use of students' experiences in the environment as a medium for education. Designed to make learning experiences realistic, relevant and practical, it aims to develop students' appreciation of the environment through direct
experience and to enhance their technological and manipulative skills as well as social skills.

Education for the environment carries an agenda of values education and social change. Its objective is to engage students in exploring and resolving environmental issues to foster the values of the new environmental paradigm. It also aims to promote lifestyles that are in accord with the sustainable and equitable use of resources. It builds on education about and through the environment to help students become informed, sensitive, responsible and competent subjects in environmental protection and improvement. The three approaches; education for, about, and through environment, help provide the skills and knowledge that could help lead to the transformative goals of education and the environment.

Fien (1993) presents a critique directed at the different approaches to environmental education. The content and method chosen in a conservative education about the environment stands on technical rationality, which promotes the belief that humans have a right to control nature and that science and technology are sufficient to manage the impact of environmental degradation. A liberal education about the environment promotes the belief that accommodations can be made in working out solutions to problems. It also promotes the belief that environmental problems can be solved through scientific and technical means without consideration for the social contexts. Since education through the environment uses the environment as a medium for education, it promotes the belief that society and education should be reshaped in accordance with natural development and ecology thus reflecting ideas of natural determinism.

The criticism on education for the environment has been centered on its anthropocentric nature, the narrow scope of ecosocialist politics in relation to green politics (Cutter & Smith, 2001), the potential dangers of bias and indoctrination (Jikling & Spork, 1998), and the tension between the values of the new environmental paradigm and the values of the dominant social paradigm (which are very much linked to contemporary schooling). In response, it has been argued that education for the environment promotes the active participation by students in solving environmental problems.
Because environmental education (EE) requires less involvement of students in resolving the environmental problems, ESD comes to fill that gap in environmental education programs. Although the United Nations developed both the EE and ESD, ESD has gained more currency and importance than other programs. ESD maintains that the only way to sustain life is by educating future generations to live sustainably with their environment.

In his discussion of what it means to educate people to live sustainably, Orr (1992) identifies six foundations of education. First, he argues that all science education should be environmental education. Students should learn that they belong to their natural world. Second, environmental issues are complex and cannot be understood through a single discipline or department. Institutions need to be transformed into transdisciplinary laboratories that would hold various components facilitating the study of interactions across disciplines. Third, for inhabitants, education occurs in part as a dialogue with a place and has the characteristics of good conversation. In conversation, people define themselves in relation to the other, hence it is an acknowledgement of the existence of the other that helps students to act unselfish and respect other life partners around them. Fourth, the process is as important as its content. Environmental education must therefore be lived because real learning is participatory and experiential. Fifth, experience in the natural world is both an essential part of understanding the environment and conducive to good thinking. To understand nature is to have an observant and disciplined intellect. Experience therefore helps in the development of good thinking. Sixth, education relevant to the challenge of building a sustainable society will enhance the learner's competence with natural ecosystems. This relates to the importance of practical competence as an indispensable source of good thinking. Good thinking derives from the convergence of reflective thought and real problems.

Clearly, Orr argues that ESD should promote students’ capabilities to think critically and be reflective learners. Schools must play their roles in helping their students reach that level of thinking and promote their environmental awareness. Kastenholz and Erdmann (1994) drafted a theoretical model for conveying environmentally compatible behavior at school based on UNESCO's recommendation for education and the Man and the Biosphere Program (MAB). This model reflects the ethical principles of the MAB.
Program and highlights the humanistic dimension of education as advocated by UNESCO. This model is also underscores the role of teachers. To promote environmentally conscious behaviors, teachers need to instill humanistic values such as social responsibility, compassion, non-violence and equality. Social responsibility, solidarity, cooperation and peaceful resolution of contradictions and other values do not come about as a result of lectures on moral development but depend largely on teachers' personalities and their being exemplars in the process. This instructional model illustrates that successfully imparting environmentally conscious behavior needs to reflect a scientific image of humankind, the character of a trained teacher and the teaching of facts and humanistic values.

In their critical analysis on writings on education for sustainability, Fien and Trainer (1993) find that much of the writing on this issue builds on an unproblematic view of sustainable development and assumptions about education and social change. Likewise, they note that some writers fail to probe deeper into the issue of values relativity and liberal idealism hence, they propose a critical framework for the analysis of alternative positions on sustainability:

This framework would involve providing learning experiences for students to identify and challenge the assumptions of all positions; imagine, explore and critique alternatives to their own position; question the influence of context and the social interests served by all positions, use the values of ecological sustainability, justice and democracy as criteria in the evaluation of all positions and adopt a reflective skepticism to their own and other people's ideas and actions (p. 16).

Mandated by the Federal government of Canada to bring existing organizations together and work for the integration of the environment and the economy, the National Round Table on Environment and the Economy (NRTEE) (1993) considers education as a powerful strategy for sustainable development. Moreover, it establishes an independent sustainable development initiative called "Learning for a Sustainable Future" for the formal Canadian educational system. Its premise is that education is the key in the transformation of public concern into appropriate decision-making and action. Another role is helping the new generation to understand the interdependence of the environment and economic development, acquiring the necessary skills to find the balance between
them and developing the commitment to participate in the search for a more sustainable future.

Education: Promise and Paradox

Population and resource consumption are currently the major issues in the international dialogue on sustainability. Mckeown (2002) considers both issues increasing population and resource consumption, as major threat to sustainable future. He links education to both fertility rate and resource consumption issues. Educating females reduces fertility rates and therefore population growth (King & Hill, 1993). However, there is paradoxical relationship between education and resource use. Generally, highly educated people, who have higher incomes, consume more resources than poorly educated people, who tend to have lower incomes. Therefore, in this case, more education increases the threat to sustainability (Mckeown, 2002).

Current statistics confirm that the most educated nations leave the deepest ecological footprints. The Figures from the United Nations Educational, Scientific and Cultural Organization (UNESCO) Statistical Yearbook (1999) shows that in the United States more than 80 percent of the population has some post-secondary education, and about 25 percent of the population has a four-year degree from a university. Statistics also show that per-capita energy use and waste generation in the United States are nearly the highest in the world.

Specifically, in the United States, more education has not led to sustainability (UNCED, 1992). Therefore, educating people to higher levels is not sufficient for creating sustainable societies. Thus, the challenge is to raise the education levels without creating an increasingly growing demand for resources and consumer goods and the accompanying production of pollutants. Therefore, reaching this level of consciousness depends on reorienting curricula to address the need for more sustainable production and consumption patterns.

It is important here to notice that the relationship between education and sustainable development is not linear. Research shows that basic education is key to a nation's ability to develop and achieve sustainability targets. For example, Mckeown (2002) indicates that four to six years of education is the minimum threshold for
increasing agricultural productivity. Education familiarizes farmers to new agricultural methods, helping them to cope with risk, and respond to market signals. It also helps farmers know how to use chemicals (e.g., fertilizers and pesticides) according to manufacturers’ directions, which ultimately reduce the risks to the environment and human health.

The benefits of education can be globally maximized when the proportion of educated females matches the education level of males. McKeown (2002) indicates that an educated woman tends to marry later and have greater bargaining power and success in the marriage market. An educated woman tends to have a smaller family size and fewer and healthier children. Education also helps women maximize their interaction with society members. Educated women can effectively participate in community decision making and work toward achieving local sustainability goals.

Education for sustainable development considers the significance of promoting women’s basic education. Chapter 36 in Agenda 21 states that improving basic education worldwide should be the priority of this century. However, we should acknowledge that simply increasing basic literacy will not advance sustainable societies. Indeed, if nations hope to identify sustainable goals and work toward them, they must focus on improving people’s skills, values, and perspectives that encourage and support public participation and community decision making. To achieve this, basic education must be reoriented to address sustainability and expanded to include critical-thinking skills.

**Reorienting Education**

Hart (2000), McKeown (2002), and Herremans and Reid (2002) explain that human communities are made up of three major systems; economic, social and environmental systems. Within these systems, humans measure their progress and show it in numbers (i.e., unemployment rose 0.4 percent in January or the economy grew 2% last year). However, as suggested by Hart (2000), the traditional numbers only show changes in one part of the community without showing the many links between the community's economy, society and environment. Indeed, traditional numbers show a community as made of three separate parts; an economic part, a social part and an environmental part.
that do not overlap (See Figure 2 for a view of community as three separate, unrelated parts):

Figure 2. A view of community as three separate, unrelated parts. Adapted from Hart (2000).

When we view society, economy and environment as separated and unrelated parts of a community, the community's problems are also viewed as isolated issues (Hart, 2000; McKeown, 2002). Consequently, economic development councils try to create more jobs, health care services and housing authorities address the social needs, and environmental agencies try to prevent and correct pollution problems. This piecemeal approach, as Hard calls it, can have a number of negative side-effects. An example of that situation is the attempt to solve an existing problem that can make another problem worse, (i.e., creating affordable housing is seen as a universal “good”, but when we build that housing far from workplaces, we increase the traffic and the pollution that comes with it) (Hart, 2000).

Therefore, rather than a piecemeal approach, what is needed is a view of community that takes into account the links between the major strands, the sustainability triad, as Herremans and Reid (2002) called it; the economy, the environment and the society. In this triad, the position of ESD is located at the intersect between the three components (see Figure 3 for a view of community that shows the links among its three parts):
Figure 3. A view of community that shows the links among its three parts.

The current environmental education programs have mainly covered and fed the environmental strand or domain of ESD, however, equal consideration has not been focused on the social and economic strands (Herremans & Reid, 2002). ESD is a framework for integrating economic, social and environmental decision-making into natural resource management. However, the extent of these considerations and the influence they exert on each other is still not clearly understood (NSWDEC, 2004). This can result in a lack of consistency and understanding of sustainability concepts and terminology that presents a challenge for policy-makers or resource managers in their efforts to achieve sustainable outcomes (Mercer as cited in NSWDEC, 2004). Although observable results are difficult to detect and may take many years to show, the integration of environmental, social and economic outcomes is figuring more seriously in the decisions made at all levels of human activity because good community-based decisions, which affect social, economic, and environmental well-being, depend on educated citizens. Development options, especially ‘greener’ development options, expand as education increases. For example, a community with an abundance of skilled labor and technically trained people can persuade a corporation to locate a new information technology and software development facility nearby.

Knowing about the three major parts of ESD is not enough to create a sustainable society. McKeown (2002), Herremans & Reid (2002), and Hart (2000) point out that ESD is more than a knowledge base related to environment, economy, and society. It also
addresses learning skills, perspectives, and values that inspire people to seek sustainable livelihoods, contribute in a democratic society, and live in a sustainable manner. ESD also involves considering local and global issues. Therefore, these five components (knowledge, skills, perspectives, values, and issues) must all be addressed in a formal curriculum that has been reoriented to address sustainability.

**Knowledge**, the first component, which might be covered by the current environmental education, describes the basic knowledge from the natural sciences, social sciences, and humanities that is needed to understand the principles of sustainable development.

The challenge for communities in the process of reorienting their current curriculum is to select the type of knowledge that will support their sustainability goals. Generally, they need to include both local and global issues to help their students develop their understanding of global concerns.

**Issues**, the second component, entails addressing all related social, economical, and environmental issues that threaten the sustainability of the planet. Agenda 21 mentions many of these issues (i.e., war and militarism, governance, discrimination and nationalism, renewable energy sources, multinational corporations, refugees, nuclear disarmament, human rights, and media influencing rapid change of worldviews) (UNCED, 1992).

**Skills** component focuses on providing people with practical skills to enable them to continue learning after they finish their education. McLaren (as cited in McKeown, 2002) mentions some of these skills: first, the ability to communicate effectively (both orally and in writing, second, the ability to think about systems (both natural and social sciences), the ability to think in time - to forecast, third, to think ahead, and to plan, fourth, the ability to think critically about value issues, fifth, the ability to separate number, quantity, quality, and value, sixth, the capacity to move from awareness to knowledge to action, seventh, the ability to work cooperatively with other people, eighth, the capacity to use these processes: knowing, inquiring, acting, judging, imagining, connecting, valuing, and choosing, and ninth, the capacity to develop an aesthetic response to the environment.
**Perspectives** component focuses on enabling people to consider an issue from different viewpoints beside their own views. McKeown (2002) mentions that this approach leads to intra-national and international understanding.

**Values**, the last component of ESD, invites people to understand their own values, their societies’ values, and other people’s values in order to facilitate their understanding of others’ viewpoints. Table 3 is an example of what one community may select to convey the five components of ESD.

### Table 3. An example of how a community may convey the five components of ESD.

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Environment</th>
<th>Economy</th>
<th>Society</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issues</td>
<td>Hydrologic cycle</td>
<td>Supply and demand</td>
<td>conflict</td>
</tr>
<tr>
<td>Protecting and managing freshwater; managing hazardous wastes</td>
<td>Combating poverty</td>
<td>Changing consumption patterns</td>
<td></td>
</tr>
<tr>
<td>Skills</td>
<td>The ability to acquire, manage, and analyze data</td>
<td>The ability to identify components of full-cost accounting</td>
<td>The ability to think critically about value issues</td>
</tr>
<tr>
<td>Perspectives</td>
<td>Linkage/interrelationship between/among contemporary global environmental issues</td>
<td>Look beyond local and national boundaries</td>
<td>Universal attributes of being human</td>
</tr>
<tr>
<td>Values</td>
<td>Ecological value of undisturbed land</td>
<td>Value of a sustainable livelihood</td>
<td>Economic value, religious value, and societal value compete</td>
</tr>
</tbody>
</table>

Adapted from Rosalyn McKeown (2002, p. 24)

Although reorienting education to address sustainability seems to be easy, it is a costly process and some nations cannot afford to rely on a remediation model to retrain the world’s 59,000,000 teachers (McKeown, 2002). However, designing new approaches to both preservice and inservice teachers to address sustainability is of an urgent need. Strength’s approach is a good example of the needed designs.
Strengths Model

Strengths Model suggests that every discipline and every teacher can contribute to sustainability education (McKeown, 2002). The model assumes that topics of ESD already exist in the formal education curriculum but do not contribute to the larger concept of sustainability. Therefore, identifying the components of ESD becomes relatively straightforward.

Implementing the Strengths model requires first, ensuring that educators and administrators understand the concept of sustainability and familiarize themselves with its principles. Once they accomplish that, they can examine each curriculum from each discipline for existing contributions to ESD. Afterwards, after that, they can identify potential areas of the existing curriculum in which to insert examples that illustrate sustainability or additional knowledge, issues, perspective, skills or values related to sustainability (McKeown, 2002).

After identifying existing and potential contributions, administrators can create awareness among the educational community of these contributions to the larger ESD picture. Then, these contributions can be woven together to create ESD programs that are taught explicitly to students. In this approach, all disciplines effectively contribute to convey the knowledge, issues, skills, perceptions, and values associated with ESD. Here is an example of how different disciplines taught can be taught to address the notion of sustainability (adapted from McKeown, 2002):

Mathematics helps students understand extremely small numbers (e.g., parts per hundred, thousand, or million), which allows them to interpret pollution data.

Language Arts, especially media literacy, creates knowledgeable consumers who can analyze the messages of corporate advertisers and see beyond "green wash".

History teaches the concept of global change, while helping students to recognize that change has occurred for centuries.

Reading develops the ability to distinguish between fact and opinion and helps students become critical readers of political campaign literature.

Social Studies help students to understand ethnocentrism, racism, and gender inequity as well as to recognize how these are expressed in the surrounding community and nations worldwide.
In the previous sections, I have discussed the importance of sustainable development (SD), the education for sustainable development (ESD), their roles in our life, and ways of teaching them in schools. I have also clarified that the huge responsibility to teach these concepts in schools relies on our current teachers and educators.

The following section addresses what we know about the influences on teaching particularly at the post K-12 level. It addresses the aspects of context that have been found to be influential in shaping the practice of teaching as well as focusing on teachers’ thinking and beliefs, the relationships between these two concepts, and ways to modify those beliefs to accomplish the global goal of ESD.

Teaching and Reforms in Higher Education

It is argued that higher education institutions bear a profound, moral responsibility to increase the awareness, knowledge, skills, and values needed to create a just and sustainable future (Cortese, 2003; Fien, 2002). Through the preparation of most of the professionals who develop, lead, manage, teach, work in, and influence society’s institutions, including the most basic foundations of K-12 education, higher education plays a vital role in reaching this goal.

Higher education in the U.S. and abroad has gone through a sequence of reforms and revisions. Few of these reform attempts have made some significant change while many have failed in achieving the ambitious reform. Higher education has unique academic freedom and the critical mass and diversity of skills to develop new ideas, to comment on society and its challenges, and to engage in bold experimentation in sustainable living (Cortese, 2003). Why, then, is it so difficult to change and reform the nature of the education that goes on in high education? Some scholars (Cuban, 1988; Gess-Newsome, Southerland, Johnston, & Woodbury, 2003; Romberg & Price, 1983) attribute that failure to the multicontextual elements that are involved in higher education and suggest that any future reform attempt should consider the multiple contextual factors to ensure its success. Clearly, any attempts to understand higher education and the reform of higher education have to be mindful of this context.
The Teacher-Centered Systemic Reform Model (TCSR)

For the sake of considering the multiple contextual factors that influence the work of teachers and the reform efforts, Woodbury and Gess-Newsome (2002) propose the Teacher-Centered Systemic Reform Model (TCSR). However, (Gess-Newsome, et. al., 2003) refine the model for use in understanding the college university classroom. They base the development of the TCSR upon an extensive review and synthesis of the literature, simultaneous recognition of the influence and interaction of the teaching context (both structural and cultural), the teacher personal characteristics, and teacher thinking (see Figure 4 for the TCSR model for a college classroom).

Figure 4. The TCSR model for a college classroom. Adapted from Gess-Newsome, Southerland, Johnston, and Woodbury (2003, p. 736)
In this model, the structural and cultural contexts within which teachers’ work play a fundamentally important role in shaping teaching. **Structural contexts** of teaching include the physical, temporal, and psychological characteristics of a setting, such as the arrangement of buildings, space, and furniture (Doyle, 1986); schedules, subject area, grade level, and/or teacher team organization and physical space (Cuban, 1993; Grossman & Stodolsky, 1995; Hargreaves, 1994; Little, 1995; Siskin, 1991); text books, tests, and teaching materials (Ball, 1990; Remillard, 1999; Shulman, 1987); and students (McLaughlin & Talbert, 1993; McNeil, 1988; Metz, 1993). All of these factors are understood to shape the culture of a setting and thus influence teachers’ thinking as well as their pedagogical and curricular choices.

Teaching culture, those taken-as-shared patterns of thoughts and behavior, is defined by the “beliefs, values, habits, and assumed ways of doing things among communities of teachers” (Hargreaves, 1994, p. 165). 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, 1991; Hargreaves, 1994), professional development experiences (Ball, 1994; Little, 1993), the perception and definition of group goals (Hargreaves, 1994; Talbert & Perry, 1994), and the influence of administrative leaders such as the department chair (Siskin, 1991).

However, as Gess-Newsome et al. (2003) and Woodbury (in review) have found, as they sought to apply the TCSR model to understand teaching, teacher personal factors and teacher thinking provides the most insightful explanation for understanding classroom practice, with a teacher’s abilities and/or inclinations to learn and relearn conceptions of content, learning, and teaching as the most salient (Ball, 1994; Sarason, 1982). Thus, to understand the act of teaching in colleges and universities, researchers must also be mindful of the role of teacher beliefs and thinking in shaping the practice of teaching.

**Teachers and Teacher Thinking**

The study of teachers' thought processes is relatively new. One model of teacher thinking shows how teacher planning, interactive thoughts, and teacher beliefs comprise
teacher thought processes (Clark & Peterson, 1986). Teacher planning encompasses the teachers' thoughts both before and after classroom instruction. Interactive thoughts are those thoughts of a teacher while engaged in teacher-student interactions in the classroom. And teacher beliefs include the rich store of ideas that a teacher has that affects planning and interactive thoughts. Each of these three areas of teacher thinking comprises a current area of educational research.

The domain of teacher thinking calls for a new paradigm in research because thought processes are inside the heads of teachers and not part of the observable process-product approach. The central methodological problem deals with how to get valid and reliable self-reports. The first of the research on teachers' beliefs used questionnaires and surveys to place beliefs into categories predefined by the researcher. Later research has sought to use the teachers' own language to develop categories (Zeichner, Tabachnick & Densmore, 1986).

Smith (2002) mentions that one of the earliest efforts at understanding teacher thinking was Smith's (1968) book: Life in the Classroom. This descriptive study departs from the process-product approach and focused attention for the first time on the importance of describing the thinking and planning of teachers as a means of understanding classroom practices (Clark & Yinger, 1987). It was not until 1974, however, that the National Institute of Education issued a report outlining a rationale and defining the assumptions of a proposed program of research on teachers' thought processes. The authors of the report claim that research on teachers' cognitive processes was necessary for two reasons: (1) to understand the uniquely human process of teaching, and (2) to study the processes used by professional teachers to perceive and define their work (Clark & Peterson, 1986).

Another important research arena in studying teachers’ beliefs is the distinction between beliefs and knowledge. Gess-Newsome (1999) argues that there is no consensus concerning the definitions of beliefs and knowledge in educational literature. It is acknowledged that beliefs and knowledge are similar, but it is generally understood that the division lies at the personal versus public domain. Knowledge is subject to group consensus regarding validity and appropriateness and is more easily subjected to examination by others. In contrast, beliefs are personal, not as readily discussed with
others. However, Nespor (1987) claims that knowledge is more dynamic and flexible than beliefs, which are difficult to change.

**The Difference between Knowledge and Beliefs**

The subject of distinguishing between knowledge and beliefs is a controversial. Pajares (1992) argues, “Distinguishing knowledge from belief is a daunting undertaking” (p. 809). A review of related literature in this field provides a battleground for this controversy. However, Nespor (1987) attempts to identify how four features separate beliefs from knowledge. These features are episodic memories, alterativity, existential presumption, and affective or evaluative loading.

1. Episodic memories of teaching events, real or imagined, make up the belief system and contribute to teachers’ practical knowledge of teaching. Although the brain stores the knowledge of teaching semantically in logical constituent lists, it stores beliefs as events or personal experiences.

2. Alterativity comprises beliefs about the ideal learning environment. Each teacher has his or her own reality or a teaching/learning utopia that differs from reality. This alternative reality is not open to challenge and helps define teachers’ goals for teaching.

3. Existential presumption includes beliefs about what is beyond teacher control, such as student abilities. Existential presumption means that a person takes conditional or ambiguous characteristics and establishes them as a well-defined and stable entity.

4. Affective or evaluative loading is the emphasis that teachers place on various activities. The teachers’ feeling or emotional response and subjective evaluation influence the energy that teachers give to varying activities such as laboratory experiences.

Richardson (1996) defines beliefs as "psychologically held understandings, premises, or propositions about the world that are felt to be true" (p. 103). Although he claims that there is "considerable similarity of definition" among anthropologists, social psychologists, and philosophers concerning this definition, other writers challenge that confusion and wide disagreement exists among social science researchers about just what
a belief is, as well as the relationships between beliefs and knowledge (Gess-Newsome, 1999; Pajares, 1992; Southerland, Sinatra, & Matthews, 2001).

Pajares (1992) made a comparison between knowledge and beliefs. He mentions that contrary to knowledge, beliefs generally do not change, are unchanging and if they change, their change will be like conversion or gestalt shift. Knowledge is open to evaluation and critical examination while beliefs are not. Furthermore, belief depends on evaluation and judgment whereas knowledge depends on objective fact.

It is worthy here to mention the categories of knowledge that Anderson (1983; 1985) (as cited in Pajares, 1992) discusses. There are three categories of knowledge; declarative, procedural, and conditional. Declarative knowledge is the knowledge of what, such as knowing the time of day. Procedural knowledge means the knowledge of how things or systems work (e.g. a teacher may have knowledge of geometry (declarative) but have no idea how to put her students in possession of it (procedural). Conditional knowledge is that knowledge that involves understanding when, why and under what conditions declarative or procedural knowledge should be used. For instance, a teacher may know classroom management procedures, procedural knowledge and how to execute them but be uncertain as to when or under what conditions, conditional knowledge, a particular approach is appropriate (Pajares, 1992).

Southerland et al. (2001) attribute the confusion that surrounds what constitutes knowledge and belief to differing theoretical perspectives. They argue that researchers who hold controversy epistemological perspectives deal with these constructs differently. The major research disciplines that Southerland and her colleagues analyze are philosophy, science education and educational psychology. They describe how each of these disciplines employs different views and definitions of both knowledge and beliefs, thus mudding the waters even more.

Given that this research will focus on the act of teaching, it seems appropriate to employ the definitions of knowledge and belief that are common to the study of teacher education. Although researchers of teacher thinking domain acknowledge the difference between both constructs, they often use them interchangeably based on the inherent difficulties in distinguishing between them. Researchers of this domain typically describe knowledge as “evidential, dynamic, emotionally-neutral, internally structured, and
develops with age and experience” (Gess-Newsome, 1999, p. 55). In contrast, beliefs are “both evidential and nonevidential, static, emotionally-bound, organized into systems, and develop episodically” (Gess-Newsome, 1999, p. 55). In reality many researchers in teacher thinking domain use the term belief to refer to both of these constructs.

Therefore, since this study included teachers’ thinking, I describe teacher belief and knowledge using the teacher thinking lens. Researchers who use this lens recognize that teacher thinking has a basis in both knowledge and belief and often equate between them and treat them as a single construct (i.e., beliefs and knowledge about students, beliefs and knowledge about teaching and learning) (Pajares, 1992).

**Teacher Beliefs**

Currently, the dominant line of research in education describes that teachers’ beliefs, more than their behaviors, affect student learning (Pajares, 1992). Research studies support the critical contribution of teacher beliefs on classroom behavior (Haney, Czerniak, & Lumpe, 1996). Teachers’ beliefs and thinking affect their implicit perceptions, plans, and actions in classroom. Teachers’ beliefs about students also affect the instructional strategies that they use in their classrooms. Science education is replete with many classroom-based studies that illustrate how different aspects of teachers' beliefs about science, and about science teaching and learning, tend to determine their teaching methods and strategies (Brickhouse & Bodner, 1992; Cronin-Jone, 1991; Dickinson, Bums, Hagen, & Locker, 1997; Hammrich, 1997; Laplante, 1997). Research also suggests that the relationship between beliefs and behavior 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).

Beliefs are important in learning because they act as filters on incoming stimuli and information (Gess-Newsome, 1999). They are the gatekeeper in the processing of new knowledge, allowing some information to become part of existing mental constructs, which reinforces previous beliefs; or discarding information that does not fit precisely with previously held conceptions. At times, new information is neither assimilated nor rejected, rather put into storage until needed. The different paths that new information, stimuli, and experiences can take leads to actions that are sometimes consistent with
beliefs and other times inconsistent (Berliner, Carter & Doyle, as cited in Waggett, 1999, p. 5).

Researchers have found that understanding teachers' beliefs is difficult because individuals are reluctant to describe their beliefs precisely. Indeed, some studies highlight large discrepancy between teachers' espoused beliefs and their observed practice (Calderhead, 1996). Thompson (1992) suggests that this discrepancy may result from problems in methodology. He states:

Any serious attempt to characterize a teacher's conception of the discipline he or she teaches should not be limited to an analysis of the teacher's professed views. It should also include an examination of the instructional setting, the practices characteristic of that teacher, and the relationship between the teacher's professed views and actual practice (p. 134).

Teachers' perceived beliefs may not match their practice. What they 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. This is why beliefs cannot be directly measured or observed, they must be inferred from a combination of what teachers "say, intend, and do" within the context of their work settings (Pajares, 1992).

Current research on teaching puts an emphasis on the formation or transformation of teacher thinking and has led to studies that examine changes in teacher beliefs, as a natural process of acquiring experience, or as an outcome of teacher education programs.

**Teacher Beliefs and Change**

As all humans, teachers invest emotionally and intellectually in their beliefs and they seek to maintain them. "Beliefs influence perceptions that influence behaviors that are consistent with, and that reinforce, the original beliefs" (Pajares, 1992, p. 317). Indeed, when people interact with changing social contexts, they try to maintain a sense of self by holding fast to their beliefs. Pajares (1992) describes this phenomenon:

From both a personal and socio-cultural perspective, belief systems reduce dissonance and confusion, even when dissonance is logically justified by the inconsistent beliefs one holds. . . . People grow comfortable with their beliefs, and these beliefs become their "self," so that individuals come to be identified and understood by the very nature of the beliefs, the habits, they own (p. 318).
Likewise, Bullough & Baughman (1997) maintain that:

changing a fundamental belief is extremely difficult because related beliefs—
perhaps attached to a particular attitude, which in turn is attached and sustained by
other attitudes... Thus when fundamental beliefs are challenged, the challenge,
whatever its source, is taken emotionally and perhaps cognitively as an attack on
the self; and the initial reaction generally is to shore up the system, even at the
cost of engaging in a counterfactual defense, and a self-deception (p. 73).

Therefore, the filtering effect of the belief structures "screens, redefines, distorts, or
reshapes subsequent thinking and information processing" (Pajares, 1992, p. 325) in an
effort to maintain a sort of stability.

Despite their elasticity, beliefs do change. So what prompts change in beliefs?
How do they change? What are the factors that stimulate that change? What types of
experiences provide a context for changes in teachers' beliefs? Researchers have studied
teachers during their educational careers in an effort to describe factors that influence the
development of their beliefs about teaching and learning. They suggest that teachers'
educational beliefs do change through their teaching experience and in relationship to
others within their community of practice.

Richards, Gallo & Renandya (n.d.) argue that change is a major dimension of
teachers’ professional lives. Change in teachers in general is either positive or negative.
Pennington (as cited in Richards et al., n.d.) describes positive change as central to the
professional life of a teacher.

Additionally, Freeman (1989) highlights a number of aspects of the notion of
change. First, change does not necessarily mean doing something differently; it can mean
a change in awareness or an affirmation of current practice. Second, change is not
necessarily immediate or complete, some changes occur over time, with the collaborator
serving only to initiate the process. Third, some changes are directly accessible by the
collaborator and thereafter quantifiable, whereas others are not. Fourth, some types of
change can come to closure and others are open-ended.

Change in teachers, however, has many sources. Vonk (as cited in Richards et al.,
n.d.,) states:

At certain moments a coherent set of changes occurs in teachers’ thinking about
the profession and in their conduct. Theses changes are both qualitative and
quantitative in nature. Such a development, however, is not a simple, spontaneous
process; it is rather the outcome of a complex interaction between the individuals and the various environments in which they are participating (p. 12).

Through discussions between teaching collaborators (i.e., supervisors, colleagues, teacher trainers and quite often groups of students), changes can begin to happen. They can guide teachers to teach differently to improve their teaching quality and their work conditions. Collaborators also can help teachers reflect on the positive aspects of their teaching (Richards et al., n.d.). They can also help by using the following set of catalysts:

Dissatisfaction with the current situation, the connection of a new idea with the teacher’s own situation, a change in the teaching context, life changes and personal growth, which led to professional development, a realization of something based on his or her experiences as a learner, and a contradiction between the teachers’ new beliefs and their practices (Baily, as cited in Richards et al., n.d.).

It is important to note that teachers do not have full control in changing themselves and their teaching. Other factors, particularly contextual factors, play a vital role in shaping teaching.

**Context, Beliefs, Teaching, and Change**

Teachers live, work and interact within multiple contexts and communities (i.e., local, state, national, and international). Within each of these contexts, they experience learning activities and develop identities that shape both personal and professional values and belief systems (Bullough & Baughan, 1997).

As Osborne (1998) mentions, the sociocultural contexts and communities shape people’s beliefs. He states "These personal experiences and the memberships in sociocultural groups which create them define a person's epistemological standpoints from which their beliefs, values, and actions are derived" (p. 428).

Context can be either a set of circumstances that surround a given event or situation, or the parts of a statement that precede or follow a specific word or passage (Smith, 2002). However, it appears that there is no consensus on the definition of context. Jone (1997) indicates:

Context is an elusive but common concept. Although most people have an intuitive notion of what context is, they cannot clearly define it..... Context is
said to have something to do with environment, something to do with conditions, something to do with the actors in a given situation. (p. 131)

Context influences teachers and the way they teach. It is understood to play a role in understanding what teachers do and how they think about teaching. Lave (1993) describes two major theoretical perspectives on the question of context; activity theorists and phenomenological perspectives. She argues that there are differences between these two perspectives. Activity theorists see that context is “historically constituted concrete relations within and between situations” (p. 18). And the surrounding context, which is made up of the relationship between persons who participate in that particular activity and their relationship with the large sociocultural context, defines the meanings of any activity. Engeström (as cited in Lave, 1993) defines context from this perspective:

Contexts are activity systems. An activity system integrates the subject, the object, and the instruments (material tools as well as signs and symbols) into a distribution, exchange, consumption (p. 18).

From the phenomenological perspective, context is defined as describing the relationship between co-participants in social interaction. Phenomenologists claim that social activity has its own context, and that social structures exist only within a given social interaction in situ (Lave, 1993).

Overall, researchers in both perspectives agree that the interaction between people in an activity system and the socially, historically, and culturally constructed world that surrounds them influences their beliefs and perceptions.

Jone (1997) describes three characteristics of context that are relevant to teaching and teacher change. First, context is functional, meaning it helps teachers build meaning from their experiences. Second, context is explanatory, meaning that it includes those conditions that support or limit teaching. He says, "These include the conditions of the classroom; the educational emphases of the school; the political, social and educational relationship between the school and the community; the financial resources available; the educational policies that govern teaching, and so on" (p. 132). The third characteristic of context is that it is interactively constructed. Jone (1997) states "A constructive context arises through discussion and reflection on action, whether taken or imagined" (p. 132). This entails that context intertwines with perspectives, and includes: the methodology a
teacher utilizes, his or her instructional goals, his or her beliefs and knowledge about subject matter and its relationship to what is appropriate or inappropriate to do with students (Smith, 2002).

Jone (1997) argues that the first two perspectives separate context from individuals and deal with it as it is a fixed thing and not changeable. He states "it is tempting to think of context as unaffected—as only a limiting force—and, thus, to think of teachers as being victims of context" (p. 133). Whereas, the third characteristic gives individuals more room to interact with their surrounding contexts and considers them as active subjects and contributors. Therefore, teachers are able to give meaning to their actions, ideas, and experiences through the dynamic relationship between the externally imposed and the constructed faces of context, as Jone explains,

Although setting, policy, and conditions may be imposed principally by external forces, they are not unaffected by a teacher's goals and perspective. . . . Similarly, although teachers' goals, beliefs, and perspectives are fundamentally internally constructed, they are definitely affected by conditions and policies (1997, p. 134).

Moreover, some researchers expand the discussion of context by portraying the effects of the wider cultural context of a postmodern society (Bullough & Baughman, 1997; Hargreaves, 1994). They describe that it is a time of change, especially under conditions of increased cultural tensions and contradictions.

The fundamental problem here, I will argue, is to be found in a confrontation between two powerful forces. On the one hand is an increasingly postindustrial, postmodern world, characterized by accelerating change, intense compression of time and space, cultural diversity, technological complexity, national insecurity and scientific uncertainty. Against this stands a modernistic, monolithic school system that continues to pursue deeply anachronistic purposes within opaque and inflexible structures (Hargreaves, 1994, p. 3).

Therefore, in this context, teachers' roles continue to expand, especially while they experiencing feelings of overload and changing in educational purposes. Teaching has become more multifaceted and confusing, and "the quality of teachers' lives is dramatically and often negatively affected" (Bullough & Baughman, 1997, p. 15).

In addition to the context, teachers' beliefs and experiences play a role in their teaching, the following section explores the relationship between these two components.
Beliefs and Experience

Regardless of the relationship between belief and practice, experiences have the greatest impact on the development of beliefs (Richardson, 1996; Pajares, 1992). Personal experiences influenced by family, religious background, gender, ethnicity, socioeconomic influences in relation to a person's mental constructs shape that person’s biases, attitudes, and beliefs (Richardson, 1996). Educational experiences shape beliefs towards the nature of teaching. Students begin preservice teacher education with deeply entrenched beliefs regarding effective teaching based on years of experience as students (Pajares, 1992).

Since teachers’ interact and deal with multiple contexts, the types of personal experiences that they gain from dealing with cultural contexts outside of teaching, researchers insist on the importance of examining teachers' practice through integrating situational, biographical, and historical information influence their teaching (Bullough & Baughman, 1997; Hargreaves, 1994).

In addition, a growing body of literature examines the relationship between personal experiences and how individuals approach teaching (Bullough, 1992; Bullough & Baughman, 1997; Richardson, 1996). Personal experiences include those associated with personal, familial, and cultural aspects of an individual's life. Most of this research literature includes descriptions of individual teachers in the form of case studies, and depicts their attitudes toward teaching in relation to their teaching practices. In each case, personal experiences appear associated with the way the teacher approaches teaching.

Teachers’ beliefs about teaching environmental education are also influenced by their life experiences. Therefore analyzing teachers’ beliefs and experiences in teaching environmental education will help us to understand the elements that contribute to successful teaching of environmental education. In the following section, I discuss the influence of teachers’ beliefs and experiences on teaching environmental education at schools.
Beliefs and Environmental Education

The increasing popularity of environmental education (EE) in schools has created a need for effective teachers. One way that researchers use to evaluate teacher effectiveness is through measuring their beliefs toward teaching EE in classroom (Moseley, Reinke, & Bookout, 2002). Although teachers’ beliefs have received little attention in EE, there are a few studies that have investigated school teachers’ knowledge and beliefs toward teaching EE.

Cutter and Smith (2001) focus on primary teachers’ knowledge and beliefs about environmental concepts and environmental education in Queensland, Australia. Their study identifies a perceived gap within the field of environmental education research and literature. They use the concept of ‘environmental literacy’ to assess primary school teachers’ knowledge and beliefs about EE. They employ both quantitative and qualitative techniques to collect their data. The results reveal that Queensland primary teachers are not only variably committed to and lack content knowledge of environmental concepts and EE, but also tend to dismiss the importance of content knowledge and instead preferring to focus upon attitudes towards EE and environmental concepts. The authors conclude that the introduction of environmental literacy in educational policy would advance the goals of EE, and particularly, the production of informed, committed and active citizens.

Moseley, Reinke, and Bookout (2002) focuses on the effect of participation in a 3-day outdoor EE program on preservice teachers’ attitudes and self efficacy (defined as teachers’ beliefs toward teaching EE effectively) and outcome expectancy (teacher’s estimation of his or her influence on student learning). Their sample includes preservice elementary teachers taking a science methodology course at a state university. By administering Sia’s (1992) Environmental Education Efficacy Belief Instrument to their students prior and after taking the science methodology class, the authors describe that the preservice teachers’ self-efficacy is high before the program, remains unchanged by their teaching experiences but drops significantly after seven weeks of teaching. In contrast, their outcome expectancy does not change as a result of participation in the program. The authors attribute the lack of change in teachers’ outcome expectancy to the structured nature and success of teaching experience.
In a similar study, Middlestadt, Ledsky and Sanchack (1999) is a qualitative exploration, funded by the North American Association for Environmental Education (NAAEE) and United States Environmental Protection Agency (EPA), to determine elementary school teachers’ beliefs about teaching EE. The primary goal of this study is to identify the strategies used by participants to overcome barriers in teaching EE in their classrooms. The authors hope to help current teachers who are teaching EE to teach more and to help encourage new teachers to begin teaching EE. The authors describe some barriers and obstacles that might face teachers in their teaching EE such as lack of materials to teach EE, lack of time, and lack of training for teachers to teach EE.

Chi-chung Ko and Chi-kin Lee (2003) describe an exploratory study of Hong Kong secondary school integrated science teachers’ perceptions of environmental education. They used both questionnaire survey and interviews to collect their data. As a result of their work, the authors describe that integrated science teachers’ attitudes toward environmental education, skills of teaching environmental education, beliefs in the relevance of integrated science to environmental education, and intentions of teaching environmental education in integrated science classes depends on the teachers’ processes of teaching of environmental education. Their results reveal that teachers tend to teach more environmental education if they hold more favorable attitudes toward environmental education, have more skills of teaching environmental education, and believe more in the relevance of integrated science to environmental education.

Moving to higher education level, Nelson (as cited in Monroe, 1993, p. 45) focuses the beliefs and understandings of environmental educators in Arizona. The purpose of his study is to describe the nature of environmental education as understand by the educational community. Nelson bases his results on data gathered from interviews from 15 participants. The results of Nelson’s study show that educators’ beliefs and understanding concerning environmental education influence curriculum and instructional decisions. Apparently, educators’ most significant beliefs and understandings reflect their personal and professional interactions with colleagues and from personal experiences associated with interest particular to the environment. A significant finding of Nelson’s study shows the teachers’ belief about environmental education involves an interdisciplinary enterprise that must include knowledge from all
subject areas. Furthermore, “environmental education should be perceived not as something to be added to the curriculum but rather a way of addressing the established curriculums within a meaningful context” (p. 10).

The results of research indicates that teachers’ knowledge and beliefs about teaching EE have captured researchers’ attention. However, more studies are needed to further understand the nature of beliefs teachers have toward teaching EE (Pooley & O’connor, 2000) and more of such studies are needed at the university level.

The main query of my study was to understand the sort of influences on university professors’ in their activity of ESD and how do these influences interact with each other. The study employed the Cultural-Historical Activity System (CHAT) to answer this question. CHAT is a useful theoretical framework in that it provides an opportunity to investigate the multiple cultural and historical elements that are involved in the ESD activity system. By understanding the ESD activity system, I hope to open the door for a future research agenda inquiring further into sustainability and ESD to foster our understanding in building a community of people who act and behave sustainably.

In the following chapter, I will explain in detail how I investigated the ESD activity system using CHAT theory through multi qualitative case study.
CHAPTER 3

METHODOLOGY

This chapter describes the research approach and strategies that I used to explore the dynamic of ESD on undergraduate environment-related classrooms. I begin with a brief discussion of the nature of qualitative research, the methodological approach that I employed in the study. Afterwards, I describe the research site, the selection of the research subjects and the research strategies that I employed. The last section describes the mode of data analysis and responds to the criteria of validity, reliability, and trustworthiness of the findings that ensured the rigor of the study. It also presents the ethical considerations that guide me in conducting the research.

A Qualitative Research Approach

A qualitative research approach guided the overall conduct of the study. The nature of the research problem called for an approach that deviated from the objective, reductionist, and positivistic approach to research, in that I was seeking an in-depth exploration of a relatively new field of inquiry. A qualitative research approach seemed to be appropriate, since it offers, as Taylor & Bogdan (1998) mention, ways of understanding social phenomena from the actor’s own perspective and examining how the world is experienced.

Standing on that assumption, in this study I relied solely on the qualitative approach. Research strategies that I employed included in-depth interviews, subject observation and artifact analysis.

In the following pages I describe the theoretical framework that I used to analyze my data as well as my study’s design and methods of data collection.

Theoretical Framework

Cultural-Historical Activity Theory

The theoretical framework that guided this study was cultural-historical activity theory (CHAT), with its roots in the work of Lev Vygotsky. I selected this framework because it allowed me to analyze the broader activity system of ESD and the several
factors that interact with that activity. It enabled me to understand and discuss in a more holistic fashion the ESD activity system and the cultural, social, historical factors that influenced this activity.

In the first half of the twentieth century, a group of Russian psychologists, Vygotsky, Luria, and Leont’ev, developed activity theory. The fundamental premise of this theory can be traced back to the writings of Vygotsky’s (1978) and his notion that human activities and higher psychological functions have sociocultural origins; that is, human activity and thought are mediated by tools (material objects or a specific human activity), as well as signs (symbolic systems like language, writing, number systems). With philosophical roots in Marx’s concept of activity, this theoretical framework goes beyond the dualism between idealism and materialism, as well as the division between the inner world of the knower and the external material world of the known, by using “activity” as its unit of analysis (Engeström & Miettinen, 1999).

Leont’ev (1979) defines activity as “unit of life that is mediated by mental reflection” (p. 46) and characterizes it as a reciprocal transformation between subject and object. Through the process of activity, the subject forms internal representations of the object and concurrently objectifies internal representations. Through the activity process societal structures as well as the subjects themselves go through a transformation process to become new individuals with better characteristics (Engeström, 1999).

The idea of meditation has its roots in the work of Vygotsky, where tool systems and sign systems (language, writing, number systems) mediate through behavioral transformations to higher forms of individual development (Vygotsky, 1978). Leont’ev (1979) extends Vygotsky’s notion of the mediated relationship between subject and object to include social interaction, as well as artifacts. He suggests three levels of a hierarchical activity system being operation, action, and activity, driven in that order by conditions, goals, and motives (Engeström, 1998, 1999) For example, he describes a scenario of a collective activity in which members of a community participate jointly in a hunt. The division of labor mediates the collective activity as people assume different tasks, or “actions.” These actions, which might have included chasing animals into an area where other members of the community could easily kill them, have different destinies but ultimately contribute to the activity of hunting.
Thus, Leont’ev (1979) views the activity system as incorporating three hierarchical processes, which may be driven by different individual or communal intentions. Operation, action, and activity, are understood to be driven, respectively, by conditions, goals, and motives (Engeström, 1998, 1999) (See Table 4 for Leont’ev hierarchical structure of activity).

Table 4. Leont’ev hierarchical structure of activity.

<table>
<thead>
<tr>
<th>Level</th>
<th>Oriented towards</th>
<th>Carried out by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Highest</td>
<td>Community</td>
</tr>
<tr>
<td>Individual action</td>
<td>Middle</td>
<td>Individuals</td>
</tr>
<tr>
<td>Operation</td>
<td>Lowest</td>
<td>Routinized human/ Machine</td>
</tr>
</tbody>
</table>

Activities, actions, and operations are dynamic and are constantly shifting (Leont’ev, 1979). For example, typing might have once been a conscious activity for a beginner. However, with practice it can become an unconscious operation embedded within a higher level action or activity. Further, an act that is an operation for one individual may be an action or activity for another person.

Early descriptions of CHAT used a triangle to represent the subject, object and the tools or artifacts used to mediate an action. An example might be a child (subject) using a book as the tool required to answer a question posed by the teacher to demonstrate reading comprehension (object-outcome) (see Figure 5 for a model of an activity system).

Engeström (1987) argues that this model needs to be expanded in order to understand the relationship between isolated actions and the ongoing cultural activities in which they are embedded. An activity system integrates the subject, the object, and the instruments (material tools as well as signs and symbols) into a unified whole. It incorporates both the object-oriented productive aspect and the person-oriented communicative aspect of human conduct.
Incorporating all mediational factors in the activity system helps transform the system. Cole and Engeström (1999) developed a model of an activity system that incorporates various mediational means within the subject and object relationship including cultural artifacts (tools and signs), community, divisions of labor, and rules (see Figure 6 for a conceptual model of an activity system).

In Engeström’s model, the individual “action” (subject, object, tools) relates to the larger cultural and historical context by the relationships represented by the other triangles. For example, the subject-object relationship changes by the cultural roles that apply to this relationship and by the division of labor in which it is embedded. These rules might include the tools considered appropriate for use (i.e., in the classroom written
communication or verbal language), and the way the different categories of community members share the control of the activity.

From the expanded Figure, the triangle in the upper half of the Figure depicts the relationship between subject and object as mediated by cultural tools that Vygotsky originally identified. This upper triangle describes individual learning with relations between the subject, object, and the mediational artifacts, in isolation from the community of practice. The lower half of the Figure adds Leont’ev’s (1979) conception of the mediating social world in the subject object relationship. Now individual learning is understood to be mediated not only by cultural tools, but also by the community of practice, including communal rules and divisions of labor and the community itself. For example, Cole and Engeström’s model of the activity system could be used to investigate how school rules, communal relationships, as well as classroom divisions of labor mediate how to use and appropriate knowledge within a particular community of practice.

Engeström (1999) distinguishes between object and outcome. He argues that the object is what connects the individual actions to the collective. The outcome is something that is not momentary, but it is broader than what individual actions would accomplish. So, individuals can have objects toward which they move with individual actions, but the outcome is something that all individuals accomplish in their collective activity. Activity theory represents a unit of analysis in the framework of “object oriented, collective, and culturally mediated human activity, or activity system” (Engeström & Miettinen, 1999, p. 9). In this study, the internal contradictions and inconsistencies identified as the areas of contradiction that prevent or discourage university professors from education for SD. Oddly enough, these internal contradictions in the system can be the driving force of change and development for that system.

In all activity systems, incoherencies, inconsistencies, paradoxes and tensions are integral elements. They become apparent in disturbances when people are interpreting situations in different ways. During such occurrences inherent dilemmas in the overall pattern of activity become clear, or unexpected difficulties emerge in the execution of everyday tasks. Engeström (1999) argues that relationships within activity systems are made orderly only by the determination people show as they engage with the objects of
their activity. As disturbances become evident within and between activity systems, actors may begin to address underlying issues and create new learning.

There are two continuously operating processes in the activity system: *internalization*, which refers to “reproduction of culture,” and *externalization*, which means creating new artifacts for transformation. This transformation occurs in the form of expansive cycle, which contains the processes of internalization and externalization (see the expansive cycle in Figure 7).

![Expansive Cycle Diagram](image)

**Figure 7.** The expansive cycle.

Both processes form an “expansive cycle,” lead to transformation at the individual level (Engeström, 1999). In other words, while the object and the outcome represent the milestones of the activity system, there is a gap between the two that requires us to bridge it by transforming our system. This transformation occurs in the form of expansive cycle that contains the processes of internalization and externalization. Once one internalizes this existing structure, then critical self-reflection takes place, and then a new structure develops, simultaneously reducing the contradictions. This new resulting structure is more complex than the previous one and does not involve the contradictions present before; however, it has the potential to develop new contradictions. In this case, the processes of internalization and externalization may repeat and another expansive cycle may emerge and a new transformation process will occur in the system.

A nonexpansive model tends to reproduce the status quo of the phenomena it represents. Nonexpansive models feed the contradictions and eventually become points of crisis (status quo reproduction) instead of driving forces of change and development.
Activity theory provides a comprehensive unit of analysis. Figure 8 represents the activity system for ESD for this study; thus it includes the consideration of the subjects in a classroom context and in the larger social, political, and educational context.

![Diagram of Science classroom activity system]

Figure 8. Science classroom activity system.

The *subjects* of the activity system focused on in this study were two university professors who taught science and environmental classes on campus, their teaching history, their pedagogical content knowledge, and their beliefs about environment and ESD. The *communities* involved their classrooms’ communities, university’s community, and local environmental communities. The *mediating artifacts* (Instruments) represented their teaching facilities and materials, (i.e., access to the Internet, classroom activities and events). The *object* were both professors’ education toward sustainable development and
the outcome represented the new learning communities who live sustainably with their environment and influence their communities to be sustainable.

**Design and Method**

The purpose of this study was to understand the interaction between the various facets of the activity system that influenced the professors’ ESD. These facets included focusing on individual university professors’ thinking, beliefs, teaching context, types of contradictions each professor faced in his activity of ESD, and their practices regarding ESD. With this focus in mind, research methods that were consistent with interpretivist principles (Taylor & Bogdan, 1998, p. 3) became required.

As a research tool, qualitative research enables us to understand in a more holistic way the meanings people have of their subjective realities and experiences. The complexity of describing contexts of teaching (both cultural and historical) for SD and interpreting and inferring individual professors’ thinking, beliefs, and challenges in this study necessitated a qualitative research methodology. A multi-case study methodology appeared to be relevant to use for the purpose of this study and both in-depth interviews and subject observations were main tools of data collection.

Choosing a multi-case study methodology for this study became crucial because my study required no control over behavioral events inside and outside the classroom. Indeed, the main goal of this study was to describe and understand the systems of activity for ESD that currently exist at a university environment-related science classroom.

In attempting to understand the dynamics of ESD, I paid attention to the mediating artifacts and the interaction that presented in the particular context of ESD in a typical university environment-related science classroom. In analyzing my data, I considered how both of my subjects viewed the tensions, inconsistencies, and incoherencies that inhibited them from fully addressing SD in their teaching and their prospective strategies of resolving these contradictions. I tied the form of interpretation of the viewed contradictions to the internalization or externalization processes embedded in the cultural-historical activity theory.
I also considered my professors’ beliefs about ESD and their practices as an important aspect in understanding the dynamics of ESD. However, understanding teacher beliefs requires one to go beyond simple conversation. Indeed, inferences about teachers’ thinking and beliefs require researchers to examine teachers’ “verbal expressions, predispositions to action, and teaching behaviors” in order to assess their relationship to practice (Pajares, 1992, p. 327). There is some variability in the degree of consistency between teachers’ thinking and beliefs and their actual classroom practices (Thompson, 1992). Therefore, it becomes more crucial to keep in mind that any serious attempt to characterize a teacher’s educational beliefs should not be limited to an analysis of the individual’s declared views alone. Moreover, any investigation that involves professors’ thinking and beliefs must include more than self-reported data. Thompson (1992) maintains that it should also include “an examination of the instructional setting, the practices characteristic of that teacher, and the relationship between the teacher’s professed views and actual practice” (p. 134).

For the purposes of this study, the instructional setting referred to the context within which my subjects teach. CHAT clarifies and emphasizes the interrelated nature of context and the socially and historically constructed activities of teaching and learning. It posits that context prescribes individual’s participation in a social practice (Lave, 1993). Since professors are surrounded with multiple contexts (i.e., social, personal, professional), it is possible to analyze context at these various levels without losing track of each of them as well as the interaction between them. The focus of this study was on the local, university-based setting of the subjects’ practices, including a detailed examination of their instruction in relation to their thinking, beliefs and understanding of what it means to educate for sustainable development. This description, in addition to data obtained through multiple formal and informal interviews and conversations enabled me to construct case studies surrounding each of the professors.

Because this study involved the examination of two university professors within the contexts of their practices, the use of multi-case study research in which I was able to describe and compare both cases seemed appropriate (Bogdan & Biklen, 1998). A case study may be defined as “a detailed examination of one setting, or a single subject, a single depository of documents, or one particular event” (Bogdan & Biklen, 1998, p. 54).
Context

A doctoral/research university in the southeastern part of the United States served as the research site in this study. The campus was a traditional one, with a high percentage of the 37,000 students living on or near campus. The university received $161 million in external funds in 2003 and was consistently in the top four American universities in patents from faculty inventions. Science research, in particular, received strong emphasis at this site. The university was home to the National Magnet Laboratory, a facility that attracts top scholars from all over the world, and also has two Nobel Laureate scholars in residence (University web page). Far more of the context of this study and an exploration of how the context shaped the activity systems is described in the results and discussion chapters.

Research Subjects

To identify my research subjects from the university level, I considered the professors who taught science classes in general and environment-related science classes in particular, to participate in my study. I made that decision for two reasons. First the purpose of my study was to understand the dynamics of ESD at the university level. Second, I assumed that ESD is not popular at universities and generally professors do not fully achieve ESD in their teaching. However, I expected that it is easier for professors who teach environmental science courses to address sustainability more than other professors who teach non-science related courses (i.e., economics, city planning) who are assumed to pay more attention to a non-sustainable notion of development. Therefore, I decided to choose two subjects from the university campus, one subject from environmental teaching program in the department of Geography and another subject form Oceanography department. Both subjects taught an environment related science class that they offered in Spring 2004 semester: environmental science class and environmental issues class. I chose these two classes because the object of both classes (as evidenced by their courses’ syllabi) was to develop a level of appreciation about the environment in students and foster their understanding of the notion of stewardship, an idea closely related to ESD. I purposefully selected two subjects in order to have the
opportunity to learn in depth from different perspectives and to make a contrast between them since they come from two different departments.

Professor Smith’s class focused on current issues in environmental science. His stated objective in teaching the class was to foster an attitude of informed environmental stewardship in his students. In this course he invited speakers from the university and the surrounding community to give talks on various environmental issues at both global and local levels.

Professor Jones’ class focused on environmental science. The main objective in teaching his class was to develop his students’ appreciation of the way nature works and foster skills needed to analyze and understand the relationship between human and the environment.

**Methods of Data Collection**

The essence of qualitative research includes some common rules agreed on by most researchers of sociology, anthropology, and education. These are: (1) looking for meaning and subject’s perspectives, (2) looking for relationships regarding the structure, occurrences, and distribution of events over time, and (3) looking for points of tension (Janesick, 2000).

For the purpose of this study, I primarily used multiple case studies and compared them to better understand and analyze the activity systems of ESD. Toward those ends, I investigated the different elements of ESD activity system by trying to understand the meanings that university professors have about SD and ESD, the structural and cultural context of their teaching, the nature of challenges they face in ESD in this context, their beliefs about environment and sustainable development, and how they employed their beliefs in their classroom practices. In the following sections I describe the qualitative research methods I employed to collect needed data.

**Participant Observation**

Participant observation is one of the main methods of data collection in qualitative research. Bogdan and Biklen (1998) state:
People act not on the basis of predetermined responses to predefined objects, but rather as interpreters, definers, signalers, and symbol and signal readers whose behavior can only be understood by having the researcher enter into the defining process through such methods as participant observation. (p. 25)

Participant observation consists of observing the activities, people and physical aspects of the situation (Bogdan & Biklen, 1998). Bogdan & Biklen (1998) portray the process of collecting data from participant observation as fieldwork:

Fieldwork refers to being out in the subjects’ world, in the way we have described-not as a person who pauses while passing by, but as a person who has come for a visit; not as a person who knows everything, but as a person who has come to learn; not as a person who wants to be like them, but as a person who wants to know what it is like to be them. (p. 73)

In my classroom observations of my study’s subjects I first collected their teaching materials (i.e., textbooks, syllabi, assignments, exams) and then observed their instructional practices and how they translated their thoughts and beliefs into actions, with particular attention to understand how they promoted their students’ attitudes toward the environment.

During my observations, I wrote my fieldnotes. Fieldnotes are “the written account of what the researcher hears sees, experiences, and thinks in the course of collecting and reflecting on the data in a qualitative study” (Bogdan & Biklen, 1998, pp. 107-108). In recording my fieldnotes, I took particular care to follow the format described by Bogdan and Biklen, and I was careful to reflect and comment on them after the observation to make them ready for analysis. Indeed, Bogdan & Biklen (1998) describe the fieldnotes consist of two parts: descriptive and reflective. The concern of the descriptive portion is “to provide a word-picture of the setting, people, actions, and conversations as observed,” and the concern of the reflective portion is “the part that captures more of the observer’s frame of mind, ideas, and concerns” (Bogdan & Biklen, 1998, p. 121). Although the former refers to a more “objective” observation, the latter refers to the observer’s “subjective” feelings, ideas, and speculations. They suggest that researchers mark their reflective fieldnotes as “O.C.,” which stands for observer’s comments, a practice I undertook to bracket my inferences.
In this study, I selected six calendar dates for each classroom for formal classroom observation. I observed my both subjects’ classroom more than six hours but after the point at which I reached data saturation, I did not document all of them.

**Interviews**

In addition to my classroom observations, I arranged personal interviews (formal and informal) with my research subjects to investigate their beliefs and concerns about their teaching. In this research, I considered an interview to be a purposeful conversation between two people or more (Bogdan & Biklen, 1998).

Bogdan and Biklen (1998) identify three types of interviews: structured, open, and semi structured. In a structured interview, the researcher uses a set of prepared questions called “probes.” In an open interview, the researcher encourages the interviewee to talk freely and then probe deeper (Bogdan & Biklen, 1998). Semi-structured interviews have sequence of themes and suggested probes to guide the interview.

In this study, I used the semi-structured format since it gave me the opportunity of getting comparable data across the subjects (Bogdan & Biklen, 1998). During my audiotaped interviews with the subjects, I probed for any tensions/contradictions that arose during their participation in their university and community contexts using the cultural-historical activity theory lens. Appendix A contains the interview protocols that I employed.

In this study, I also conducted interviews with select students from both classes in order to gain students’ perspectives and insights, different than those derived from professors, about teaching and addressing sustainability in classroom. Throughout my interview with students, I stimulated them to talk and critique the culture of their professors’ teaching in regard to sustainability and also focused my questions to ask them to suggest ways of effective education for sustainability in classroom.

Upon completing my interviews, I carefully transcribed them verbatim (Bogdan & Biklen, 1998), in order to facilitate the process of data analysis.
Documents

Documents are materials such as photographs, videos, films, memos, letters, diaries, and clinical case records that can be used as supplemental information as part of case study whose main data source is participant observation or interviewing (Bogdan & Biklen, 1998). There are three types of documents: 1) personal documents, refer to documents that the subjects themselves have written (i.e., course syllabus) 2) official documents, those that are produced by schools or other organizations for the purpose of record (i.e., teaching strategies and guidelines) and 3) popular documents, that are produced for commercial purposes and some examples are TV programs and news reports.

In this research, I used all the three types of documents. Examples of these types of supplemental data sources are; news reports about George Bush, university’s memoranda to faculty, faculty handbook, university’s website.

The Survey

In order to better understand the student component of the community in which these professors worked, the students’ expectations, I distributed a short survey to their students at the beginning of the semester. The survey had two sections: demographics and expectations. The demographic section asked the students about their academic level as well as their field of the study. This information provided background information on the type of students who participated in both professors’ classes. The expectation section was designed to describe the reasons the students were enrolled in the courses and the expectations students had for the learning in the course. (See appendix C for the students’ survey.)

Data Analysis

In this study, I analyzed all data thematically based on the various elements of the theoretical framework of this study. Toward these ends, I classified my collected and transcribed data according to the categories of CHAT theory; instruments, rules, division of labor, and community. Then I extracted the major themes from each category and
started building connections between these themes for the purpose of understanding the full picture of the dynamics of ESD.

After categorizing my data, I analyzed each subject’s data to avoid glossing over the uniqueness and complexities of the cases (Stake, 2000). My analysis of the fieldnotes and transcripts consisted of three stages: (1) open coding, (2) selected emergent themes, and (3) focused coding (Emerson et al., 1995).

In open coding, the researcher reads the data line-by-line to identify and formulates any and all ideas, themes, or issues they suggest, no matter how varied and disparate. During this stage, the researcher writes initial memos reflecting a variety of ideas to begin the preliminary analysis of data. After arranging all my data and coding them I went over them and attached meaningful notes and defined the core themes and the sub themes as well that emerged from analyzing my data.

In focused coding, the fieldworker subjects his fieldnotes to fine-grained, line-by-line analysis on the basis of topics that he identifies as of particular interest from the earlier open coding process. In the focused stage of my data analysis, I combined the coded data under my selected themes and I wrote my reflective memos (Bogdan & Biklen, 1998) on each theme.

In analyzing the data gathered through the conversation sessions, I shared the transcripts of my interviews with the research subjects in order to correct any misunderstanding of their meaning. Afterwards, I identified the topics that I discussed with my subjects and classified these topics into broader categories. Then I organized these categories around SD and ESD themes and their interrelated issues.

In reviewing my interview transcripts, I identified patterns or themes emerging from the data (Berg, 1995) and organized them into broad categories that CHAT theory identifies. I carefully cross-checked the themes that emerged from each subject’s transcripts to enable myself to link related data from different interviewees. Then I grouped them under one theme and marked them with accompanying interpretive notes.

From my journal, I focused on the observation notes of my visits to each subject’s classroom. I integrated my observation notes on the activities, events and features of the physical setting with information drawn from the interviews and the conversations that I had with the subjects.
And with regard to the textual materials such as the course syllabi and books and other reading articles, I analyzed these materials according to ESD content and themes. After analyzing all related data of each case study, I started building each subject’s case while being careful to account for all of the data. Afterwards, I compared the two case studies. That cross case comparison allowed for a description of the commonalities and differences between the professors’ strategies and beliefs about resolving their contradictions.

Establishing the Rigor of the Research

Establishing rigor in qualitative research is a critical issue. The trustworthiness of research is an issue that should be thought about during research design as well as in the midst of data collection (Glesne, 1999). All qualitative researchers must establish a sound strategy to ensure the credibility of their results.

Data Validation

One means I employed to assure the rigor of my study and its findings was triangulation of data. Triangulation involves the comparison of multiple data points, in this case interview data with observational, and artifact data (Patton, 1990).

Adopting the process of triangulation helped me clarify meanings and interpretations by looking from different angles at a single issue. It also forced me to keep in mind the multidimensionality of the CHAT. Indeed, the activity theoretical framework itself ensured the triangulation of the research design by requiring examination of many facets of the broader activity, although in this latter case it was not triangulation of data around a single issue, but triangulation of research foci around the central questions.

Another method I employed to ensure the rigor of the research was prolonged engagement. I was in the research context for a prolonged period, indeed I was in contact with the subjects and frequented their classrooms for the bulk of the semester. In this research, I tried to communicate with the professors to build a friendly relationship with them to better engage myself in the environment in which they live in order to understand the kinds of difficulties they face in their ESD. This prolonged engagement helped me
overcome as Guba & Lincoln (1989) mention, the effects of misinformation, distortion, or presented ‘fronts.’ They argue, and I agree, that it is necessary to establish rapport and build the trust necessary to uncover constructions, and to facilitate immersing myself and understanding the context’s culture. To allow for this “immersion,” prolonged engagement was fundamentally necessary.

In addition to the prolonged engagement, I shared the tentative results of data analysis with my committee chair and peers to help minimize my personal influences. Too, in this study, the member checking procedure was one of the most critical techniques that I used to establish credibility (Glesne, 1999) and ensure the rigor of the research. For this, I checked my data (through allowing the professors to review and comment upon the interview transcripts) and my analysis (through allowing them to review and comment upon my interpretation of the data). In checking my data interpretations with my subjects both during data collection and analysis, I was able to compare my interpretations and make needed corrections and contrasts, and again report rival interpretations, if necessary. This step was very important for me to validate my understanding of data. In addition to that, I tried to ensure that my sense making was systematic and rigorous through the member check procedure that I used in my study. However, I preserved my right, as a researcher, to freely analyze and interpret my data in the way that I saw it appropriate.

As with qualitative research, my goal was not for generalizations of my findings, meaning I do not intend my findings to be applied to all university environmental science classrooms. However, if done rigorously, my results can be transferred to similar cases, meaning the salience of my cases to other similar situations and cases may be insightful for others. However, in much qualitative research, the decision of applicability is left up to the reader (Glesne, 1999). The major technique that I followed to make my results transferable was to provide thick description of my subjects’ cases studies. In that thick description, I provided an extensive and careful description of the time, the place, the context, and the culture of the cases (Guba & Lincoln, 1989). By doing that, the readers of my study may transfer my findings to better understand their own situations.
The Researcher

“Qualitative field study differs from other research methods in that it features researchers themselves as observers and subjects in the lives of the people being studied” (Lofland & Lofland, 1995, p. 3). In such research, the researcher acts as both witness and participant in the lives of others in ongoing natural settings as well as the key instrument of data collection and analysis for the study. It is impossible for the researcher in such studies to maintain an “objective” role as mere observer. Rather, the presence of the researcher affects the subjects, methodology, and interpretations of the study. In this particular study, I believe that my presence and particular subjectivities, as a researcher from outside of the United States, brought unique environmental, political, and ethical perspectives, perspectives that are different from those prominent in American culture. It is important to note how my subjectivities shaped the design of the study, the data collected and the analysis of those data. In this section, I briefly explore my particular subjectivities that I found to influence the conduct of my research, and I will return to this reflective analysis of my role in shaping this research in chapters 4 and 6.

I was born in Jordan, a Middle Eastern country with a relatively democratic regime during my youth. Certainly given the wider political context of the Middle East, democracies are still seen as novel, and as such, this system of government is still examined critically by the citizens living in them and also by citizens of countries located close to them. Thus, in this research, the wider democratic context of the United States and its influence on education was a point of interest for me, and the result of that interest became evident in my thematic findings. Too, the culture of my home is very communal, where the needs of the individual are often secondary to the needs of the wider community. I find this aspect of my home culture to be in stark contrast to much of American Culture, particularly the particularly the culture of students attending the university in which my research was conducted. While this was very apparent to me from simply living in the United States, the individualistic nature of education and work in education became a great interest of mine as I conducted my research. Certainly, part of my findings was shaped by my selection of CHAT theory, a theoretical frame that is more community based, placing the actions of subjects always within the wider structural
and community context. Thus my subjectivities here shaped my selection of my theoretical frame as well as shaping my particular findings.

Likewise, my role as an international researcher working in the United States allowed me to examine broader cultural and political influences on the activity system of ESD in ways that may not be immediately apparent to a researcher raised in a consumeristic country. Indeed, my data collection and analysis were shaped by my questioning eye toward America’s consumeristic, disposable-culture, given that my Islamic beliefs were often counter to the dominant American consuming lifestyles.

In Jordan, I earned my first university degree in biology. Being a biology graduate, that discipline helped me develop my sincere passion toward the environment and environmental issues, and is in large part responsible for my adoption of sustainable development as the most appropriate response to current environmental dilemmas. I understand that my environmental standpoint has played a central role in the crafting of my research questions, as I selected sustainable development from the host of other approaches to environmental education. Likewise, I must recognize that my passion toward environment definitely influenced my data analysis, as my championing of the environment certainly caused me to be more critical and have high standards for the sustainable development education that I studied. One example of the influence of this particular subjectivity can be found in the way I crafted my research. I set out to see to what degree the professors in this research were successful in attaining ESD, certainly a very high bar, and one that has been set by the global community. I could have selected to examine their teaching without this normative lens. But this would have resulted in a very different study, that of simply describing what they did achieve in their courses. In my view, this would have been a far less informative study and would fail to link this work to the global environmental conversation. Hence, the high bar seemed justified.

Being an international researcher, I understand the differences between my original culture and the American culture that I live in now as well as the difference in the context that I interact with. I believe that my position as a bi-cultural researcher gave me a unique opportunity to compare between the two cultures; my original culture and American culture in terms of the beliefs, habits, and lifestyles. I believe that this
difference had a strong influence on my interpretations of the different aspects of this research by viewing things from two cultural lenses.

Also being a non-native English speaker influence my understanding of the words that I hear from both my subjects and in the research site. I tried to attend carefully to my interviewees and clarify any misunderstandings immediately, and through later member checks, in order to minimize any misinterpretation of my research data.

Finally, it is important to recognize that as an observer, I acted as yet another contextual factor within the activity system that I studied. It is important to realize that as such, my interactions with the subjects modified the context of their teaching. However, as a researcher interested in promoting ESD, I expect that my subjects might have acted differently in front of me for the sake of appearing advocates of ESD, but I believe that this interchange enhanced my understanding of their beliefs about environment and education for sustainability.

**Ethical Issues and Considerations**

As Clandinin and Connelly (2000) write, ethical matters are not one time issues; they argue that receiving the Human Subject Committee’s approval to proceed with research is only one of many safeguards to ensure the ethical soundness of a study. Lincoln and Guba point out that research within the naturalistic paradigm has its own set of ethical concerns because of the “emphasis on face-to-face interaction, on faithfully representing multiple, constructed, and often contradicting realities, and on maintaining privacy and anonymity while utilizing extensive word-to-word, natural language quotations…. (Lincoln & Guba, 1985, p 83).

In general, codes of ethical for social science research deal with issues of deception, data confidentiality, personal privacy, and ownership of the data (Krathwohl, 1998). There are many scholars, who have put forth specific guidelines for particular types of research, in this sense, Bogdan and Biklen’s (1998) four principles are applicable to my study:

1. Unless otherwise agreed to, the subjects’ identities should be protected so that the information you collect does not embarrass them…. The
researcher should not relate specific information about individuals to others and should be particularly watchful of sharing information with people at the research site who could choose to use the information in political or personal ways.

2. Treat subjects with respect and seek their cooperation in the research. Under usual circumstances the subject should be told of your research interests and should give you permission to proceed. Get written consent. Researchers should never lie to subjects nor record conversations on hidden mechanical devices.

3. In negotiating permission to do a study, you should make it clear to those with whom you negotiate what the terms of the agreement are, and you should abide by that contract. Because researchers take the promises they make seriously, you must be careful to be realistic in such negotiation.

4. Tell the truth when you write up and report your findings. The most important trademark of a researcher should be his or her devotion to reporting what the data reveal. (1998, pp. 44-45).

In my research I handled the issue of confidentiality in an extremely conservative way by following the rules that I mentioned earlier. I preserved all my subjects’ rights.

Finally, during my study I tried to be more aware by being honest and genuine, a good listener, respectful, and kind with my subjects.
CHAPTER 4

CASE STUDIES

Introduction

The purpose of this study was to understand the activity systems of ESD in two American university classrooms. In this chapter, I will further explore the theoretical perspective used in analyzing the data, present the first layer of findings of the research, and the case studies of these classrooms and their instructors. The first section of this chapter is a description of the research site, information that is important as one understands it to be the macro context for both the activity systems in this study. The second section provides the narrative accounts for each professor, narratives that are structured around descriptions of the current state of ESD inside a university classroom, the personal and contextual factors that work within the activity of ESD, as well as the professors’ perspectives in resolving the contradictions and contradictions they face in their activity of ESD.

In analyzing my data, I first identified the nodes of each professor’s work activity system (mediating artifacts, community, rules, and division of labor) by way of their interviews with me. The main focus of these interviews was their ESD, which includes an exploration of the intersection between the three major elements of sustainability; environment, economy and society. However, it is important to note that the process of data analysis was influenced by my own subjectivities. The issue of subjectivity has long been considered an issue in qualitative studies (Glesne, 1999). Although some researchers Denzin & Lincoln (1994) consider that the notion of subjectivity as something negative, some Glesne (1999) suggest that qualitative researchers should recognize that subjectivity is always a part of research from deciding on the research topic to selecting frames of interpretation. Therefore, it is important to note that in this study, my standpoint as a researcher and my perspective of ESD influenced the way I designed, collected, and analyzed the data.

It is important to note that my goals for this research were normative, as I employed the description of ESD provided by the global environmental conversation to frame this work. As such, my results are not to be taken as a description of overall course
effectiveness, as that was not my intent. Certainly, each of us as teachers have wide goals and expectations for the students in our courses; this study is intended to focus on just one aspect of those goals and expectations, that is to what degree was ESD achieved in these contexts and the myriad factors influencing this achievement. Thus this work is not measure of teaching or curriculum effectiveness, the emphasis was not on “how well” a professor performs. Instead, it was an attempt to understand the complex activity system that influences ESD at the university.

**Reintroducing the Theoretical Perspective for Analysis**

Jonassen & Rohrer-Murphy (1999) describe that all activity is object-oriented. The object of an activity system is twofold in that the object is both something given and something projected or anticipated (Leont’ev, 1977). According to Leont’ev, the object determines the horizon of possible outcomes and actions that functions as the motive force driving the activity forward. The subject constructs the object and singles out those properties that prove to be essential for developing social practice (Lektorsky, 1984, as cited in Kärkkäinen, 1999).

Furthermore, Jonassen & Rohrer-Murphy (1999) state that “The object of an activity can be anything, so long as it can be transformed by subjects of the activity system, “they might be physical objects, soft objects, or conceptual objects” (p. 8). In this study, the conceptual object of the activity was ESD in both subjects’ environmental science classrooms. In addition to that object, both subjects intended to achieve other objects from teaching their courses (i.e. improve students’ decision making, planning, and critical analysis skills). However compelling these other objects were, it is important to remember that this research focused on their object of ESD.

As in any activity system, when an external force or element (i.e. university rules) is introduced to a stable activity system, contradictions or tensions can result between two or more nodes of that system. In this study, many internal and external factors created contradictions in the professors’ ESD activity systems. Those contradictions altered the professors’ teaching priorities and shifted their focus from ESD toward “delivering” the scientific information related to environmental content. It is important to note that science of environmental studies comprises one of the three elements of sustainability. This
almost sole focus on the science portion of the sustainable triad documented in this study was in stark contrast to the under- representation of the two other elements of sustainability, economy and society.

For example, one of the contradictions occurred between the division of labor (i.e., funding graduate students) and the subject, the professor. To develop or learn to continue in his activity, the subject needed to resolve that contradiction, resulting in a change in the activity system and a change in behavior. In this study, the professors made adjustments to their object in response to the imbalances they perceived in their activity systems. These adjustments took the form of altering teaching priorities, shifting from addressing the three elements of sustainability (the main object of teaching their courses as it appeared in their course syllabi) into addressing the environmental element only. This shift allowed them to achieve their outcome of preparing informed and knowledgeable students, but precluded the achievement of students aware of sustainable development. That shift in object was due to a spectrum of individual and contextual barriers that both professors experienced. As will be demonstrated through the findings, the contextually embedded barriers such as the dominant understanding of education as an information but not transformation tool, as well as education versus indoctrination, influenced the focus of both professors to achieve only the science component of sustainability as a recognizable and attainable object.

In order to describe patterns of change that the subjects in this study experienced throughout the semester, the researcher looked for indications of object reformulation by way of turning points, or ways in which the professors delineated or outlined the object in a new way, in the professors’ interviews. Object reformulation can occur in four ways (Kärkkäinen, 1999): widening, narrowing, switching, and disintegrating. Widening of the object relates to the object expansion while narrowing refers to object contraction. Switching involves a shifting of the object in response to tensions in the system, and disintegrating refers to fragmenting or splitting of the object. For example, professors in this study could not appropriate some of the contradictions in their systems, which led them to under-represent the three elements of sustainability in their teaching. In response, they became satisfied by simply providing their students with the needed environmental information. In other words, the professors responded to their contradictions in a way that
led them to reformulate their object, specifically, narrowed their object to deliver environmental content knowledge, which lead to their outcome of preparing environmentally informed students. The reformulation of the object of their activity can be explained by Engeström (1987) explanation of expansive learning.

According to Engeström, expansive learning means above all expansion of the object and motive of activity. This means that questions such as what is the aim of an activity, what is produced and why, are formulated and reformulated, leading often to the formation of new collaborative relations of workplace members (Engeström & Miettinen, 1999).

**Narrative Accounts of the Case Studies**

Each case study included a description of the professor’s classroom teaching of an environmental course with particular attention to the way he addressed sustainability in his classroom. This narrative was constructed by drawing upon multiple sources of data related, interviews, classroom observations, the professor’s personal documents, (syllabus, textbooks) and artifacts external to the classroom. In each case study, I identified the contradictions perceived by the professor, categorized them according to CHAT elements, and described turning points. Accompanying the turning point description, I indicated how the professor responded to the contradictions and the way his response influenced his formulation and reformulation of object.

Finally, as the professors taught and addressed sustainability in their classroom, their students learned and developed their own perception about the material. In the teaching activity, the students were considered as a powerful component of the classroom community that influences the professors’ teaching (McLaughlin & Talbert, 1993; McNeil, 1988; Metz, 1993). Moreover, the influence of the students became more important because their opinions about the professor’s teaching were translated into teaching evaluations that do impact a professor’s work life. In this study, I paid attention to the students’ voices and examined their influence in the whole teaching activity through the classroom observations and the follow-up interviews.

In this study, I based my research on two subjects, Professor Smith and Professor Jones, who were my “opportunities to learn” (Stake, 1995) about the dynamics of ESD.
Professor Smith was a full professor in Oceanography department whereas Professor Jones is an assistant professor in Geography department. In the following sections, I present the data through two case studies, followed by my interpretation of these data using the CHAT framework. But to understand these cases, the reader needs an understanding of the wider research site, the macrocontext of these activity systems, a context that played a significant role in influencing my subjects’ activity of ESD.

**Research Site Description**

This research took place in one of the largest universities in the southeastern USA with 38,886 students enrolled (77.2% undergraduate, 19.2% graduate). As a comprehensive Carnegie Doctoral/Research Extensive Institution, the university devoted a great deal of its resources on research and development. In the University’s Fiscal year 2004, the total expenditures for grants and contracts in the previous four years exceeded 679.2 million dollars (University’s Fiscal year 2004 annual report). Among its current faculty there were recipients of many national and international honors including four Nobel laureates and ten members of the National Academy of Sciences (University’s mission statement). These individuals were brought to the university to foster the university’s mission of enhancing research.

As defined by the mission statement, the University sought to serve as a center for advanced graduate and professional studies while emphasizing research and providing excellence in undergraduate programs. Additionally, the university aspired to excellence in other core activities of teaching, learning, creative expression and public service (Faculty handbook). In accordance to these goals, the university was said to choose its 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). In fact, the reality of the university professors’ experiences 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.

Indeed, it must be recognized that the outset of the 21st century is a difficult one for American Universities, as normal patterns of funding are no longer available or much
more competitive in nature. Thus the work lives of both subjects in this study had a much stronger 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. As will be discussed, this emphasis served to limit the time and energy they had to devote to reconceptualizing their teaching.

In each of the following case studies, I will explore the various contextual influences that the subjects experienced and discuss how these influences contributed in contracting the objects in their ESD activity systems, as I explain the turning points that resulted from each contradiction.

Professor Smith

It was the end of fall semester 2004 when I first spoke with Professor Smith. I was familiar with him long before this first meeting as he is a frequent committee for students in the science education program, but I had not had any personal communication with him. When I decided to invite him to participate in my study, I visited him in his crowded office and introduced myself. From the first sight, Professor Smith appeared to be a constantly working, but despite this activity he presented himself in a very low key, casual manner. In this first meeting and in all our subsequent meetings, he always appeared in jeans with his long hair tied back. As I described my research, he was helpful, encouraging, open minded, and eager to learn from the proposed research. He was fairly excited about the potential of participation and he quickly agreed both the interviews and my observation in his upcoming Environmental Science course offered in spring semester 2005.

Professor Smith was a European American who earned his PhD degree in Marine Chemistry in 1985. In 1987, he became a faculty member in the department of Oceanography. As evidenced by his curriculum vitae, Professor Smith seemed to be very committed to his work, and in addition to his overwhelming departmental responsibilities (i.e., attracting grants to fund his many graduate students, serving in many academic and professional committees), he published over 120 articles with his peers. His publications appeared mainly in chemical and hydrological related journals (i.e., Organic Chemistry,
Limnology and Oceanography, Global Biogeochemical Cycles). He was also active in his research community through acting as a reviewer for both journal articles and books. As one considers Professor Smith’s work, it is clear that he devoted a great deal of his time and efforts 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 meet to secure funding to support his many graduate students, as well as providing materials and resources necessary for his and their research.

Professor Smith received several awards for his outstanding research and community service work. One of his recent research awards was the “Aldo Leopold Leadership Fellowship Award”. The award, sponsored by the Stanford Institute for the Environment, was offered to distinguished environmental scientists to foster their leadership skills in making sustainable environmental decisions and practices. Another recent award he received was from the Florida Wildlife Federation for his efforts to promote environmental education and energy conservation. His department, obviously pleased with this accomplishment, announced Professor Smith’s awards on its website.

Professor 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. In his response to the question of why he chose to be an environmental professor, he said:

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. (C. Smith, personal interview, January 14, 2005)

This enthusiasm for the environment was evidenced in his teaching, as throughout the semester, Professor Smith appeared to be excited about teaching his “Current Issues in Environmental Science” course.

Professor Smith’s Course of Environmental Science

In spring 2005, Professor Smith offered his course of “Environmental Science” for both graduate and undergraduate students. There were 24 students in this course (8 graduate and 16 undergraduate). Seven students were in their second academic year, six
were in their third year, and eleven were in their fourth year. Out of the 24 students, 21 students were environmental majors, and 3 were non-environmental majors. Thirteen of the students took the class because they were interested in its subject, and nine of them enrolled in it simply because it was required from them.

The students’ expectations from taking their class were diverse, 38% of the students expected to learn more about the current environmental issues, 7% expected to learn how the environment interacts with human social activities, and the other 7% expected to learn how the environment interacts with both economic and social activities (See Table 5 for Professor Smith’s students expectations).

<table>
<thead>
<tr>
<th>Students’ Expectations for Course</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interested in learning about environmental issues</td>
<td>17</td>
<td>37.8</td>
</tr>
<tr>
<td>Interested in learning how the environment interacts with human social activities</td>
<td>3</td>
<td>6.7</td>
</tr>
<tr>
<td>Interested in learning how the environment interacts with both economic and social arenas</td>
<td>3</td>
<td>6.7</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>2.2</td>
</tr>
</tbody>
</table>

* Total 55%

**Professor Smith’s Teaching Strategy**

In teaching the class, Professor Smith used one of the university’s high-tech classrooms, which contained a flat panel computer, an overhead projector, video, and other multimedia equipment.

In addition to these artifacts, he used several others to teach his course. One of the most striking of these was his detailed course syllabus that contained the guest speakers’ names matched with their presentations’ topics, as well as a description of the responsibilities required of students for that semester. In this syllabus, he defined multiple
purposes and objectives of his course where one of these objectives was fostering an attitude of informed environmental stewardship in his students.

Another mediating artifact that Professor Smith used to achieve his course objectives was a recent environmental textbook, which contained a variety of collected articles covering environmental, economy and society issues (see Table 6 for the Major units of Professor Smith’s book).

Table 6. The Major units of Professor Smith’s book.

<table>
<thead>
<tr>
<th>Name of the Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>The global environment: an emerging work view.</td>
</tr>
<tr>
<td>Biosphere: endangered species.</td>
</tr>
<tr>
<td>The hazards of growth: pollution and climate change.</td>
</tr>
<tr>
<td>Resources: land and water.</td>
</tr>
<tr>
<td>Population, policy, and economy</td>
</tr>
</tbody>
</table>

Professor Smith used the textbook entitled *Annual Editions: Environment*, edited by Allen (2004), to explore sustainability issues in his classroom. Although the book mentioned many economic and social topics related to the environment, it is important to note that it did not directly address the three major elements of the sustainability triad (environment, economy, and society) as I will discuss in the latter portion of the case study.

Professor Smith structured his course in an unusual format in which he involved himself, his students, and his guest speakers in teaching the course. In the first two weeks of the semester, he gave two purely scientific presentations (lectures) to the students.

During the following weeks in the semester, he dedicated the first portion of each class meeting to his students’ presentations, while he devoted the second half of the class to his guest speakers. In the student presentations, 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. 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 Professor Smith halted the discussion.

In the second portion of each class session, a guest speaker presented from some local environmental issue. (Note, these topics were not directly related to the topics addressed by the students in the earlier portion of the session). Table 7 shows the list of topics that the guest speakers presented in Professor Smith’s class.

<table>
<thead>
<tr>
<th>Topic</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate change</td>
<td></td>
</tr>
<tr>
<td>Coastal zone dynamics</td>
<td></td>
</tr>
<tr>
<td>Research findings of Gulf of Mexico fisheries</td>
<td></td>
</tr>
<tr>
<td>Idiosyncrasies of marine creatures</td>
<td></td>
</tr>
<tr>
<td>Air pollution and allergies</td>
<td></td>
</tr>
<tr>
<td>Barrier islands: Flood and insurance issues</td>
<td></td>
</tr>
<tr>
<td>Potential karst aquifer pollution from a big city spray field</td>
<td></td>
</tr>
<tr>
<td>Decimation to possible annihilation of Albatross populations.</td>
<td></td>
</tr>
<tr>
<td>Bats: one of humankind’s best friends.</td>
<td></td>
</tr>
<tr>
<td>Nature writing in the red hills bioregion</td>
<td></td>
</tr>
</tbody>
</table>

Although some of the guest speakers presented various local environmental issues, most of their power point presentations revolved around the findings of their scientific research that they conducted related to this issue. The follow-up questions sessions that followed
each presentation revolved around exploring the technical and methodological issues related to the experimental designs of their research as well as clarification of the results of the presented materials.

**Professor Smith’s Teaching Approach and Beliefs**

The teaching style of Professor Smith, as evidenced in his classroom presentations, was a traditional one where he understood his role as a teacher was to convey the scientific content to his students in an efficient manner:

> …well, because I try to focus more on the content and I need more classroom participation and I guess I am more conservative about that, and 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”. (C. Smith, personal interview, March 3, 2005)

Throughout the study, the professor was in favor of lecturing over any other mediating artifacts¹. When I queried him about his preference for lecturing, he argued for the efficiency of this approach and the limited amount of preparation and effort required for this method of instruction:

> …I tend to think that lecture is a good way to convey knowledge … In my opinion you can spend a long day to learn a concept using other new ways but in a lecture you can say it quickly. It is effective. (C. Smith, personal interview, March 3, 2005)

The professor’s value of lectures seemed to be deeply rooted in his personal teaching beliefs. As reflected in the following quote, he perceived his teaching role as an information deliverer. That belief or perception was originated from the fact that he was more knowledgeable than his students.

> …For me I haven’t done that much discussion in the class because I know more than them and they know less so there is no reason for them to talk and I need to tell them the information. (C. Smith, personal interview, February 7, 2005)

¹Mediation in teaching is done by artifacts, which broadly define and include teaching instruments, teaching approaches and tools. By using “Lecture” as an example, teacher can mediate or change their students’ learning and behavior.
This quote demonstrates Professor Smith’s perceptions that his students had very limited knowledge of environmental issues. Thus, for him, teaching required first and foremost the dissemination of information. He understood teaching to be knowledge dissemination and learning to be the process of receiving that knowledge. Those beliefs about teaching and learning influenced his selection of his guest speakers, who again were dominantly information deliverers.

Too, his students were also delivering the content knowledge that they assimilated from their review of the pre-assigned articles. As described by Professor Smith, the classroom discussion was very limited, as the focus in the class was the delivery of information, and not the support of students as the struggle to come to an understanding of this information.

Perhaps enabled by his traditional teaching beliefs, his personal engagement in the process of developing his approach to teaching failed to echo his engagement in research in which his knowledge was continuously evolving:

……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 is on self discovery and in my opinion they (new strategies) are very slow and time consuming. (C. Smith, personal interview, March 3, 2005)

It is very important to note that a member of the classroom community, one of his distinguished students in the class, who was in a leadership role in the university’s environmental club, applauded Smith’s teaching. She saw Professor Smith’s class as challenging, causing her and her co-learners to think more deeply about various environmental issues, saying:

The professor’s teaching has increased my perspective on environmental issues. For example it has helped me understand that the environment is far much in greater danger than I had previously thought. Environmental issues cannot be addressed successfully by a single nation or country except that the entire global community works together in concert with a sincere commitment toward this goal. (B. Penny, personal interview, April 27, 2005)

The previous quote reflects a high level of environmental awareness of the student. However, it is possible that her awareness was one developed through years of
environmental science classes and activities, as she was majoring in environmental science and had many environmental classes before Professor Smith’s.

Indeed, some students in Professor Smith’s course viewed his course to be engaging to the students as it helped them learn new environmental information and fostered their skills to search and learn more about these issues in the future:

There are many topics we have discussed concerning the environment that I have never been exposed to before like Antarctic ice core research, barrier island development, and oil productivity. I am not learning about any particular topic in any great detail. I am learning what environmental issues are out there and where I can go to learn more about them. (J. Mack, personal interview, April 7, 2005)

However, Professor Smith’s did not fully address the notion of sustainable development in teaching, as some of his students noticed. Some of his students noticed that absence of discussing sustainable development saying:

I would love to see more discussion of Sustainable Development in our class but I understand that it is a vast topic. (K. Laurie, personal interview, March 30, 2005)

As one considers the expectations of the students entering the course, Professor Smith was successful in meeting the expectations of the majority of his students (38%), as these students expected to learn about the current environmental issues. These student expectations may have played a powerful role in shaping or ensuring Smith’s concern on the scientific aspects of the environmental issues. However, it is important to note that the expectation of another subset of his students (14%), that of learning more about the interaction of environment with the economic and social activities, was not as effectively realized in the class.

In total, as I described the nodes of the Professor’s activity system, he was successful in achieving some of his objects by using his traditional mediating artifact, lecture. However, due to the serious contradictions that he experienced in his activity system, Professor Smith underrepresented his object of ESD in his class. He responded to the contradictions that he faced throughout teaching his course by narrowing his sustainability object into only delivering knowledge.
Professor Smith’s Perceptions of ESD

Fostering an attitude of informed environmental stewardship, an ESD object, was an important object of Professor Smith’s course, as evidenced by his course syllabus. (See Professor Smith’s course objects, Appendix D.) Professor Smith derived that object from his work and research in various environmental problems that has informed him of the importance of building informed citizens. The deep knowledge that Professor Smith built over years made him aware of many environmental problems and sparked his motivation to resolve these problems. Part of this resolution, he understood to start with the dissemination of knowledge to his students:

I became aware of the current environmental problems through my work and research with many environmental problems (i.e., greenhouse gases and methane). The alarming increase of these gases encouraged me to teach my students about them. (C. Smith, personal interview, January 14, 2005)

Indeed, Professor Smith used this course to deliver this knowledge to his students. He relied on his guest speakers’ presentations and the textbook (as I will describe in the latter sections of this case study) to address the social and economic aspects of ESD. Thus, the professor placed the central component of his object for ESD in the hands of others:

I think that some of the readings [have] talked about the social and economical issues, I myself have little expertise on talking about that and I leave that for readings. I focus on the environmental part because it is something that I know about, the science of the environment, but I try to make some other connections throughout the readings and discussion. (C. Smith, personal interview, February 7, 2005)

However, although he understood his guest lecturers to carry part of the “ESD load”, in my estimation the notion of sustainable development was absent in his guest speakers’ talks. These presentations focused primarily on presenting the results and the conclusion of their scientific research. An example of that was one of his colleagues who presented a lecture about tracking a bird using satellite imaging technology. As such the social implications of the findings of this research were not broached, nor were economic considerations. Again, we see the technical, scientific aspects of the ESD triad emphasized.
I found a similar situation to be true for the textbook “Annual Editions: Environment” that Professor Smith relied on to explore sustainability issues in his classroom. Upon close review, the book addressed few sustainability issues. Indeed, echoing Professor Smith’s class, its main theme was informing the reader about the current environmental issues and concerns. It is important to note that his object of ESD could have been easily achieved using other environmental textbooks currently available. Indeed, there are several that are written to mainly address sustainable development (i.e., Sustaining the Earth, by Tyler Miller (2004), a book recognized for its approach to teaching environmental science through sustainable development lens. I compared Tyler’s text with that employed by Smith to gain a sense of what was available at the time of this course in the area of sustainable development in comparison with what the professor chose to employ. I argue that this choice can shed light into his understanding of and approach to ESD. The following Table (Table 8) shows a content analysis of both Professor Smith’s text and Miller’s (2004) text, Sustaining the Earth. This analysis was informed by Titscher’s (2000) method of text analysis.

The following table shows the scant attention to sustainability in the book that Professor Smith used to achieve his sustainability object. However, an alternative book (Sustaining the Earth) was much more focused on analyzing various environmental topics through sustainability. It is important to note that such an alternative was available, but the professor did not select it.

Furthermore, although his choice of text did not address sustainability, the professor himself did not compensate that shortage by discussing sustainability during his classroom discussion. He preferred to invest his class efforts to make his students more knowledgeable about the environmental problems without supporting them in considering possible solutions. Indeed, he argued that the provision of students with the basic scientific knowledge related to an environmental issue may allow them to think about solving the environmental problems themselves.
Table 8. Making Sense of Smith’s Text Selection: A Comparison of *Annual Reports* and *Sustaining the Earth*.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Professor Smith’s Book [Annual Reports: Environment]</th>
<th>The Alternative Textbook [Sustaining The Earth]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNS: WHAT IS THE CONTENT OF THE TEXT?</td>
<td>Presents different environmental articles that poorly consider sustainability. Offers no guidance for the reader to act sustainably, words-dominated with few pectoral representations.</td>
<td>Discuss mainly sustainability, the content guides the reader of how to function through sustainability, presents stories about successful sustainable behaviors and actions. Rich with multimedia tools.</td>
</tr>
<tr>
<td>STRUCTURE: HOW IS THE TEXT ORGANIZED?</td>
<td>Collected articles categorized under units (e.g., global environment, energy, biosphere, population, and resources)</td>
<td>Comprehensive environmental topics organized under 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…)</td>
</tr>
<tr>
<td>INTENT: WHAT WAS THE INTENTION OF THE AUTHOR</td>
<td>Presents selected environmental issues with little focus on sustainability.</td>
<td>Presents the various environmental issues through the lens of sustainable development.</td>
</tr>
</tbody>
</table>

You might have a certain point of view but it is better to let them 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. So it is better to [let the students] get the water themselves and be less pushy about getting people to do what you want them to do. If you told somebody to do it he probably won’t do it, but a little more indirect [approach and perhaps they] do it. (C. Smith, personal interview, March 3, 2005)

This focus of the professor on expanding his students’ environmental knowledge was considered, by some of his classroom community, as a good way to educate for sustainable development:
I think our instructor wants us to live responsibly and support the idea of sustainable development. (J. Mack, personal interview, April 7, 2005)

However, some of his students commented that what they learned in the class was the ambiguity that surrounded the concept of sustainable development as well as the impracticality of applying it in the real world:

I think our professor taught it but I also think that he stressed the impracticality that we have met with in trying to reach sustainability as do the articles we read. (K. Laurie, personal interview, March 30, 2005)

Although the previous quotes of the students demonstrate the professor’s attempts to address sustainability in his teaching, the professor was not successful in helping students come to understand sustainable development. Indeed, a focus on sustainability appeared only occasionally in his teaching throughout the semester as we will see in the following section.

**Weaving the Strands of Professor Smith’s Activity System**

Although the professor stated at the beginning of his course that his outcome was to foster an attitude of informed environmental stewardship in his students, the object that came up again and again in discussions with Professor Smith and the object that seemed to best explain his teaching was the object of informing his students about the scientific aspects of current situations with the environment (i.e., climate change, costal zone dynamics). This second object, which represented a shift away from his initially stated objects, provided a recognizable place for his role as a knowledge and information deliverer. To satisfy this second, more focused and achievable object, he needed only to address the science involved in these issues. Indeed, that shift in Professor Smith’s object occurred throughout the semester and especially after he realized the difficulty of continuing addressing sustainability in his teaching.

However, Professor Smith did not discard his sustainability object, on the contrary, he kept his both objects, but put primary emphasis on delivering his environmental knowledge believing that he would secure his outcome of building
stewardship citizens at the end of his course. (See Professor Smith’s activity triangle in Figure 9.)

Figure 9. Professor Smith’s activity triangle.

Furthermore, Professor Smith kept revisiting his sustainability object whenever the chance was available during the classroom discussions. The following is an observation I made in his class:

In one of his presentations, Professor Smith played a video about climate change and population growth. The speaker in the video showed the population growth throughout the history and the dilemma of finding natural resources and preserving the beauty of the earth. The professor then presented the consequences of the climate change on human health and the indirect cost that governments have to pay to treat patients. At the end, he concluded
by asking his students, how can they contribute in counteracting the climate change phenomena. (C. Smith, classroom observation, January 11, 2005)

The previous observation indicates that the professor tried to touch on sustainability issues throughout his teaching, however, as indicated earlier, sustainability appeared only occasionally in his teaching as he invested the bulk of his time on achieving his second object, that of helping his students build strong environmental knowledge.

Although, Professor Smith was aware of the difference between his two objects, he kept emphasizing environmental knowledge delivery, because he believed that ESD must begin with students becoming aware about the science underlying the environmental problems that they study:

…They [students] need to know that there is a linkage between different environmental issues. They 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. (C. Smith, personal interview, February 7, 2005)

According to the sustainability perspective (Hart, 2000; Herremans & Reid, 2002; Mckeown, 2002), delivering environmental content is part of the sustainability vision. However, as I argued in the literature review, the whole sustainability can not be accomplished without addressing each of the three elements; Environment, Economy, and Society.

As Professor Smith mentioned during his interviews, he was not willing to go further in discussing the solutions of the current environmental problems, as he was careful that his teaching not be construed as “politicizing” students, which meant for him that he could not be perceived as pushing for specific political agenda. Rather, he sought to provide his students with the basic knowledge about the environmental issues and allow them to apply that knowledge on their own:

…I guess I want them to think for themselves, I just want to give them the facts and let them think for themselves, I don’t think that it is my business to politicize them or make them see things my way, but want them to understand the way things are and give them an objective point and they can make up their own mind. (C. Smith, personal interview, February 7, 2005)
It is possible that his fear of being construed as “pushing” a political agenda could be related to his belief that environmental advocates often work to achieve some political action, as shown in the following:

…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. (C. Smith, personal interview, February 7, 2005)

Clearly, Professor Smith did see his role in the classroom as a political advocate; indeed he carefully avoided such a position in order to maintain the trust of his students:

…I think my role is strictly content and that way they [students] can trust what they hear from me. (C. Smith, personal interview, February 7, 2005)

That fear of losing his students’ trust caused him to orient his classroom discussions around the environmental part of sustainability. Although at times he did allow a brief mention of economical element of the sustainability triad, he carefully avoided the political aspect of this conversation.

As I have described, instruction focusing on the intersection between the elements of sustainability was typically absent in both the professor and the guest speakers’ presentations. When I asked Professor Smith about that omission, he revealed sets of contradictions that he saw as obstacles preventing him from considering sustainability in his teaching.

One of the major contradictions in Professor Smith’s activity system occurred between the formal rules of his institution and the subject (Professor Smith). That contradiction distracted him from addressing sustainability in his teaching and consequently caused him to contract his object from ESD to produce knowledgeable and informed students. The rules in his activity system included the high demand from his institution for publications and funding:

…I have many things that I am supposed to be doing…the research that I have to do, I am supposed to do both research and teaching. (C. Smith, personal interview, February 7, 2005)
Although Professor Smith was not in need of publications for promotion (as he was already ranked full professor), he felt the need to attract grants in order to fund his graduate students. This raised another set of contradictions between the division of labor and the subject himself:

… Since I am in a graduate department only, and we have only graduate students, we have to produce publications because we have to get funds and grants to keep our department running. (C. Smith, personal interview, March 3, 2005)

Indeed, he tended to adopt the policy of his “financially driven department” by agreeing to devote his time and efforts to get funds and grants for his graduate students. Professor Smith justified this activity by saying that his department served only graduate students, students in need of funding. Thus, his work in this regard served the greater role of his department:

…My institutional values have become my own, I succeeded in the institution because my values have become similar to theirs. (C. Smith, personal interview, March 3, 2005)

In addition to that responsibility, Professor Smith had other university duties such as participating in academic and professional committees, preparing for his courses plus his own personal/social responsibilities. He understood that these many demands on his time and attention prevented him from reconsidering his teaching and/or reshaping what happens in his classroom.

Community also had a visceral role in shaping Professor Smith’s teaching activity. All his department, institutional, and national communities shaped his teaching inside the classroom. It is important to note that much of the higher educational institutions in the United States adopt the principle of “political liberalism”, which revolves around the need to prepare students 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 (Rawls, 1993). However, the implication of this philosophy is to look askance at any kind of indoctrination (i.e., religious, political…) promoted by teachers or administrators. Here, following this principle, Professor Smith avoided suggesting any solution for the environmental
problem. Instead he recognized students’ abilities to “pursue their own doctrines”, allowing them to think and manipulate their knowledge themselves. Therefore, he focused his efforts to inform students about the current environmental problems and avoided discussing any solution for those problems inside the classroom:

.... 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, I am not a policy maker or have to push some agenda I am here just make them aware of the problems. (C. Smith, personal interview, January 14, 2005)

In sum, the net interaction between the various contradictions in Professor Smith’s activity system made him reformulate his sustainability object that he set for himself at the beginning of the class. Furthermore, he found his newly formed object (delivering environmental science knowledge) to be a less demanding and an attainable one. For him, his adoption of this object appeared easier to achieve as it could be accomplished by his most favored Mediating artifact of delivering knowledge, lecture. This approach is again strengthened by his transmission approach to teaching and learning, allowing him to favor the object of preparing informed students. However, the turning point that Professor Smith experienced in forming his new object forced him to contract his main object and narrow it into only transferring environmental content, which Hart (2000), Herremans & Reid (2002), and McKeown (2002) consider it to be only one element in sustainability teaching. This is not surprising as the continuous reformulation of the object is a normal response to the imbalances and contradictions that the subject sees in the system (Engeström & Miettinen, 1999; Kärkkäinen, 1999).

According to Engeström & Miettinen (1999), the failure of overcoming the contradictions may turn out to be nonexpansive. That failure may lead to reproduce the status quo of the teaching that does not address sustainability. Here in Professor Smith’s case, the professor did not challenge his contradictions to create new artifacts to transform his education toward sustainability; therefore, his teaching remained inside a non-expansive mode that reproduced the status quo of the dominant unsustainable teaching practice.
I argue that the non-expansive situation that Professor Smith experienced was largely due to the multiple constraints in his institution. Although the university gave voice to the importance in supporting faculty to improve their teaching, in reality both the explicit and implicit rules of this institution played out differently. The significant responsibilities that the university expects of its faculty (i.e., research, committees…) often contradicted its published emphasis on enhanced teaching. Furthermore, in Professor Smith’s case, these responsibilities required him to devote significant time and attention to grants, research and writing, leaving scant time or attention to be focused on his teaching. The same situation was also to the case with Professor Jones, the second subject in this study, as we will see in the next case study.

**Perspectives on Resolving the Contradictions**

Although Professor Smith appeared satisfied with part of his teaching, he felt the need to improve his pedagogical knowledge to foster his teaching skills in general and to better address sustainability in particular. However, this need was not significant enough to cause him to devote some of his limited time to participate in some professional development programs either on-campus or off-campus. Indeed, he admitted that if he had that luxury of time, he would devote that time to further research and writing:

> I can learn how to use blackboard and all the web stuff that I want but I need time to do so, I don’t have time. Instead of spending time on professional development I can spend more time on my research development. (C. Smith, personal interview, March 3, 2005)

However, when prompted with the question of what activities he might engage in if he miraculously had more time, he responded that he might catch up on his responsibilities and spend some more time in “surfing the web” to enrich his teaching skills and prepare better teaching activities for his students:

> I can do a better job, if I just have more time to think about it and organize it. I think there is so much that you can get from the web. If I have more time to think about it I would be a better teacher. (C. Smith, personal interview, March 3, 2005)
As will be described in chapter 5, it is important to note that Professor Smith’s notions of activities that can influence how and what one teacher revolve around the solitary access of information as he does not have a rich teaching community to participate within. Seeking a community for discussion of teaching was not something he perceived to be important.

Having support in the form of a teaching assistant was also another aid that Professor Smith thought might be helpful. Although he had a teaching assistant already, he thought another assistant could help him handle his growing responsibilities so that he could devote more time to improve the quality of his education toward sustainability:

A teaching assistant is helpful, if we had more money to pay for them. I need assistance, human assistance. My responsibilities are too much for my time, I can only spend so many hours in my office and my home to do my work. (C. Smith, personal interview, March 3, 2005)

Summary

In this case study, I have described Professor Smith’s activity system for the ESD. Throughout the course, Professor Smith encountered several contradictions and tensions that distracted him from realizing his sustainability object. Some of these contradictions originated from the context while others derived from the personal characteristics of the professor himself. The contextual contradictions arose from the community, division of labor, and rules elements in his activity system. The high demand of his institution for attracting grants and doing research was one of his serious contradictions; however, the contradiction that originated from his community, that is his fear of indoctrination, was the most significant one in terms of limiting his ability to address the whole of the sustainability triad.

On the other hand, the Professor’s personal characteristics played a significant role in shaping his teaching. In addition to his little interest in sustainability, his deep traditional pedagogical knowledge did not equip him to attain his sustainability object.

The combination of both, the contextual and the personal contradictions in Professor Smith’s activity system, resulted in various turning points that contributed in narrowing his sustainability object into only addressing the science component of it. For
him, that narrowed object appeared more attainable and less demanding. However, the strategy that the professor adopted in accomplishing his sustainability object implied that he adapted his contradictions rather than challenging them. In activity theory terminology, the professor “internalized” his contradictions but did not “externalize” them. According to Engeström (1999), any activity model that does not address and eliminate its contradictions will eventually become nonexpansive.

Similarly, in the following case study, Professor Jones encountered similar contradictions and tensions in his activity of ESD. However, the seriousness of his contradictions was slightly different than those of Professor Smith.

**Professor Jones**

At the time of this study, Professor Jones was relatively a new faculty member in the department of Geography. He was a European American who graduated from the University of California-Los Angeles in 1997 with a doctorate degree in Geography. After he completed his postdoctoral fellowship at Princeton University in 2000, he became an assistant professor in the department of Geography at the university. As evidenced by his curriculum vitae, his research areas included human-environment relations; land-use change; conservation and development; deforestation; Mexico and Latin America. Since his graduation, he published 10 journal articles, all for largely geography related Journals (i.e., Economic Geography, Professional Geographer, World Development) as well as reviewing an assortment of journal articles and book chapters.

I first met with Professor Jones at the end of fall semester 2004. From the first sight, Professor Jones appeared to be a very engaged in his work. In each of our meetings, he was enthusiastic but formal, and this formality extended to his personal dress while at work. When invited to participate in the study, he appeared excited about the possibilities. No small part of this excitement was due to the potential as serving as a subject of research, something he had never experienced before. Too, in his own research Professor Jones employed qualitative methods and so my methods were intelligible to him.
What stood out about my early sessions with Professor Jones was his interest in teaching. He was very invested in honing his teaching abilities, and, recognizing his limited pedagogical knowledge, he continually involved himself in different professional teaching development programs to broaden that knowledge, as indicated on his statement on teaching:

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. (D. Jones’ teaching statement)

In acknowledging his efforts toward enhancing his teaching, the university presented him the distinguished teaching award during the timeframe of this study. However, the prospect of awards was not the only motivator for Professor Jones’ efforts to enhance his teaching; instead, his motivation to improve his teaching seemed to be intrinsic rather than extrinsic. Indeed, his social beliefs and what he perceived to be his social obligations were important sources of his motivation to improve and refine his teaching. However, his students’ support and feedback further fostered his motivation to advance his teaching:

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. (D. Jones, personal interview, March 24, 2005)

The previous quote reveals the professor’s belief of his “social obligation” that is his conviction that it was his responsibility to “help them think effectively”. That belief was a strong motivation for Professor Jones to refine his teaching.
Professor Jones’ Course of Environmental Issues

In spring 2005, Professor Jones offered his “Environmental Science” course for undergraduate students. There was a total of 45 students in this course. Fourteen of them were in their second academic year, seventeen were in their third year, and 10 were in their fourth year. Out of the 45 students, seventeen students were environmental majors and twenty seven were pursuing other majors. Twenty seven of the total number of the students took the class because they were interested in its subject, in contrast to the twelve who were enrolled because it was required from them.

The students’ expectations from taking their class were diverse. The majority of them (45%) expected to learn more about how the environment interacts with both economic and social activities; however 20% of them expected to learn more about the current environmental issues. (See Table 9 for the expectations of Professor Jones’ students).

Table 9. Professor Jones’ students expectations.

<table>
<thead>
<tr>
<th>Type of Expectation</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>About the current environmental issues</td>
<td>9</td>
<td>20.0</td>
</tr>
<tr>
<td>The physical aspects of the environment</td>
<td>4</td>
<td>8.9</td>
</tr>
<tr>
<td>How the environment interacts with human social activities.</td>
<td>5</td>
<td>11.1</td>
</tr>
<tr>
<td>How the environment interacts with economic concerns</td>
<td>1</td>
<td>2.2</td>
</tr>
<tr>
<td>How the environment interacts with both economic and social activities</td>
<td>20</td>
<td>44.4</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Professor Jones’ Teaching Strategy

In teaching the class, Professor Jones used a technology enhanced classroom that contained a flat panel computer, an over head projector, video, and other multimedia equipment.
In addition of using these equipment, Professor Jones used multiple teaching tools to teach his class; one of these tools was his detailed syllabus that he distributed to his students at the beginning of the semester. In his syllabus, he stated the objectives of teaching his course as well as the students’ duties throughout the semester. In the syllabus, he defined multiple purposes and objectives of his course where one of these objectives was building environmentally conscious citizens. Moreover, Professor Jones used the local environmental organizations as an additional tool to better engage his students in various environmental issues, offering students a distinctive opportunity to do service learning with local environmental agencies.

To teach his course, Professor Jones used a 2003, recycled paper printed environmental textbook. However, the concept of sustainability was not the major theme of the book. Instead, the book contained many abstract environmental concepts that designed to help the reader build a strong environmental knowledge background. Indeed, the last chapter of the book talked about sustainability concepts and approaches. Table 10 contains the topics that appeared in Professor Jones’ book.

<table>
<thead>
<tr>
<th>Lecture Topic</th>
</tr>
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<tbody>
<tr>
<td>Matter, Energy, and Life.</td>
</tr>
<tr>
<td>Human Population</td>
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<tr>
<td>Biodiversity</td>
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<tr>
<td>Preserving and Restoring Nature</td>
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<tr>
<td>Population Biology</td>
</tr>
<tr>
<td>Food and Agriculture</td>
</tr>
<tr>
<td>Land Use: Forests and Grasslands</td>
</tr>
<tr>
<td>Climate &amp; Air Pollution</td>
</tr>
</tbody>
</table>
In teaching these topics, Professor Jones used both lectures and student-centered activities. In his lectures, he summarized the important information that appeared in each topic and presented these summaries via PowerPoint. After his lectures, he allowed his students to ask questions to clarify any unclear issue.

In addition to his lectures, Professor Jones conducted two students centered classroom activities or simulations. One of these simulations focused on global population and the second focused on global carbon emission. During his simulation sessions, he divided his students into small groups and gave them sheets of statistical data about the human population and the carbon emission for each country. Each group had to choose a country and represent the population (using animal crackers) and the amount of emitted carbon (using charcoal briquettes). Then, 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.

**Professor Jones’ Teaching Approach and Beliefs**

The teaching strategy of Professor Jones was a semi-traditional one (Bourne, McMaster, Rieger, & Campbell, 1997), in which he typically lectured using his well-organized and thorough power point presentations rather than doing student centered classroom activities. He had several reasons for this approach:

I chose to lecture for a variety of reasons, I guess the most important one is the class size, what I did last week (a classroom activity for 52 students), can not be done so often because it takes a lot of work to set it up, it requires more work than going to a textbook and preparing a lecture. Lecture is also easier to be replicated in the following semester. (D. Jones, personal interview, February 3, 2005)

However, regardless of his preference for lecture, Professor Jones did two student-centered activities or simulations. He used these simulations for many reasons, one of these was to help students visualize and understand abstract environmental concepts (i.e., population growth rate). He argued:

…my objectives from that simulation are to try to take off the fear of a simplistic Malthusian expectation about human population
growth so people can understand where they are. I often forget that
the US is a very populated country; some students generally don’t
think that India and China are populated countries and Indonesia is a
highly populated country, too. So I can get them to visualize where
people are on the planet. Secondly to get them to see that there is a
drastic difference of the reproductive and population patterns in
different countries. So they see Japan has negative population
growth, [something] that they did not know about. (D. Jones,
personal interview, February 3, 2005)

Moreover, Professor Jones intended to promote his students’ understanding about the
diverse cultural and political dimensions of human population as reflected in his
discussion of the advantages of his simulations:

…it is an interesting way of getting them (students) to think about
people. [It’s] more than a graph in a line. I also use the diversity and
outcome to pose questions of why people have a lot of babies in
Nigeria and don’t have many in Germany? Why is that? Are these
people different? This helps to create the climate to talk about the
diverse cultural and political perspectives on population issue. (D.
Jones, personal interview, February 3, 2005)

As an important facet of building students’ sense of environmental citizenship so that
they are capable of understanding the technical, ethical, and social dimensions of the
diverse environmental issues, Professor Jones aimed to highlight the contradictions
between the different worldwide environmental perspectives (i.e., perspectives in
population growth, energy consumption). That object, as Professor Jones believed, has its
merit in helping his students widen their understanding about the global environmental
issues:

I want them to be able to think about contradictory issues and see the
difference between different perspectives and make reasonable
decisions and recognize other ways of looking at the world. I need
them to be able to better understand the environmental issues and
their political and social complications. (D. Jones, personal
interview, February 3, 2005)

However, he was careful to explain that this envisioned environmental citizenship can not
be achieved by “preaching” about this position citizenship, but rather by helping students
first acquire a broad technical (scientific) understanding of environmental issues before
going any further to address the social and economic aspects of the issues in discussing
t heir relations with other issues:

I believe that they 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
both social and technical……I am not going to do lots of
preaching to them, I might do some but I know it will not be
effective to preach anyway. (D. Jones, Personal interview, January
13, 2005)

Furthermore, he considered the act of preaching his students, to become
environmentalists, 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 and it is important for me not to abuse my power
and ask question in such away that if they did not tell me what I want
to hear they will get it wrong. (D. Jones, personal interview,
February 3, 2005)

Indeed, he considered such “preaching” as disrespectful to his students, as this approach
assumes that students have blank minds that need to be rewritten and ultimately
ineffective as he explained:

I think I have more trust in them [the students] than what my
colleagues do when I hear what [these colleagues] do in the
classroom….. 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
think if I got that attitude I would probably turned [the students]
off…. I don’t want to close their ways of thinking. (D. Jones,
personal interview, February 3, 2005)

As shown in the previous passages, Professor Jones’ teaching beliefs directly influenced
the way he taught his students. Although he appeared confident and satisfied with his
teaching approach, he was open to modify his teaching practices to match his students’
needs. Given an example of how he changed his teaching to match his students’ needs…
This behavior of the professor suggests that his students influenced his instructional
actions (Gess-Newsome et al., 2003). I confirmed that influence through my observation
of Professor Jones’ classroom. He frequently asked his students for their feedback and suggestions in order to improve his teaching.

It is very important to note that the members of Professor Jones’ classroom community had various influences on his teaching practices. Throughout my interviews with them, I evidenced a range of reactions to their experiences with Professor Jones’ class. Some appreciated the content of his class and considered it as a good opportunity to learn about various environmental issues and concerns:

..this course has opened my eyes to a lot of environmental issues that I never knew. As an example, how serious environmental issues are and how they are happening right before us like habitat extinction, loss of biosphere, pollution …. (V. Neil, personal interview, March 30, 2005)

Others considered it as an unchallenging course, despite their recognition that it motivated them to consider environmental issues and concerns:

…this class motivates me to think more about some environmental issues. I guess I don’t think it challenges me academically that much. (W. Paul, personal interview, April 5, 2005)

This quote of Paul signifies that although Professor Jones did motivate his students to learn more about environment and environmental problems, his teaching did not challenge his students to think and analyze the information presented.

These comments of Professor Jones’ students indicate that the professor was, by many measures, a successful teacher. His students valued both the scientific information that they learned from the class and the way the professor delivered that information. However the students’ satisfaction with their Professor’s teaching signifies their perceptions about the meaning of “effective teaching”. For them, teaching means delivering new information and effective teachers are those who deliver more information. Indeed, according to Martin, Sexton, & Gerlovich (2001), effective teachers are those who develop a repertoire of methods they can draw on for maximum effect and to fit their preferred teaching and student-learning styles. For the case of Professor Jones, he believed that lecture was a powerful tool to deliver the information to the students; therefore, he used it as the predominate means of teaching his course.
However, in the case of ESD, Professor Jones had his own perception of the meaning of sustainable development and appropriate means of teaching for it. In the following section, I describe his personal perception and the practices he employed in ESD.

**Professor Jones’ Perceptions of ESD**

Professor Jones did not consider himself an advocate of ESD, instead his aim was to help students become environmentally conscious citizens who were technically (scientific) informed about environmental knowledge and able to understand its complex interaction with social issues (See Professor Jones’ course syllabus, Appendix D.)

Although he espoused an object addressing sustainability issues in his teaching, he was not keen on my initial intense questioning about the term “sustainable development.” In the first interview, he complained:

> Ok, I am having trouble with the questions focused on sustainable development because, like I said, I don’t approach this class talking about sustainable development. (D. Jones, personal interview, January 13, 2005)

Later, when I asked him about the reason for his discomfort with using that term, he complained about the ambiguity that surrounded the meaning of the term itself (a shortcoming recognized in the literature (Temple as cited in Davis, 1996, & Venetoulis, 2001).

> Well first of all the term is so problematic and I don’t even use it… I developed the idea of sustainable development more as a way of trying to educate student about the various facets of the contradictions about development and environment. (D. Jones, personal interview, January 13, 2005)

Conversely, when I asked him if he is interested in discussing the intersection between the three major elements of sustainability (Environment, Society, and Economy) in his teaching, he showed a great interest in doing so and eventually revealed his own way of sustainability education in his classroom:

> That’s actually [discussing the intersection between the three major elements of sustainability] something that I very much agree with.
I don’t talk about sustainability the way you talk about it, but I had a point on environmental issues and the social and technical and political dimensions of each environmental issue. (D. Jones, personal interview, February 3, 2005)

Among these three elements, Professor Jones believed that the most important component was the social one:

In my view the social component is the most important one for the students to understand because it includes both the political and the economical ones (D. Jones, personal interview, February 3, 2005).

In addition to the sustainability objective, Professor Jones pursued a variety of other objectives (i.e., developing students’ understanding and appreciation of how nature works, involving students in the resolution of environmental problems). However, this study only considered his sustainability object:

Well, I guess the object of my course is to build citizens, which is simply the idea that people should understand the technical aspects of environmental issues and the social components that relate to these issues. (D. Jones, personal interview, January 13, 2005)

To accomplish his teaching objectives, Professor Jones carefully chose a textbook, “Environmental Science: A Global Concern,” as a mediating artifact. Although the textbook had some socially and economically related issues, the majority of it dealt with purely technical concepts about the environment (i.e., ecological principles, physical resources). Indeed, echoing Professor Jones’ class, the book’s main theme revolved around environmentally conscious citizens who have sufficient information about current environmental issues and concerns and capable of acting sustainably with their environment. It is important to note that that object could have been easily achieved using other environmental textbooks available. Indeed, there are several, which aim to mainly promote sustainable behavior (i.e., “Sustaining the Earth” by Tyler Miller, 2004). As before, I compared Tyler’s text with that employed by Jones to gain a sense of what was available at the time of this course in the area of sustainable development in comparison with what the professor chose to employ. I argue that this choice can shed light into his understanding of and approach to ESD. The following Table (Table 11) shows a content
analysis of both Professor Jones’ text and Miller’s (2004) text, *Sustaining the Earth*. This analysis was informed by Titscher’s (2000) method of text analysis.

Table 11. Making Sense of Jones’ Text Selection: A Comparison of *Environmental Issues* and *Sustaining the Earth*

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>SIGNS: WHAT IS THE CONTENT OF THE TEXT?</td>
<td>Presents different environmental concepts that slightly consider sustainability. Offers no guidance for the reader to act sustainably.</td>
<td>Mainly discusses sustainability; the content guides the reader of how to function sustainably while presenting stories about successful sustainable behaviors and actions. Rich with multimedia tools.</td>
</tr>
<tr>
<td>STRUCTURE: HOW IS THE TEXT ORGANIZED?</td>
<td>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).</td>
<td>Comprehensive environmental topics organized under 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)</td>
</tr>
<tr>
<td>INTENT: WHAT WAS THE INTENTION OF THE CREATOR(S) OF THIS TEXT?</td>
<td>Presents pure environmental concepts with little focus on sustainability issues.</td>
<td>Presents the various environmental issues through the lens of sustainable development.</td>
</tr>
</tbody>
</table>

The previous Table shows the scant attention to sustainability in the book that Professor Jones used to achieve his sustainability object. However, an alternative book (Sustaining the Earth) was much more focused on analyzing various environmental topics through sustainability. It is important to note that such an alternative was available, but the professor did not select it. The professor’s selection of *Environmental Science: A Global Concern*, which was structured around technical (scientific) knowledge, signified that he
believed that teaching for ESD can be achieved by building a strong knowledge background about environment. This interpretation was supported in the following quote:

…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 how ecosystem organized and how it can be used and also they need to understand the biogeochemical cycles which is essential to understand global warming which is important to sustainable development because our current development is not sustainable. (D. Jones, personal interview, January 13, 2005)

Regardless of that preference of providing students with the technical knowledge about the environment, Professor Jones discussed sustainability issues infrequently in his class and only when he talked about socially-related environmental topics, particularly the population issue (his favorite topic for this class). Paul, one of his “classroom community” members, had the same observation:

I think Professor Jones addressed Sustainable Development occasionally but not in every class that we had. I guess because the focus of this course is on the environmental content and in another course he might have a chance to focus more on other Sustainable Development issues. (W. Paul, personal interview, April 5, 2005)

Neil, another student of Professor Jones’ class who attended both Professor Smith’s and Professor Jones’ classes, made a similar comment about the infrequent discussion of sustainability in Professor Jones’ classroom:

I feel that in both classes; Professor Smith and Professor Jones’ classes, we talked a lot about environmental issues and problems, but not so much about actual Sustainable Development. In Environmental Issues class we have talked about how to reduce emissions and pollutions, but I feel that there should be more emphasis in both classes on Sustainable Development. (V. Neil, personal interview, March 30, 2005)

However, Bate, whose major was International Affairs, was not familiar with the term “sustainable development” and did not recognize its use in any class discussion.

A review of the students’ expectations upon entering the class suggests that the professor was successful in meeting the expectations of 20% of his students, as they
hoped to learn about the current environmental issues. However, the expectation of the rest of many others of his students (45%) of learning more about the interaction of environment with both economic and social activities was not as effectively realized in the class.

**Weaving the Strands of Professor Jones’ Activity System**

Although the professor stated at the beginning of his course that his object was to address sustainability, the object that came up again and again in discussions with Professor Jones and the object that seemed to best explain his teaching was the object of informing his students of the technical (scientific) knowledge of the environment (i.e., Population Biology, Air Pollution). This second object, which represents a shift from his initially stated objects, also indicates the professor’s perception of his role as a knowledge and information deliverer. However, to satisfy this more focused and achievable object, he needed only to address the science involved in these issues. Indeed, this reformulation of Professor Jones’ object of sustainability occurred throughout the semester as a result of the contradictions he found in his activity system. However, because he was aware of the distinction between his two objects as well as the importance of addressing both of them, he kept oscillating between his two objects throughout the semester (but with a decidedly stronger emphasis on attending to the second object of delivering technical environmental knowledge).

The professor’s inclination to focus on the environmental element of sustainability could be justified by the significance of giving students the required technical (scientific) knowledge. That knowledge, as the professor believed, potentially made his students competent and able to better understand and discuss the relations and the implications of those issues in their life:

…so the main thing that I teach is content, that is the technical knowledge (i.e., the idea that the ecosystem recycles matters and energy, the biogeochemical cycles, global warming), those technical ideas help them understand how ecosystem organized and how it can be used. Furthermore, these ideas are essential to understand sustainable development. (D. Jones, personal interview, January 13, 2005)
Furthermore, the strategy of moving between both of his objects indicates his interest in ESD. However, this strategy appeared to be a response to the various contradictions that distracted him from structuring his teaching around sustainability. (See Professor Jones’ activity triangle in Figure 10.)

![Professor Jones' activity triangle diagram]

**Mediating Artifacts**
- LECTURING.
- Classroom hands on activities.
- Video.
- Volunteer service learning.

**OBJECT**
- Deliver Environmental Knowledge
- Preparing Environmental citizens

**OBJECT**
- Teach for Sustainable Development

**SUBJECT**
- Prof. Jones
  - Teaching style.
  - Teaching beliefs.
  - PCK knowledge.
  - Philosophy.

**RULES**
- Formal
  - Publication.
  - Promotion.
  - Class size.

**COMMUNITY**
- Implicit rules
  - Classroom Community
    - Unequal students’ preparation.
    - Dept. community (Unsustainable goals).
  - University community.

**DIVISION OF LABOR**
- Role as a professor at University.
- Funding graduate students.
- Other responsibilities.
- Role of social life.

Figure 10. Professor Jones’ activity triangle.

In analyzing the professor’s activity system, the contradiction between the Rules and the Subject were viewed as major obstacles that interfered with the professor’s teaching priorities. The University’s demands for publication, as well as the faculty promotion criteria, were a major concern for Professor Jones. This concern consumed the professor’s time and energy and stole time from even further consideration of his teaching:
…I am in a research institution and an important thing is to do research and publish, actually publish and research. (D. Jones, personal interview, February 3, 2005)

Indeed, the professor attributed his modest teaching preparation to the inherent culture of an institution that values research over teaching. That culture consumed his time and effort and made him less focused on improving his teaching competency. He criticized this culture, saying:

I think that they are an inherent problem in the approach of education in this institution…the way in which research is valued over teaching reduces my chance for professional advancement and makes me pay less attention to my teaching. (D. Jones, personal interview, February 3, 2005)

Moreover, the university’s promotion system for faculty was another obstacle in front of Professor Jones, as became obvious as he was crafting his tenure file during the time of this study. Although the University set the priority for both teaching and researching in its mission statement, in Jones’ view, the clear emphasis was research. The professor was critical of the promotion and tenure process, describing the minor role teaching quality played in it:

The hurdle to pass the teaching quality test is very low; if your teaching is not very bad, they will pass you. (D. Jones, personal interview, March 24, 2005)

This system, as Professor Jones argued, makes professors pay more attention to their research activities rather than their teaching activities:

….you cannot get promoted without researching. If my peers in the University looked at my scholarship, they might say, ‘Even though he won a teaching award, he is not appropriate for this institution because he does not do research.’ (D. Jones, personal interview, March 24, 2005)

Another aspect of the culture of the institution that contributed to Jones’ inability to fully perfect his teaching was the acceptance of large class size:

The big classes in my institution are another inherit problem in the approach of education …the limitation is that the large number of
students in each class. (D. Jones, personal interview, February 3, 2005)

However, in comparing Professor Jones’ class to other classes in the same university, his relatively small class (45 students) seems to be small and encouraging, if not ideal, to teach for ESD. But the professor’s perception of the rules of his institution (i.e., large class size) created a time crisis for him, the result of which was he felt constantly overwhelmed and behind. He said in addressing his concerns and obstacles:

… the limitation is that the larger number of students that I have and the less time to teach, write papers, and grade papers. However, since I am in a research one university, they need me to publish papers and then I need to spend a lot of time in preparing that. (D. Jones, personal interview, January 13, 2005)

In addition, the set of contradictions between the Subject and the Division of Labor contributed in altering the professor’s teaching priorities. Besides his other social and academic responsibilities, the professor believed that his responsibility to attract grants and support his graduate students deterred him from considering fully considering the role of sustainability in his teaching. However, he believed that he would pay more attention to his teaching if that peripheral concern was eliminated:

…..if I did not have to do research anymore and did not have the pressure of getting grants, I would not have to worry about this chunk of work of writing manuscripts, and I would spend more time on my teaching, and my accomplishments in the classroom will be recognized. (D. Jones, personal interview, March 3, 2005)

The influence of classroom community had also something to do with Professor Jones’ teaching activity. He viewed the unequal academic preparation of his students as an obstacle that hindered him from doing more student-centered activities and limited the classroom discussion with regard to sustainability:

I can give them additional readings and do more activities in class, but with a class of 50 students, 10 of them are bright; 10 are going to have skills and talents and the rest will be unmotivated. (D. Jones, personal interview, February 3, 2005)
However, he believed that he would do more open-inquiry education for sustainability if he had a more homogenous, high quality student population:

…if I had equal students’ levels, I would set a task for a group of students and let them go and investigate on their own. (D. Jones, personal interview, March 3, 2005)

Also, the Community inside the department where Professor Jones worked influenced his priorities and objectives. In addition to the departmental demands for research, it determined the objects for each course. For the case of Professor Jones’ course, the department considered it to be one within a sequence of courses that the students need to take. Therefore, Professor Jones needed to focus more on teaching the technical (scientific) knowledge of the environment to best prepare students for the wider department curriculum:

…this class has a place in the curriculum and it has a place in their education in which they get the chance to learn the technical environmental stuff. The focus is on the technical stuff even if it is the least important. (D. Jones, personal interview, February 3, 2005)

In total, the aforementioned contradictions that Professor Jones faced in his teaching activity forced him to digress from his primary object of sustainability and reduce it to focus only the environmental content. However, because the professor was aware of that turning point and had the intention to address the other elements of sustainability in his teaching, he mitigated his contradictions by finding a middle ground between becoming a sustainability teacher and a content deliverer.

That mitigation represents the internalization state that the professor experienced during the semester (Engeström, 1999). Indeed, the transformation process required the professor to externalize and challenge his contradictions in order to achieve his teaching objectives. However, in Professor Jones’ case, his mitigation strategy does not indicate an externalization condition since he did not challenge his contradictions to transform his education toward sustainability. On the contrary, it indicates that the professor accommodated his contradictions and reformulated his teaching objects to go with the status quo of his institution. That failure, as Engestrom & Miettinen (1999) indicates,
represented a non-expansive condition of activity that maintains and strengthens the dominant status quo. However, Professor Jones viewed several solutions for his contradictions as I will describe in the following section.

**Perspectives on Resolving the Contradictions**

Although Professor Jones was successful in accommodating some of his contradictions, he could not address them all and maintain his object of sustainable development in his teaching. However, throughout the interviews, he revealed several ideas to resolve his both personal and contextual contradictions.

At the personal level, although he had participated in different pedagogical programs both before entering the profession and after he became a professor, he continued to be motivated to learn more about the act of teaching and how he could best support students in learning:

> I need to know more about learning styles and pedagogical stuff; that would be the most important thing for me. There are programs on campus; I have gone to most of them but unfortunately, most of them are technology oriented [i.e., blackboard, syllabus construction] and they less appreciate the human side of education. (D. Jones, personal interview, March 3, 2005)

Furthermore, he believed that furthering his pedagogical knowledge could help him vary his teaching strategies and make his teaching more exciting for both him and his students as well.

On the other hand, Professor Jones provided some perspectives on resolving his contextual contradictions too. He believed that addressing sustainability in his department’s courses required adjusting both the philosophy of the department itself and the description of its courses as well. In other means, and from Professor Jones’ perspective, the real transformation to achieve the object of ESD required changes, both on a personal level, but also beyond the personal, including changes in goals of the department.
Professor Jones explained that the resolution of his institutional contradictions would require reducing the demand for research and publishing in order to provide more time for the faculty to focus on improving their teaching skills and approaches:

…If I did not have to do research anymore and did not have the pressure of getting grants, I would not have to worry about this chunk of work of writing manuscripts, and I would spend more time on my teaching, and my accomplishments in the classroom will be recognized. (D. Jones, personal interview, March 3, 2005)

Additionally, he argued that minimizing the size of the class would help him teach productively and effectively. He believed that having small classes could encourage him employ progressive teaching strategies such as having more debate and discussion on the diverse environmental issues and concerns:

Well, if I had the same class size as in a small college and good, quality students, I would set a task for a group of students and let them go and investigate on their own. I would guide them to do some self-learning and some debate. (D. Jones, personal interview, March 3, 2005)

Resolving these contradictions may help Professor Jones improve his teaching and motivate him to design different classroom activities to better address sustainability in his teaching.

**Summary**

In this case study, I have described Professor Jones’ activity system for the sake of understanding his activity of education for sustainable development. Throughout the course, Professor Jones encountered several contradictions that distracted him from realizing his sustainability object that he set for himself at the beginning of the semester. Some of his contradictions were contextually related while others were personally related. The contextual contradictions were located in the *Community, Division of Labor,* and *Rules* elements in his activity system. The high demand of his institution for grants was one of his serious contradictions; however, the contradiction that originated from the *Rules* of his workplace (i.e., The University’s demands for publications) was the most
challenging one for him personally that greatly interfered with the quality of his teaching. That contradiction

On the other hand, Professor Jones’ personal characteristics played a significant role in shaping his teaching. In addition to his modest interest in sustainability, his extensive knowledge in traditional pedagogy hindered him from consistently seeking more innovative teaching strategies in his classroom.

The combination of both the contextual and the personal contradictions in Professor Jones’ activity system resulted in various turning points that contributed in narrowing his sustainability object into only addressing the science component of it. For him, that narrowed object appeared more attainable and less demanding. Although the professor adopted a mitigation strategy to achieve both his sustainability and knowledge delivery objects, he tended to achieve his knowledge delivery object. This behavior of the professor implied that he adapted his contradictions rather than challenging them. In activity theory terminology, the professor “internalized” his contradictions but did not “externalize” them. According to Engeström (1999), any activity model that does not address and eliminate its contradictions will eventually become nonexpansive, which maintains the status quo practice.
CHAPTER 5

CROSS-CASE COMPARISON AND DISCUSSION

The purpose of this study was to understand the activity system of education for sustainable development at an American university classroom. The main questions for this study were:

1. What are the influences on university professors’ education for sustainable development and how do these influences interact?

   - What is the state of education for sustainable development at a typical university environment-related science class?
   - How do features of the university context influence the manner in which professors teach for sustainable development?
   - Which factors, both personal and contextual, support education for sustainable development and which factors inhibit it? How do these factors interact?
   - What are the university professors’ perspectives in resolving the contradictions they face to achieve the object of ESD?

The individual case studies offered in the previous chapter served as the basis for a cross-case analysis in an effort to find aspects of the activity systems that could inform the work of others, beyond these two professors. The format of this analysis centered on identification of the contradictions that both professors experienced. In the following passages, I discuss those contradictions that arose from the cross case analysis. This cross case analysis also allowed for the identification of more generalizable themes that I found to be useful in understanding the activity systems of both professors. I will present these more transferable themes following the cross case analysis. In the final section of this chapter, I will return to the questions that guided my work and bring my results to bare in answering them.
Cross Case Analysis

A host of authors argue that the term sustainability education implies whole paradigm change (Filho, 1999; McKeown, 2002; Sterling, 2001), one which asserts both humanistic and ecological values. Although ESD has recently won a small niche in some science curricula, the overall educational paradigm otherwise remains unchanged (Sterling, 2001). ESD educators argue that most mainstream educators contribute to unsustainable human actions through the uncritical reproduction of current norms, by failing to challenge fragmented understandings, by recognizing only a narrow part of the spectrum of human ability and need, hobbled by an inability to explore alternatives (Orr, 1992). In response, education for sustainability calls for an authentic education that recognizes the best of past thinking and practices and works to revise education to help assure the future (Filho, 1999; Orr, 1992).

Given that premise, creating institutions that encompass sustainability education is no small task. Academic institutions are entrenched with structures and values that are often resistant to change (Tyack & Cuban, 1990). Many argue that an important first step in fostering change is the recognition of the current system with a close analysis of where this system is effective and where it is not (Cuban, 1990, 2001; Gess-Newsome et al., 2003; O’Neil, 2000; Tyack & Cuban, 1995; Woodbury & Gess-Newsome, 2002). This work promises to contribute to this recognition. This chapter is devoted to a broader examination of the contradictions endemic to the context of this study influenced the process of education for sustainability in its classrooms.

Contradictions in the System

The two university professors at the heart of this study encountered serious contradictions in their activity of ESD. These contradictions had multiple roots and origins, some of them originated from their wider context while others were derived from their personal characteristics of the individual professor. The contextual contradictions originated from rules of their institution, their inner and outer communities, and the division of labor and responsibilities in the work environment. The personal contradictions arose from the professors’ personal philosophies, ideas about teach and learning, and vision of sustainable development. The contradictions in the activity
systems arising from inconsistencies in personal and contextual features of these systems served to interfere and reshape their teaching priorities.

As indicated in the individual case studies, the influence of the contradictions was varied. Both of the professors narrowed their sustainability objects to address only one side of the sustainability triad; however each of them had a different strategy that allowed for the outcome of preparing environmentally aware citizens. Professor Smith responded by mainly focusing on his new object of delivering scientific information; Professor Jones adopted a strategy that allowed him to address both sustainability and scientific information at the same time, although he placed a greater emphasis on the latter one.

The patterns of object development that both professors experienced are known as turning points. Kärkkäinen (1999) used turning points in his description of the reformulation of the object as a way to identify transformational episodes in people’s practices. A turning point is an event when the subject in an activity system begins to outline his/her object in a different way. It represents a response of the subject to a contradiction, which results in a resolution of the contradiction, potentially widening the object or an unresolved contradiction, which might lead to narrow the object.

In activity theory, turning points occur when subjects respond to contradictions found in their systems. Turning points represent specific events that led subjects to view their objects of the activity differently. In this study, the turning point occurred during teaching the course, when both professors responded to contradictions in the system by choosing to reformulate their sustainability object.

In any activity system, subjects can respond to their contradictions in their systems in either changing the elements of their systems that produce the contradictions or accommodating the contradictions and changing or reformulating their object to make it more attainable. For the subjects in this study, they did not challenge their contradictions; instead, they responded their contradictions by reformulating their sustainability objects. This reformulation resulted in narrowing their sustainability objects into delivering the science part of sustainability. Figure 11 graphically illustrates the various turning points that led to the object reformulation of each professor. In this Figure, the broken arrows indicate a contradiction in that activity while the heavily
broken arrows signify the most substantial contradictions that each professor had in his activity system.

![Diagram of Professor Smith's and Professor Jones's activity systems]

**Professor Smith**

**Professor Jones**

Figure 11. Professors’ Turning Points.

Turning points found in this study, shown as a black circle encircling the letters “TP”, indicate a professor response to a contradiction, as evidenced through their interviews with the researcher. These turning points, also listed in Table 13, led to object reformulation. They represent specific events in each professor’s dialogue that led him to view the object of the activity differently, based on his initial motive in his activity “addressing sustainability in his teaching”.

As shown in Figure 11 and Table 12 both professors experienced similar sets of contradictions and turning points. The two professors identified five major contradictions in their activity systems: contradictions between rules and object, between division of labor and object, between community and object, between mediating artifacts and object, and between subject and community.

The first contradiction occurred between the rules and the object elements in their systems, both professors commented on their institution’s values that worked to privilege research over teaching. I documented that contradiction using both my interviews and the analysis of their university’s official documents. It is important to note that this contradiction seemed to be related to their second contradiction between division of labor and object.
<table>
<thead>
<tr>
<th>Turning Point</th>
<th>Work activity system contradiction</th>
<th>Indication of Turning point</th>
<th>Object reformulation</th>
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<tbody>
<tr>
<td>Smith</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Rules (Institutional) vs. Object</td>
<td>Interviews, University’s documents</td>
<td>Narrowed</td>
</tr>
<tr>
<td>2.</td>
<td>Division of labor (at work place) vs. Object</td>
<td>Interviews, artifacts</td>
<td>Narrowed</td>
</tr>
<tr>
<td>3.</td>
<td>Community (Institutional and societal) vs. Object</td>
<td>Interviews</td>
<td>Narrowed</td>
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<tr>
<td>4.</td>
<td>Mediating artifacts (teaching tools) vs. Object</td>
<td>Interviews, observation</td>
<td>Narrowed</td>
</tr>
<tr>
<td>5.</td>
<td>Subject vs. Community (Institutional and societal)</td>
<td>Interviews, observation</td>
<td>Narrowed</td>
</tr>
<tr>
<td>Jones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Rules (Institutional) vs. Object</td>
<td>Interviews, University’s documents</td>
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<td>5.</td>
<td>Subject vs. Community (Institutional and societal)</td>
<td>Interviews, observation</td>
<td>Narrowed</td>
</tr>
</tbody>
</table>

The second contradiction occurred between the division of labor and the object, meaning the division of labor of each faculty in the university. Both professors in this study described their responsibilities as overwhelming (i.e., research, seeking funding for research, teaching, preparing syllabi, and correcting exams). They lamented their many responsibilities and the scant time they had to manage these responsibilities. This frustrating situation caused them to feel “behind” at all times.

The third contradiction occurred between the community and the object elements, in which each subject explained different sub contradictions. Although Professor Smith mentioned the influence of the implicit rules of his wider community (i.e., politics-free teaching), Professor Jones demonstrated a concern about his smaller departmental community and the lack of interest in sustainability for the courses that it offered. Both of these communities influenced the two professors’ mission toward ESD. Indeed, I
documented the influence of these communities using both their interviews with me and
the analysis of various documents of both communities as I will describe in this chapter.
The fourth contradiction for both professors was located between their use of mediating
artifacts\(^2\) and realizing their sustainability objects. The professors’ pedagogy had a great
influence on the manner in which they realized and reformulated their objects. Both
professors appeared satisfied with the use of traditional pedagogical strategies (i.e.,
lecture). Like other teachers (Gess-Newsome et al., 2003; Sowell, Southerland, &
Granger, in review), that satisfaction hindered them from searching for other new
innovative teaching strategies that might have allowed them to pursue their original
teaching object. Although both of them used lecture as a teaching tool, Professor
Jones appeared to have a larger repertoire of more innovative pedagogical knowledge of
classroom activities and “simulations”. Professor Jones appeared to have a larger
repertoire of more innovative pedagogical knowledge of classroom activities and
“simulations”.

The employment of these simulations by Professor Jones suggested that he
understood how learning can be a difficult and complex process in that he felt the need to
support students in this process; however, it is important to note that these simulations
appeared infrequently in his teaching due to his lack of time, as he mentioned in one of
his interviews. In contrast, Professor Smith demonstrated more traditional pedagogical
knowledge and he mainly used lecture or variations on lectures (student presentations,
guest presentations) to convey information to his students. In both cases, the extensive
knowledge of traditional pedagogy that both professors had and their action to narrow
their sustainability objects appeared to be related and serve to support one another.

\(^2\) Human activity is mediated by a number of tools, both external and internal. The
mediation in teaching is done by artifacts which broadly define and include teaching
instruments, teaching approaches and tools. Using these artifacts in teaching, teacher can
mediate or change their students’ learning and behavior.
Finally, a fifth contradiction for both subjects can be identified between the subject and community elements of the activity systems. Professor Smith had a contradiction within his institutional and national communities, whereas Professor Jones had a contradiction with his institutional community. Professor Smith failed to address the political side of environmental issues in his teaching, that failure originated from his belief about the need to exclude politics from the practice of teaching. Professor Smith personal belief on this issue it derived from a wider cultural perspective on this issue as I discuss in latter sections of this chapter.

On the other hand, Professor Jones’ contradiction was with both his institutional and departmental communities. For Professor Jones, these communities provided support for professors to focus on their research and publication; and they provided support for professors to hone the technical aspects of their teaching (construction of syllabi, assignments, blackboard sites). However, it is important to recognize that the communities did not support professors to substantially reform their teaching, something that will be required if there is to be a shift toward ESD.

These five contradictions, as they appeared in both professors’ activity systems, translated into several turning points. Those turning points, shown as black circles with the letters “TP” inside (Figure 11) indicated their responses to these contradictions and caused them to narrow their sustainability objects.

Although both professors had similar contradictions in their activity systems, the level of seriousness of those contradictions, with respect to the subjects themselves, was different. Professor Smith believed that his community contradiction greatly interfered with his sustainability object. The implicit rules of Professor Smith’s community, with regard to the purpose of education in general, and ESD in particular, shaped his teaching. Throughout the semester, Professor Smith was cautious in discussing the political side of the environmental issues in his classroom. That caution caused him to reside solely on the science of the ESD triangle.

In contrast, the most serious contradiction in Professor Jones’ activity system had to do with the university rules (i.e., doing research). Although Professor Jones focused on improving his teaching and honing his research, that focus did not harmonize with the university’s values that value attracting grants and publishing research. Because that
serious contradiction was not resolvable, from Professor Jones’ perspective, he narrowed his sustainability object to address only the environmental component of that object.

The cross cases comparison allowed for a description of the commonalities and differences between the professors’ strategies and beliefs about resolving their contradictions. However, further analysis of across these two cases resulted in more fundamental themes, themes that may prove to be transferable to other similar situations. I devote the following section to discussions of these emergent themes.

**Emergent Themes of the Study**

A number of themes helpful in understanding the influences on ESD emerged during my analysis. These themes include: emphasis on research, demanding work responsibilities, fear of indoctrination, and lack of ESD communities. I will begin discussing these themes by considering the first two (emphasis on research and demanding work environment), which emerged very early in the research. Then, I will consider the two themes (fear of indoctrination and lack of ESD community) that arose from continued data analysis.

**Theme One: Emphasis on Research**

There is a number of ways one can determine the values of institutions; the way they position themselves to others, the way in which funds are expended, the way in which the institution structures the evaluation of those who work within it. Perhaps of all of these the one that exerts the most influence on the work of professors is the way in which the institution evaluates their work. Indeed, evaluation of faculty takes place at a number of levels at universities; in classrooms, in which students are asked routinely to evaluate the teaching ability of their instructors, in departments and colleges, in which merit, tenure and promotion committees evaluate the total work of the faculty, a consideration that extends all they way up to the upper layer of administration. Evaluation is an ongoing process at this institution and others like it.
At this university, just as in most universities categorized as Carnegie Doctoral/Research Extensive Institutions, faculty in tenure track positions needed to excel in three core areas: research, teaching, and service (The University’s mission statement). The university’s guide to promotion and tenure procedures outlined the detailed criteria for faculty promotion and tenure (Memo from the Office of the Dean of Faculties, 2005). And, indeed, these criteria laid out expectations for all three core areas of a professor’s work. However, these three core areas were not perceived by these subjects to be equally weighted in evaluations. Indeed, Professor Jones described that the current evaluation structure calls for “the publishing game”:

…. you cannot get promoted without researching. If my peers in the university looked at my scholarship they might say even though he won a teaching award … he is not appropriate for this institution because he does not do [enough] research. (D. Jones, personal interview, March 24, 2005)

According to Professor Jones, from a faculty member’s perspective, the process of evaluation weighed most heavily on evaluation of the research efforts of that faculty. Merit, tenure and promotion committee routinely reviewed the number of publications and citations as well as consider the rank of journal in which a research appeared in order to develop some estimation of a faculty member’s scholarly ability. Given the current evaluation process, this consideration of a faculty member’s scholarly ability was a very real concern for young faculty members, such as Professor Jones.

One should not be surprised that the University valued research given its status as a Carnegie Doctoral/Research Extensive Institution. However, according to the university’s mission statement and criteria for promotion and tenure, teaching too appeared to be another priority for the university. But if teaching was as important as research, how did this institution evaluate the teaching capabilities of faculty? Professor Jones answered this question. As he was crafting his tenure and promotion materials, he commented:

The hurdle to pass the teaching quality test is very low; if your teaching is not very bad they will pass you. (D. Jones, personal interview, March 24, 2005)
On the surface, this perception was surprising given the clear description of teaching materials called for in the criteria for tenure and promotion (Memo from the Office of the Dean of Faculties, 2005) combined with the emphasis on course evaluation by students. However, as one looks more closely into these documents, the more minor emphasis on the quality of teaching became clear. The university used a detailed course evaluation procedure with students, asking questions about their perceptions of the details of the course as well as the overall quality of the course structure and instructor. This evaluation procedure was derived from questions developed at the University of North Carolina and University of Michigan as well as including questions for evaluation required by the state legislature (Course Evaluation, n.d.).

Although faculty were asked by the administration to describe their teaching quality through an assortment of artifacts, in the promotion and tenure process they were required to report all facets of their research in a separate publication binder. Indeed, if the university required a separate file for research, why did it not require one for teaching? Clearly, the university did not consider a faculty member’s teaching as closely as the quality of their scholarly efforts. Too, in discussions with a number of faculty, they explained that in the past, consideration of the findings of the voluminous student perception data largely resided on one question, “overall assessment of instructor” (“SUSSAI and SPOT/SUSSAI Overall Assessment of Instructor”, n.d.).

This unequal consideration occurred not only in promotion and tenure decisions, but also in hiring practices. It was a common practice for hiring committees to count the number of publications of a job applicant and to consider where the publications of a faculty appeared and how many authors appeared on that publication. The order of authorship was another way to quantify the “excellence or lack of excellence” in an individual. On the other hand, the university rarely considered the teaching quality and skills of applicants, few departments required a teaching presentation, while all departments required a research presentation to be made by candidates. Again, it seemed that the university considered its applicants to faculty positions in terms of their research potential. Teaching abilities seemed to be assumed to be accessible to all, as if good researchers were automatically good teachers. However, many have questioned the
validity of that assumption, suggesting that good researchers are not always good teachers.

In their book *No place to learn: Why universities aren’t working*, Pocklington and Tupper (2002) call into question what they call the “the myth of mutual enrichment”, the myth that justifies neglect of teaching and obsession with frontier research. According to this myth, frontier research enlivens teaching, if only by ensuring that the professor is "up-to-date," while teaching enriches research for reasons that remain unstated. So traditionally good teachers are thought to be good researchers and good researchers are thought to be good teachers.

The Pocklington and Tupper (2002) claim that the mutual reinforcement thesis is intuitively implausible. They evidence their claim saying that every hour devoted to frontier research is an hour not devoted to teaching, and vice versa. Therefore, they argue that both activities are competitive and not complementary. Moreover, scholars who study the relationship between teaching and research find no correlation between superiority in one and superiority in the other (Fulford, 2002).

Other evidence that Pocklington and Tupper (2002) use to support their rejection of the myth of mutual reinforcement is the administrative practices of universities (and research granting agencies) themselves. Although universities and granting agencies sponsor programs that provide support for teaching, often these programs are established so that professors can have more time to do research. This presupposes, however, that teaching and research are competitive rather than complementary. Moreover, part-time lecturers, who are assigned in each department, do much important university teaching, but are not required to do research. So either a strong research trajectory is not required for high quality teaching or (unthinkably) universities knowingly staff many classrooms with unqualified teachers (Pocklington & Tupper, 2002).

Furthermore, the common practice for departments to reduce teaching loads for new appointees so that they can hone their research skills in order to be successful in the current system is another point of evidence that calls into question the myth of mutual reinforcement.

Given this, Pocklington and Tupper (2002) polemically conclude that most professors now in the university system are not intellectuals; instead these authors argue
that they are experts. They go on to unpack this inflammatory statement suggesting that intellectuals engage in broad and deep reflection, while experts conduct highly specialized research. These authors suggest that current university structures work to support the experts, not intellectuals—and experts are often ill-equipped in the classroom.

**Theme Two: Demanding work**

One of the most obvious themes that emerged during my interviews with the two professors was the demanding work responsibilities required of faculty in the university and the emotional toll those responsibilities entailed:

…..how much that I am supposed to do and how little time that I have to do…. I always feel behind. (C. Smith, personal interview, February 7, 2005)

If I did not have to do research anymore and did not have the pressure of getting grants, I would not have to worry about this chunk of work of writing manuscripts, and I would spend more time on my teaching, and my accomplishments in the classroom will be recognized. (D. Jones, personal interview, March 3, 2005)

Although one might argue that all workers feel their responsibilities are demanding, the professors’ perception of this demand and the stress that accompanied their attempts to attend to all these demands was an effective barrier to moving toward ESD. When one considers movement toward ESD as a transformative act, the professors’ perception of overwhelming work responsibilities became a significant barrier to this transformation. It is difficult to conceive of and attempt a new approach to a task, such as education for ESD, when one feels pressured to attend to current responsibilities.

As universities struggle to survive on smaller budgets, they often adopt bigger class size. Large classes again add to the work load of professors. The consequences of adopting such strategies increase faculty workload, again detracting from the close consideration of teaching. Indeed, in this study as we consider the case of education for sustainability, professors found it difficult to consider ESD as a frame for their teaching as this framework required a transformation of the teaching, bringing with it increased
needs for preparation. Therefore, they chose to hold fast to traditional approaches to the material.

Many researchers in the area of sustainability education emphasize the transformative role that education for sustainability should play (Clugston & Calder, 1999; Cortese, 1999). But it is important to note that this transformative role can not be attended to with such demanding work responsibilities. Institutions interested in moving toward ESD must create a space where transformative learning is supported and encouraged (O’Sullivan’s, 1999). This transformative space is not only a physical space, but dedicated time for reflection, dialogue and action. These spaces could allow for the transformation of individuals, classrooms and learning communities toward sustainability (Sterling, 2001). Without such spaces, the notion of transformation toward ESD seems implausible.

**Theme Three: Fear of Indoctrination**

Although each of the themes are derived from these case studies and thus are situated in a particular context, I argue that theme three, the fear of indoctrination, is the one that ties this study firmly, not only to the context of university education, but to American university education. In this section, I will describe this theme in terms of how it helped me develop an understanding of the ESD activity systems, as well as trace this theme to aspects of the broader American culture. However, before I start my discussion about indoctrination, it is useful to explain the meaning underlying my use of the term “fear”

According to Jimenez (2003) fear of something stems from a belief, typically a belief about the negative consequences of a particular action. As I argue in this section, both professors operated from a set of personal and contextual beliefs about indoctrination, beliefs that were not grounded in careful rational analysis. Therefore, I argue that it is appropriate to conceptualize their reactions to indoctrination as a form of fear. Certainly, other terms could have served a similar purpose: aversion, disinclination. However, neither of these terms carries with it the implied tie to a particular belief, and
for that reason in this section I characterized the professors’ responses to indoctrination as a form of fear, as I wanted to highlight the role beliefs play in this relationship.

The concept of indoctrination typically refers to the unethical influence of students in a teaching situation (Huttunen, 2003). The term is also used to refer to inculcation of concepts, attitudes, beliefs and theories and thus by-passing students’ free and uncritical deliberation of ideas.

The Oxford and Webster’s dictionaries define indoctrination in neutral terms as the inculcation of attitudes, beliefs, doctrines, or teachings. The definition bears a striking resemblance to an ordinary understanding of the term education. However, in the contemporary usage, the words education and indoctrination are understood in seeming opposition to each other. We use “education” to refer to a positive and more benevolent ideal, one in which opposing viewpoints are considered and evidence weighed; we use “indoctrination” to refer to a situation in which ideas are presented as final and analysis of opposing viewpoints is stifled. Used in such a way, “indoctrination” is a forceful and negative term.

Clearly, in contemporary usage, the negative implications of indoctrination originate from the concept itself (Kleinig, 1982). However, the nebulous lines between education and indoctrination have been the focus of current philosophical analysis. Kleinig (1982) describes that such focused attention on indoctrination is necessary and “reveals not only its boundaries, but also those considerations which constitute it the undesirable practice that it is” (Kleinig, 1982, p. 54) and his analysis offers four ways to better understand the concept of indoctrination: content, method, intentions, and consequence of teaching.

Content, or what one teaches, is one possible criterion of indoctrination. Content indoctrination relates to the drilling of certain kinds of belief or doctrine “in students’ minds”. Both Kleinig (1982) and Thiessen (1993) explain that whatever else ‘indoctrination’ means, it obviously has something to do with doctrines which are a closely related to beliefs, that is constructs related to a non-rational acceptance or rejection (Southerland et al., 2001). The teaching of doctrines is usually associated with morals, religion, and politics.
Closely associated with the *content* criterion is the *method* criterion. The suspicious methods are usually labeled nonrational and noncritical (Huttunen, 2003). The prime examples of indoctrinative methods are rote and drill, limited discussion, inadequate analysis of conflicting points of view, and authoritarian teaching (threats, isolation) that induce fear and anxiety in the learner (Thiessen, 1993).

Thiessen (1993) supports Macklin’s (1980) view that *method* is the most plausible candidate for demarcating the concept of indoctrination. He claims that the method criterion has widespread acceptance but that indoctrinatory methods have been awarded limited attention. Thiessen (1993) suggests two categories to link methods conceptually to indoctrination: the techniques that manipulate subject matter, either by failing to provide evidence or by misusing the evidence, and the techniques that manipulate the learner. In the second category are methods that cause a learner to hold a certain belief because of deplorable manipulation by the teacher—an obvious misuse of the teacher’s authority.

With regard to the *intention* criterion, Kilpatrick (as cited in Huttunen, 2003), considers the teacher’s intention to be the most important criterion of indoctrination. Kilpatrick (as cited in Huttunen, 2003) contends that content and instructional methods derive from the teacher’s intentions and that intention provides an adequate explanation of indoctrination. In his discussion of this criterion, Kleinig (1982) summarizes the premise of the intention criterion with the following statement: “A person indoctrinates if and only if he/she intends the beliefs he/she teaches to be held regardless of the evidence” (p. 60). This premise is a fundamental shift in focus away from teaching issues that are external to persons (namely, content and methods) toward the indoctrinator and the circumstances that reveal intent.

A more plausible idea is the focus of Kleinig’s (1982) and Beehler’s (1985) work. Beehler (1985) comments that to “appreciate when indoctrination is going on, and what it involves, is to begin at the outcome of this activity: the indoctrinated person” (p. 263). Beehler asks us to focus conceptually on the consequences of indoctrination to the learner. Kleinig too argues for this approach. He defines the outcome criterion as “teaching in which the beliefs, attitudes, and values taught are held in such a way that they are no longer open to full rational assessment…this is not the same as saying that it
is held without reasons” (p. 62). This idea shifts our attention from content and methods to the results of teaching, the intellectual condition of the learner. The outcome criterion advances the analysis in a significant way by speaking to the most important person in the teaching learning paradigm, the learner.

As it appears from my previous illustration of the four types of indoctrination, indoctrination, a negative outcome of certain teaching, demonstrates a profound lack of respect for the other person. It is, fundamentally, a type of instruction that encourages a closed mind. For this reason, many argue that it is the antithesis of education.

The rejection of indoctrination in education has its roots in western societies (Palmer & Neal, 1994; Standler, 2000). In the context of 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).

The hallmarks of American’s awareness and rejection of indoctrination as a tool in schools abound. For instance, the American Association of University Professors (AAUP), an organization begun in 1915 to work to maintain academic freedom in the work of professors, maintains the need for continuous cautions in terms of preserving academic freedom as it admonishes that professors should not take unfair advantage of the students’ immaturity by indoctrinating him 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 has sufficient knowledge and ripeness of judgment to be entitled to form any definitive opinion of his own (American Association of University Professors, 2005).

Too, the recent Academic Freedom Bill that was proposed to the House of Representatives by Bill Baxley of the Florida Legislature is another earmark to manner in which indoctrination is viewed in American culture. In This bill that (the Florida’s legislature declined) echoes the sentiments behind the national campaign for the Academic Bill of Rights, in its suggestion that “academic freedom is most likely to thrive in an environment that protects and fosters independence of thought and speech” (p. 1). Toward those ends this bill seeks to assure that "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". In clear attempts to prevent indoctrination of students, the bill
also suggests that faculty and instructors have a right to academic freedom in the
classroom in discussing their subjects, but they should make their students aware of
serious scholarly viewpoints other than their own and should encourage intellectual
honesty, civil debate, and critical analysis of ideas in the pursuit of knowledge and truth
(Baxley, 2005).

In one last marker to the role pluralistic discussion have in American education,
one can look to the current president, George Bush, and his own position on the teaching
of intelligent design in American schools (Associated Press Notice, 2005). In a recent
interview, 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 American public has a view of education that champions the
consideration of multiple views on subjects and many educational organizations (such as
American Association of University Professors discussed above) actively work to
maintain a broad perspective in education, and thus limit instances of indoctrination.

Given this widespread cultural distain of 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 to
indoctrination. They showed extreme caution and took great pains to present unbiased
materials to their students. Both of them expressed that caution by providing their
students with the solid scientific facts and gave them the total freedom to use these facts
in their own, personal consideration of the material, a consideration that was often not
supported in the class, but left to the hands of the students. The fear of being perceived as
indoctrinating their students, forcing a singular point of view in the classroom, caused
them to rely on delivering environmental information as demonstrated in the following
interview excerpts:

....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. (C. Smith, personal interview,
February 7, 2005)
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. (D. Jones, personal interview, February 3, 2005)

The professors were comfortable with presenting the science, as they considered it to be “facts” that describe “the way things are” and thus an approach that precluded indoctrination. The professors in this study were fearful of indoctrination, that they took active steps not to lead their students’ to adopt a sustainable development perspective. For this, both professors housed their teaching activities firmly in the scientific portion of the ESD triangle, as to branch out from this and consider the intersections of science, economics and society was perceived as leading toward ideas that were biased in nature, that had a clear message in terms of human action. Instead the professors “presented the facts” and hoped that students would come to an understanding of the needed human action as they “made up their own minds”. Given this fear of indoctrination, their role of teachers was to present scientific information that students may or may not consider on their own.

The consequences of the fear of these professors resulted in the disappearance of the critical analysis and discussion of the presented ideas in class. Although both professors assumed that their students would critically discuss the presented material in the light of the three dimensions of sustainability; environment, society, and economy, the students did not clearly reflect that objective, as evidenced by their classroom discussions. Indeed, their limited classroom discussions revolved around discussing the content knowledge and, at most, some interrelated economic issues.

The questions that this theme begs is if teaching environmental issues course in a university classroom does not provoke students’ critical thinking and analysis, when can we expect that to happen? How can university students be taught to think critically and use sustainability as a frame of their thinking? These questions and others need to be considered in order to attend the teaching that universities in the 21st century will require. We will return to these questions in the implications of this study.
Theme Four: Lack of ESD Communities

As I described earlier in this chapter, the university that was the site for the study aspired to excellence in its core activities of teaching, learning, research, creative expression, and public service and was committed to the integrity of the academic process (the university’s mission statement). Indeed, the university encouraged building communities between its citizens (faculty, students, administrators, and staff) to help them communicate and exchange their ideas and opinions (Faculty handbook).

However, as a Carnegie Doctoral/Research Extensive Institution, the university highly prized the development of communities of researchers inside its boundaries. Toward those ends, it offered various services to improve its faculty’s skills in writing scientific proposals and grants. Furthermore, it urged its faculty to assist each other in developing their research ideas (The University’s office of research). Moreover, many academic departments in the university traditionally offer special discussion meetings (i.e., colloquia, research seminar series, speaker series) to build the sense of community inside their academic unit and access the resources of others within this community to further develop their work. Too, graduate students perceived these sessions as valuable vehicles for them to learn how to make presentations, how to critique research, and how to learn to adopt the role and habits of a researcher. The focus of such meetings was the research of the group and the generation of new knowledge, indeed, it was infrequent for issues of teaching to hold sway in such discussion. Thus, there were numerous research communities throughout the universities, but very limited numbers of such communities devoted to teaching.

I explored the issue of the lack of teaching communities with both of my subjects in this research. In one of my interviews, Professor Jones described the way that colleagues in his department discuss issues related to their teaching:

No, we [faculty in the department] don’t talk about our teaching. We mostly chat with each other about issues related to our research. I sometimes discuss some small teaching issues with my teaching assistants (i.e., absence policy, ways to deal with problematic students, and how to post our teaching notes). (D. Jones, personal interview, March 24, 2005)
Clearly, in Jones’ case there was not a rich community in his department to explore one’s teaching even in general, and certainly no community devoted to issues of sustainability in environmental education. This omission was understandable, however, given the primacy of research over teaching in the university reward structure.

In discussing the relationship between the teaching communities and sustainability education, some educators argue that sustainable development will be impossible to achieve without communities, which make individuals aware of their connections, both locally and globally (Lincoln, 1999). Community, however, appears in many different ways in our complex modern societies. Putnam (1996) explains that it is common in North American society for people to talk on a daily basis electronically to people as far away as Australia or Thailand.

Researchers in educational reform emphasize the importance of learning communities in fostering learning, understanding, and behavior (Astin, 1993, 1998; Tinto, 1997; Tinto, Goodsell-Love, & Russo, 1993) and reforming the university’s education toward sustainable development (Cortese, 1999; Filho, 1999; Sterling, 2001). Learning communities, however, represent an intentional departure from many traditional practices in higher education (Levine Laufgraben & Shapiro, 2004; Smith, MacGregor, Matthews, & Gabelnick, 2004).

Moore and Brooks (1997) mention several advantages of building learning communities for sustainable development in higher education. First, learning communities demonstrate a capacity for inclusiveness and empowerment. Second, learning communities encourage and facilitate the sharing of ideas, dialogue, and discussion across a large part of the community. Third, learning communities are very capable of putting ideas into action. Fourth, learning communities focus on following up on plans and problems and in visioning the future. Fifth, learning communities plan for their own survival and sustainability. In short, they engage in a process of community development.

Furthermore, Malnarich (2005) maintains that through the dialogue and discussion process between individuals in learning communities, they refine their personal knowledge of the community, improve their interpersonal communication skills,
and articulate their individual concerns for community problems and how best to carry out successful projects to attain their objects of sustainable education (Cortese, 1999; Filho, 1999; McKeown, 2002).

**Theme Five: Conception of Teaching and Learning**

At several points during this study, I asked the professors to identify and review their philosophical beliefs about learning and pedagogy. Both of them demonstrated similar pedagogical beliefs about the process, methods, and the object of teaching their courses. They conceived the process of learning as the straightforward assimilation of information, where the teacher is the main actor in delivering that information. I saw evidence of their beliefs about the process of learning in many parts during their interviews:

…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. (C. Smith, personal interview, March 3, 2005)

I was trying to convey information about the foundation of ecosystems and the organization of energy and matter on planet (D. Jones, personal interview, January 13, 2005).

The concept “convey” that both subjects employed in their interviews served to confirm their traditional teaching beliefs. These beliefs however influenced the way they viewed their students’ learning. One of them justified his intensive use of lecture by comparing the amount of knowledge and information that he and his students have:

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”. (C. Smith, personal interview, March 3, 2005)

Moreover, that perception of the way students should be taught limited the professor’s use of classroom discussion as an 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 so there is no reason for them to talk and I need to tell them the information. (C. Smith, personal interview, February 7, 2005)
Furthermore, his belief halted his desire from looking for new innovative teaching strategies:

… 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 is on self discovery and in my opinion they (new strategies) are very slow and time consuming. (C. Smith, personal interview, March 3, 2005)

On the other hand, Professor Jones, who demonstrated enthusiasm to learn more about pedagogy, was anxious to participate in workshops devoted to the use of innovative strategies of teaching:

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 I have gone to most of them but most of them are technological oriented and full of technology and less appreciation of humanity. (D. Jones, personal interview, March 3, 2005).

Pajares (1992) and many researchers argue that teachers’ beliefs do greatly affect students’ learning (Haney, Czerniak, & Lumpe, 1996). They argue that teachers’ beliefs and thinking affect their implicit perceptions, plans, and actions in classroom. Moreover, their beliefs about students also affect the instructional strategies that they use in their classrooms. Furthermore, the educational literature on teachers’ beliefs emphasizes the strong relationship between teachers’ beliefs and the teaching methods and strategies that teachers use inside the classroom (Brickhouse & Bodner, 1992; Cronin-Jones, 1991; Dickinson, Bums, Hagen, & Locker, 1997; Hammrich, 1997; Laplante, 1997).

Teaching culture and environment also influence the way teachers teach (Gess-Newsome et al., 2003; Hargreaves, 1994). The research indicates that 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, 1991; Hargreaves, 1994), professional development experiences (Ball, 1994; Little, 1993), the perception and definition of group goals (Hargreaves, 1994; Talbert & Perry, 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 that valued research over teaching did not trigger the professors’ desire to explore new innovative teaching strategies or even begin to question their own assumptions about teaching and learning. Moreover, the lack of community between faculty members limited their chances of discussing and developing their teaching beliefs and practices.

**Interaction of Themes**

The five themes outlined in this chapter (Emphasis on research, Demanding work, Fear of indoctrination, Lack of ESD community, and Conception of teaching and learning) interacted with each other in a complex fashion to shape both professors’ activities of education for sustainability.

As I have discussed, both personal and contextual barriers influenced the activity of ESD in both professors’ classrooms. The primary emphasis of their institution was on research and publishing. That emphasis consumed most of their efforts and attention in order to thrive in that environment. Because of this, the professors felt overwhelmed with the huge amount of academic responsibilities and focused their efforts in their research.

The university’s culture was too strong to be neutralized by the professors themselves. They both found themselves assimilating the values of their institution in order to thrive. That assimilation, however, was at the expense of achieving their sustainability objects of their courses.

In addition to these contextual contradictions, the professors’ personal characteristics fundamentally shaped the professors’ teaching. Their straightforward conception of the process of teaching and learning shaped the way they chose their teaching methods. They viewed that lecture, the traditional teaching method, as the easiest way to deliver their information, was allowed by their belief that learning was a relative straightforward process that simply required an engaged learner. They also favored the use lectures as they were familiar with and prepared for this approach, thus negating the demands required by a movement toward ESD.

Too, their fear of indoctrinating their students limited them from leading their students in critiquing and analyzing the presented information in the light of
sustainability paradigm. That fear, however, harmonized with their selection of using lecture to deliver the scientific facts to their students. Too, this synchronized with the strong emphasis of their environment on research and publishing.

In total, these five elements stood as barriers in achieving their sustainability objects of these two courses. In response, the professors exchanged these objects with a narrowed version of delivering information to their students.

In this chapter, I summarized the state of ESD in a university context and discussed the major contextual and personal influences that shaped the activity of ESD in a typical American university classroom setting. The personal features of the professors (i.e., personal philosophies, perspectives, and vision of sustainable development) as well their contextual elements (i.e., rules of their institution, their inner and outer communities, and the division of labor and responsibilities in their work environment) served to interfere and reshape their activity of ESD. Although both professors narrowed their sustainability objects due to their personal and contextual contradictions, several strategies were suggested as a means to resolve their contradictions.
CHAPTER 6

IMPLICATIONS OF THE STUDY

The motivation for this study was the need to understand the dynamics of education for sustainable development at an American university classroom. Stepping away for a moment from the CHAT framework, in these two cases we see professors that had, as one of their course goals, the intent to teach for sustainable development in their college courses. In many ways, these courses seemed like ideal settings for ESD; the professors had a wide knowledge of SD to draw upon, both professors were concerned with teaching well, and both courses included students from a variety of stages in their school (so ideally a wealth of knowledge could be drawn upon). However successful these courses may have been from a wider view of their overall effectiveness, through the strict ESD lens I employed in this study, neither professor was successful in considering ESD in his course. The question becomes why? Why was ESD so seldom seen in either of these courses? Answering this question is where CHAT theory proved to be useful. CHAT theory requires us to move our target from analysis from the course professor, to understand the broader activity system, to look at all components of the system. Thus, this study was not intended as a measure of overall course effectiveness or even overall instructor effectiveness, as CHAT allows for a broader understanding in which an instructor is but one agent in an intricate system. Instead, this research was intended to describe what is required for ESD to emerge in American Universities.

In order to develop that understanding I focused on the ESD activity systems of two professors throughout one academic semester. Each professor identified teaching for sustainable development as an object in his teaching activity. As part of my study, I identified the turning points in each of their activity systems. These turning points resulted in changes in their understandings and associated behaviors in response to contradictions (personal and contextual) arising in their activity systems. These turning points led them to reformulate their original objects of teaching for sustainable development into objects that were far less demanding but far more attainable.

The contradictions that both professors experienced during the study had multiple roots and origins. Some of their contradictions originated from the work environment
itself, where other contradictions were derived from their personal perceptions and beliefs about the activity of teaching for sustainability as well as their more fundamental beliefs about teaching and learning. CHAT theory suggests that in order for an activity system to be expansive and thus allow attainment of the original outcome, contradictions must be resolved. Thus, if we are to move toward ESD in university classrooms (Cortese, 1999; Filho, 1999; Orr, 1992), then we must move toward resolution of the contradictions identified in this study.

However, it is important to note that any prospective activity (i.e., ESD activity) does not emerge “out of the blue” as Engeström (1999) describes, but it “requires reflective analysis of the existing activity structure, meaning one must learn to know and understand what one wants to transcend” (Engeström, 1999, p. 33). That reflective analysis of the subjects empowers them to challenge and overcome the contradictions that they face. However if the subjects fail to challenge their contradictions, the current status quo will remain unchallenged. This nonexpansive system (Engeström, 1999) will feed the contradictions and so the contradictions become points of crisis. In such activity systems there is reproduction of the status quo instead of driving forces for change and development. I argue that this description of the nonexpansive system may be appropriate for ESD at American Universities, unless professors and others take active steps toward resolving the contradictions. Certainly, to arrive at a view of science education as one that links science and science education to the values and purposes to sustainability as called for by Brickhouse and Kittleson (in press), externalization in which areas of contradictions are changed, is called for. Describing some of those steps in externalization is the focus of this chapter.

Resolving Personal Contradictions-Fear of Indoctrination

Many researchers Ball (1994), Gess-Newsome et al. (2003), Sarason (1982) explain that to understand the act of teaching in colleges and universities, researchers must be mindful of the primary role of teacher beliefs and thinking in shaping the practice of teaching.
In this study, one of the most significant personal beliefs of both professors, which stood as a serious contradiction in their ESD activity, was their fear of indoctrination. I argue that this fear held them back from leading their students to think of alternatives that would allow movement toward sustainability. Perhaps Ashley (2005) and Tan (2004) systematic analysis of indoctrination might be useful for these professors.

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. Both of these authors argue that there should be a minimum level of indoctrination that educators should conduct to equip students with some basic scientific thinking skills.

In the same vein, Siegel (1991) argues that it would seem impossible to teach a great many things without some version of indoctrination. For this reason, Siegel makes the critical distinction between indoctrination and non-indoctrinative belief inculcation. Siegel (1992) describes the scenario of indoctrination as “Y” has been indoctrinated if she holds that “P” is true without evidence to support it, or considers evidence against “P” to be irrelevant. Thus, it is “Y’s” style of belief that is the crucial determinant of indoctrination (i.e., dogmatic beliefs). On the other hand, Siegel (1992), Wagner (1982), and Tan (2004) define what they call the non-indoctrinative belief inculcation by arguing that since young children are not capable of deliberately choosing to do the right action or capable of being persuaded rationally, some non-rational methods must be used in order to insure inculcation of the desirable beliefs and habits of conduct. Moreover, Wagner (1982) adds that “educators generally recognize that the students must be indoctrinated into appreciating those character traits that one will subsequently adopt freely as a member of the life form of educated persons” (p. 191).

Furthermore, Siegel (1992) explains that if we accept that education, in the true sense, serves to increase a student’s ability to reason and be creative, then this distinction becomes important. He argues that we cannot teach the importance of reasoned thinking in a reasoned fashion; until a person understands certain things, reason is not possible. Therefore, Siegel (1991) indicates that we must inculcate certain beliefs and attitudes so
that students will be able to behave in a reasoned way based on these beliefs and in the context of these attitudes.

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 (as cited in Bell, 2004, p. 39) expects education to 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. Furthermore, Rawl argues that education should promote respect for each other as equals by fostering the virtues of reasonableness and a sense of fairness.

Scott (2002) suggests that the focus of education involves exposing individuals to the cultural norms, trends, and aspirations as well as an exploration of present-day problems without looking nostalgically to the known past, or optimistically or pessimistically to an unknown future. 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 while being protected from indoctrination with regard of both facts and cultural values.

This said, I 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 indoctrinative approach of their education for sustainable development, it is helpful to look to the work of Fien (1993a) and many other accounts of the critical pedagogy of education for the environment. These theorists recommend several strategies as a safeguard against indoctrination while still seeking to support firm analysis and application of ideas by students. Examples of these strategies are inquiry learning, logical and critical thinking, 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 (1993a) 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 environmental educators have a responsibility to avoid indoctrination, indeed, he describes that 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 which, 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.

In 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 act to maintain the best of what we have, to challenge the unsustainable, and to build the desirable (Hoepper, 1993; Orr, 1992).

For the participants in this study, it seems that the abovementioned strategies might help them alleviate their fear of indoctrination when addressing environmental issues. Although, as Snook (1972) argues, there is a thin and sometimes difficult-to-delineate line between education and indoctrination, 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. I argue that currently the professors’ positions on indoctrination are 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 et al., 2001). The thorough analysis that my research calls for would allow these professors (and others) to consciously build a reasoned and articulated position on the role and
nature of indoctrination in their classroom. As Snook (1972) argues, there is a thin and sometimes difficult-to-delineate line between education and indoctrination, and effort must be made to identify the boundaries of what one finds acceptable in a classroom in order to more effectively operate within those boundaries.

Resolving Personal Contradictions – Accessing Teaching Communities

Another way that these professors could support themselves in their endeavor for teaching for sustainable development is to hone and advance their teaching strategies (an approach that would also be necessitated as they grapple with the issue of indoctrination). Although both of them demonstrated a broad knowledge of traditional pedagogy, participating in some professional teaching programs that focus on alternative teaching strategies, community service learning, and participatory group learning (also called transformative learning) maybe provide them some insight. Participating in these programs may help increase their emphasis on the use more student-centered learning (Donald, 1997), reflective learning (Brockbank & McGill, 1998), problem based learning (Evensen & Hmelo, 2000), and collaborative learning (Bruffee, 1993). All these teaching strategies have the underlying goal of promoting inquiry into the undergraduate classroom. But learning about these strategies requires a community from which to learn, something both participants are in need of.

Cortese & McDonough (2001) emphasize the importance of professors’ participation in ESD communities. They argue that these communities play a vital role in promoting the dialogue of sustainable development inside the university’s classrooms and the teacher education literature is replete with the evidence that sustained work toward the transformation of teaching, as is required in the move toward ESD, requires such communities (Cortese, 1999, 2001; Gess-Newsome et al., 2003; Woodbury & Gess-Newsome, 2002).

That said, it is important to note that teachers do not have full control in changing themselves and their teaching. Many factors aside from personal beliefs and knowledge play a vital role in shaping teaching. Indeed, as Gess-Newsome et al. (2003) and others argue, the context within which teachers work also plays a significant role in shaping
teaching. If change is to be sustained in individual, change in context is also required. The following section explains how to overcome the contextual contradictions in the university of the subjects of this study.

**Resolving Institutional Contradictions**

Reforming schools and schooling involves change. Change, however, is not an isolated process. It occurs within some context (Cortese, 1999, 2001; Cortese & McDonough, 2001; Cuban, 1990, 1993; Orr, 1992; Sterling, 2001). To compound this difficulty of the change, we should recognize that a school is a complex organism, not just a building with people inside (Cuban, 1990). In order to change the organism, it is necessary to consider the effects of a change on all the parts of the organism. Each part is dependent upon the others and all parts react to changes in any other part. The examination of these parts and the consideration of their influence on the change process is important for leaders of efforts toward improving education (Sterling, 2001).

For the case of reforming schools toward sustainability, that process implies whole paradigm change, one which asserts both humanistic and ecological values (Sterling, 2001). The possibility of a new educational paradigm is based upon a very important distinction, between “first order” change and “second order” change (Cuban, 1990; Sterling, 2001). The first order change takes place within accepted boundaries of current educational system; however; second order change involves critical reflection to examine the mainstream assumptions. Although first order changes require small alterations of existing practices, second order changes challenge the structures and rules of schooling.

Clearly, education for sustainable development requires a second order change (Sterling, 2001). However, for second order change to occur and be sustained, many institutional changes are needed. One of these changes is building ESD communities to support its dissemination in the current educational system. Many advocates of sustainable development urge universities to take the lead in building sustainable communities among faculty and staff (Cortese, 1999; Filho, 1999). These communities are imagined to ignite the collective transformation in societies by creating a pressure on
governments to adopt sustainability as a tool to build a lasting future for its citizens and future generations.

However, in order to establish these communities, universities need to promote these teaching communities that take the lead in articulating the issue of teaching for sustainability in the university’s classrooms. However, in order for this to occur, there needs to be more obvious and concrete support from university’s administrators.

But, before establishing the ESD community, this university needs to resolve the contextual barriers that its faculty face in their teaching for sustainable development. The findings from this study suggest that sustainability and teaching for sustainability is not a fundamental priority for the university. However, sustainability education must be a priority for this university and others universities as well if they want to fulfill the requirements of the 21st century universities (Filho, 2000; Huckle & Sterling, 1996; Orr, 1998; Wals & Jickling, 2002).

To implement this overarching goal, the university in this study needs to update its mission as the latest update was in 1993 (University mission statement). It needs to incorporate sustainability into its new mission and into the goals and processes of the university in order to fulfill the requirements of the 21st university. The 21st university needs to incorporate the concepts of sustainability into all academic disciplines and in liberal arts and professional education requirements, as well as into faculty and student research (Clugston & Calder, 1999).

The next step after updating the mission of this university would be establishing ESD communities inside its borders in order to support its faculty in their teaching for sustainable development. Cortese (2001) stresses that the role of the university’s community is important because, it represents a model for the outside communities. Cortese (2001) argues that the university should operate as a fully integrated community that models social and biological sustainability itself and in its interdependence with the local, regional and global community.

Another point that this university needs to consider after establishing the ESD communities is to encourage its faculty to be active members in these communities. There are many ways for the university to increase its faculty participation in these communities. One of these ways is to more explicitly support the faculty in terms of all of
their academic responsibilities, not just those related to their research. Although moderate stress for faculty is often favored by administration as it creates opportunities for innovation and excitement, overwhelming responsibilities for faculty (i.e., attracting grants, funding graduate students, peer reviewed publication, tenure and promotion materials) limits their attention to their teaching. By revising current incentives and rewards structures to more equitably acknowledge all portions of a professor’s work, then professors may be able to devote more time and energy into close examination of not only what they are teaching, but also why and how they are teaching.

One task for the newly formed ESD communities inside the university would be reorientation of the existing curricula to address the three elements of sustainability triad (Hart, 2000; Herremans & Reid, 2002; & McKeown, 2002). In reorienting its curricula, the university might consider McKewon’s (2002) strategy of reorienting traditional curricula into ESD ones by including the following five components (knowledge, skills, perspectives, values, and issues) that I have discussed in chapter 2.

I recognize that creating a list of recommendation is a much simpler task than finding ways to implement them. Too, recommendations for individual professors seem much more likely to occur than those recommendations whose target is the structure of the academy. However, as the teacher education literature is careful to point out (Cuban 1988; Woodbury & Gess-Newsome, 2002). Change in teachers without accompanying structural changes is doomed to long-term failure. Implementation of the above mentioned recommendations, both personal and contextual, can help this university better serve its community and indeed the broader US community by calling attention to the need for sustaining environmental resources.

Suggestion for Future Research

It is clear from the literature and the findings of this research, achieving sustainability is no small task. Sustainability is a complex interdisciplinary challenge for all of us to consider. I argue that sustainability should not be left for one discipline or one institution to address. Sustainability suggests a movement towards transdisciplinary and transformative ways of knowing and being at the university. However, to explore these
ways, future research is needed to determine how professors’ beliefs and perspectives inform the classes they teach. How do professors’ perspectives aid or interfere with students’ ability to discover their own ways of thinking and being in the world?

More research is needed on the implementation of sustainability in the classroom. What does it mean to have a classroom that encompasses sustainability? What are the values of sustainability? How can the values of sustainability be incorporated into the classroom? Research is also needed that will investigate whether alternative methodologies and pedagogy in the classroom reproduce the status quo or create alternatives for a more sustainable future.

One final suggestion for future studies could be investigating the nature of formulating and reformulating these professors’ sustainability objects. The findings from this study indicated that both participants reformulated their sustainability objects due to contradictions in their activity systems. But that begs the question, what about next semester? Will they go through the same cycle of reformulating their sustainability objects or keep them by counteracting their contradictions? If the latter is correct, then I will be very excited to see how can these professors overcome their contradictions and hold tight to their sustainability objects.

Limitations

This study, by its nature, was designed for a special context. Its results are restricted on the field of the study. In this study, the limited number of participants that inhibits the ability to generalize from these findings. However, qualitative case studies, if done rigorously, can inform others. It is up to the reader to determine if the results of this study can be transferred to their own situations (Glesne, 1999). The major technique that I employed to aid in the transferability of my results was to provide thick and rich description of my participants’ cases studies. In that thick description, I provided an extensive and careful description of the time, the place, the context, and the culture of the cases (Glesne, 1999; Guba & Lincoln, 1989). By doing that, the readers of my study may transfer my findings to better understand their own situations.
However, to increase the transferability feature of this research, future studies could extend this study and attempt to include more professors and more university classrooms.
APPENDIX A

EXAMPLE INTERVIEW QUESTIONS

1. Professors:
   1. What do you hope students take away from participating in this course?
   2. Who or what do you believe supports you in the design of your teaching?
   3. What benefits or coasts have you seen in the use of technology in the classroom?
   4. How will successfully designing and implementing your teaching affect your goals as a teacher?
   5. What types of professional development would be beneficial to you in helping you design and implement similar units in the future?
   6. What limitation do you foresee that you would need to consider if you were to teach your course according to SD perspective?
   7. In terms of instructional design, would you consider yourself innovative?
   8. How do you engage your students to actively participate in environmental improvement and protection?
   9. As you mentioned earlier, you are not intending to teach for SD in your class, why not?
  10. How do you view the relationship between the environment, economy, and society? Which one you see the most important in ESD?
  11. How do you attempt to raise your students’ awareness with regard to these three elements?
  12. Could you identify and describe some curriculum or activities you use to have your students achieved that goal? How did you learn about these activities?
  13. What would prevent you from teaching the way you want if you did not have your current obstacles?
  14. What are your suggestions to overcome your predicted obstacles?
  15. What kinds of resources do you need to become a more effective educator for sustainable development?
  16. How encouraging is your institution in your efforts to teach for sustainable development?

2. Students
   1. Are you finding this course challenging? In what ways? What did you learn from it so far?
   2. How is this course different from or similar to other courses you've had in the university?
   3. Has this course changed how you've thought about environmental issues? In what ways?
   4. If you could change anything about the course that would allow you a greater understanding of environmental issues, what would you change? Why did you think this approach is currently not being employed in this course?
5. In your view, what is meant by sustainable development? Do you think that your teacher teaches for it?

6. How are discussions of sustainable development related to or different from typical environmental discussions?

7. How do you see the book and the teaching strategy of your teacher?
### APPENDIX B

**FACULTY CLASSROOM OBSERVATION RUBRIC**

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>OBSERVATION AREAS</th>
<th>OBSERVATION NOTES</th>
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<tbody>
<tr>
<td><strong>Teaching and Learning Strategies</strong></td>
<td>○ Mode of instruction (lecture/discussion noting means of interaction/activities)</td>
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<td></td>
<td>○ Instructional tools employed</td>
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<td></td>
<td>○ Who is responsible for knowledge generation</td>
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<tr>
<td></td>
<td>○ Is consensus sought?</td>
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<td></td>
<td>○ How are divergent perspectives dealt with?</td>
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<tr>
<td><strong>Learning Environment</strong></td>
<td>○ Instructor enthusiasm</td>
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<td></td>
<td>○ Student engagement</td>
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<tr>
<td><strong>Sustainability concepts</strong></td>
<td>Environment related concepts</td>
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<td></td>
<td>Society related concepts</td>
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<td>Economy related concepts</td>
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<tr>
<td><strong>Points of Interaction between sustainability concepts</strong></td>
<td>Environment X Society</td>
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<td>Environment X Society X Society X Economy</td>
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APPENDIX C
Course Expectations
Students’ Survey

My name is Ahmad Qablan, and I am a PhD candidate in Science education program at this university. My research interest is education in environmental issues, and for that I would like to know about your expectations in taking this course. Your answers to the following questions will greatly help me conduct my research. Thank you.

Part I: Respondent’s personal information.
1. Academic level:
   a. First year.
   b. Second year.
   c. Third year.
   d. Fourth year.
2. Field of study:
   a. Environment related.
   b. Non-environment related. Please provide ______________________

Part II: Expectations:
1. I am taking this course because:
   a. I am interested in the material.
   b. It is required for my program.
   c. Other ______________________
2. I expect to learn from this class:
   a. About the current environmental issues.
   b. The physical aspects of the environment.
   c. How the environment interacts with human social activities.
   d. How the environment interacts with economic concerns.
   e. How the environment interacts with both human economic and social activities.
   f. Others ______________________
3. I expect this course to be:
   a. Similar to my previous courses.
   b. Different than my previous courses. If so, please indicate in what way ______________________

Thank You
Ahmad Qablan
Spring 2004
APPENDIX D
Participants’ Syllabi

(1) Professor Smith’s Course Syllabus

ENVIRONMENTAL SCIENCE

3 SEMESTER HOURS

SYLLABUS AND COURSE OUTLINE

SPRING SEMESTER, 2005

CLASS MEETING TIMES:

7p.m. to 9:45p.m., Tuesday

This is a service learning course. Community service OPTIONAL. Community service will be recorded on the student’s transcript if registered with the Center for Civic Education and Service.

Purpose / Objectives

• Foster an attitude of INFORMED environmental stewardship
• Cultivate a “can do” attitude in lay individuals
• Generate a “grapevine” of awareness regarding local, and selected national, or global, issues
• Inspire and prepare ambassadors who will actively spread the word to others they work with, e.g., current or potential Girl Scout or Boy Scout leaders, 4-H or church leaders, youth group counselors, those who work with troubled teens or community service groups
• Equip students to evaluate more effectively the decision-making and planning choices made at municipal and regional levels
• Provide an understanding of the critical analysis needed to demand full accountability and intelligent choices from environmental policy decision-makers
• Kindle students’ interest in independent pursuit of environmental knowledge
• Re-tool students’ attitudes toward pro-active, rather than reactive, approach
• Educate voters

• Evaluation by Point System

• Class attendance REQUIRED
One weekly quiz = 5 points  5 possible points
end class, week following lecture  x 12 lectures

= 60 points

One weekly assignment:
written lecture summary  10 possible points
due beginning of class,
week following lecture  x 12 lectures

= 120 points

POSSIBLE ATTENDANCE AND COMPREHENSION POINTS = 180 Total

• Midterm Exam  90 possible points

• Final Exam: noncumulative (covers
  2nd half course only)  + 90 possible points

= 180 points

POSSIBLE COMBINED EXAMINATION POINTS = 180 Total

TOTAL POSSIBLE POINTS FOR COURSE = 360

Class Format and Attendance

Our course has an extensive bibliography. Selected reading materials will be taken from
there and other possible sources. Both in-house and guest lecturers will present. The
bulk of the course will be derived from the lectures. ATTENDANCE IS THEREFORE
REQUIRED.

Attendance will constitute half the points that can be earned in this course. Up to
15 points may be awarded for each lecture session, 5 from a weekly quiz to be
administered at the end of the FOLLOWING class period, and 10 from a written lecture
summary to be turned in at the beginning of the FOLLOWING class period.

Any student who, due to documented illness or tragedy, misses a lecture session,
will be given an opportunity to make up the work via assignment of an oral report, the
topic to be selected by the instructional staff. Students will find it necessary to take detailed notes during the lectures and will be
couraged to contribute to class discussion. Being a special topics course, future
semesters’ offerings will be planned to deal with fresh subject matter. Since an array of
topics will be sought for upcoming course cycles, student input regarding topics they
wish to see offered will be solicited. This course is repeatable.
Students will also be expected to familiarize themselves with nomenclature used in discussions and lectures. Nomenclature may be presented as vocabulary items on quizzes and tests.

**Speakers / Lecture Topics**

01/11/05  The instructor, Professor Smith, Department of Oceanography

  **Climate Change**

01/18/05  The instructor, Professor Smith, Department of Oceanography

  Costal Zone Dynamics

01/27/05:  Barrier Islands:  Regulation and Development;  Flood and Insurance Issues

**Northwest State water Management district.**

Potential Karst Aquifer Pollution from the capital city of this state.

Professor, Dept of Geological sciences and curatorial associates

Tour of National Science Foundation Antarctic Research Facility with slide lecture about daily life, challenges, and even recreational opportunities, in a scientist’s research stint “on the ice”, hands-on opportunities to get acquainted with climate change via seafloor cores from the Antarctic.

**Professor from the Departments of Meteorology, Oceanography**

Decimation to possible annihilation of Albatross populations by longline fishing operations on a global scale.

Research associate. Dept of Biological sciences.

Research Findings on Gulf Of Mexico Fisheries, Seagrass beds, and Mangrove Coasts.

**Professor (Retired), Dept of Oceanography.**

Perspectives on our Planet’s Dwindling Supply of Oil.

**Twilight Group, and the State Fish and Wildlife Conservation Commission.**

Bats: one of humankind’s best friends! Debunking their many malignments and Myths and Constructing a Nursery House for their Propagation.

Prof, Dept of Oceanography.

Idiosyncrasies of Marine Creatures.

**Between Two Rivers: Stories from the Red Hills to the Gulf.**

Nature writing in the red hills bioregion.

Allergy and Asthma, and Clinical Assistant. Professor, College of Medicine.

**Air Pollution and Allergies.**
Reading Syllabus for *Issues in Environmental Science*

**Required reading 2 books:**

*Laboratory Earth* by Stephen H. Schneider  
*The Consumer’s Guide to Effective Environmental Choices* by Michael Brower and Warren Leon  
Both books should be in both book stores. You can also get the from On-line book stores.

If you are taking this class for a second time or have already read these books, please see the instructor on January 13th for alternative readings.

**Assignment.** Each week, please turn in 5 multiple choice questions on the reading material. Prepare these questions on your own.  
**Reasonable Accommodation**

Students with disabilities needing academic accommodations should:

1. Register with and provide documentation to the Student Disability Resource Center (SDRC):

2. Bring a letter to the instructor from the SDRC indicating you need academic accommodations. This should be done within the first week of class.

(This syllabus and other class materials are available in alternative format upon request.)

**Academic Honor Code**
Students are expected to uphold the Academic Honor Code published in The University Bulletin and the Student Handbook. The Academic Honor System of the University is based on the premise that each student has the responsibility (1) to uphold the highest standards of academic integrity in the student’s own work, (2) to refuse to tolerate violations of academic integrity in the University community, and (3) to foster a high sense of integrity and social responsibility on the part of the University community.

See Linda for some extra credit regarding the above material.

**Office Hours**

I have read, and agree to abide by the terms of, this syllabus. (Clip / return 2nd class night.)

__________________________
Signature
date
(2) Professor Jones’ Course Syllabus

<table>
<thead>
<tr>
<th>Environmental Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2005</td>
</tr>
<tr>
<td>Tuesday and Thursday, 12:30 –1:45</td>
</tr>
</tbody>
</table>

Please note: This syllabus is a guide for the course and is subject to revisions announced during class sessions.

Description and Objectives
The title of this course is a good description of its content and purpose! This class provides an opportunity for you to develop an understanding of several basic environmental functions, the physical and social causes of some of our major environmental problems, their impacts, and some strategies for their management.

Through careful attention and review of lectures, readings, films and assignments, you will accomplish several learning objectives.

- You will develop the ability to use the principles of environmental science to better appreciate the way nature works.
- You will better understand several current environmental problems.
- You will learn to analyze the separate roles of structured consumption and human population growth in your understanding of environmental problems.
- In addition, you will learn about the environmental field as a profession, perhaps through your voluntary service learning activities.
- You might even contribute to social and environmental improvement through service learning.

This class is part of the core curriculum for the Major in Environmental Studies in the Department of Geography, it is an elective for the Major in Geography, and it contributes to the Area III Social Science requirement at the university. There are no prerequisites.

Course Content and Outline
For a schedule of topics covered, tests, and quizzes, please see the class schedule on the blackboard website. Please make a note of those dates and check for conflicts.

Materials
This text is required, and should be available at both campus bookstore and Bills, and various internet book sellers.


Additional required readings will also be posted to Blackboard or handed out in class. I have also selected several films that present important material in a manner accessible to debate, discussion, and the expression of informed opinion. Most of these films are available for repeat viewing in the Library media center.

You will need access to a computer with fast internet access to read and/or print many of the course materials, interact with the course blackboard site, send and receive email, etc.
You will need your email account name and password to access the materials there. In Blackboard, I can only send email to your account. If you use a different account, please set up your account to forward your preferred email.

Assignments and Responsibilities
You will demonstrate your mastery of the course objectives through participation, tests, and optional service learning activities.

Lectures, reading, and study guides
You are responsible for material in lecture, text, films, and other supplementary materials. My lectures and guided discussions will be mainly—but not only—based on the text. I often post lecture notes to Blackboard and you should study them.

Tests, exam and quizzes
I write tests with the expectations that you will have taken clear and complete notes in class, kept them organized, and reviewed them reviewed the notes I post on the blackboard website read and understood the text developed the ability to utilize information from text, lecture, videos, etc. to make arguments and express informed opinions studied by quizzesing yourself with your own notes and with any study guides I provide (passive reading and reviewing notes is not an effective study strategy for most people)

Final Exam
Yes, it is cumulative. It is scheduled for Friday, April 29, 7:30 to 9:30 am. in our normal lecture hall. Please make note of that time and date and check now to see how many other exams you have scheduled for that day.

Attendance and participation
Attendance and active participation is required for the successful completion of this class. By skipping class you lose opportunities to learn and you squander a significant subsidy to your education provided by the taxpayers of the State of Florida. Successful learning requires your personal investment in being physically present and mentally attentive in class, thus I reserve the right to mark a tardy, sleeping, newspaper-reading etc. student as absent, even if physically present in class. Stellar attendance and/or in-class participation will raise your grade one step, for example from B to B+. Poor attendance and/or sustained lack of attention may decrease your final grade by one step.

Ten or more unexcused absences will mean an F grade in the course, regardless of performances on tests and exams.

The following and only the following absences are eligible to be excused: Religious holidays, as specified in policy; absences due to representing at official functions, including intercollegiate debating or varsity sports events; verified emergencies and/or illness; other events you clear in advance with me. While one is not penalized per se for excused absences, s/he is nevertheless responsible for all content missed, including any assignments, knowledge, or skills covered or assigned in the missed class(es). To document excused absences, please fill out an excused absence form available from Blackboard and attach verification.

Grading and Evaluation
I will evaluate your mastery of course objectives as follows:
20% Test I
20% Test II
20% Test III
5% Quiz 1
5% Quiz 2
5% Quiz 3
5% Population/Resource Reflection
20% Cumulative Final Exam (optional for Service Learners)
+/- Attendance and Participation
+/- Successful completion of Service Learning raises your grade by 1 step

Grade Converter

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
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<tbody>
<tr>
<td>96-</td>
<td>A</td>
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<tr>
<td>100%+</td>
<td>A-</td>
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<tr>
<td>90-95%</td>
<td>B+</td>
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<td>87-89%</td>
<td>B</td>
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<td>84-86%</td>
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<td>0-59%</td>
<td>F</td>
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</tbody>
</table>

Service Learning Opportunities
In coordination with the Service Learning Program, this class offers an optional service learning component. Service Learning matches you with a local environmental organization where you will work on issues related to environmental management, and where you will learn while working. You can think of it as a combination of field education and unpaid internship. Service learning builds on the academic preparation of this class, integrates community service, and structured reflection. You must be willing to devote at least three hours per week to working with a client organization and keep a reflective journal of your experiences. (See blackboard for journal format). Other benefits include skill building, civic participation, career planning, professional contacts, experiential learning, and making a positive difference in the world. It provides “real world” work experience that can help you decide what you want to do after college and that should be helpful in reaching your career goals. Less importantly, your participation in Service Learning will probably help your grade in this class (see below). You should also download a ServScript form. Use this form to document service hours on a weekly basis. Get your supervisor's signature and turn it in to the Center for Civic Education and Service during the last week of classes. If you document sufficient hours in a semester, your Service Learning experience will appear as an official entry on your university transcript.

Potential service learning assignments are posted on the blackboard website for this class. Grades should not be your motivation for participating in Service Learning. But if you do participate, it will help your grade as follows:
Successful completion of service learning increases your final grade by 1 step, for example B+ to A-. 

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Following the successful completion of your Service Learning contract, the final exam is optional. If you don’t take it, I’ll calculate your grade based only on the tests, quizzes, and assignment.

If you choose to take the final anyway, I will guarantee a minimum grade on your final exam equal to or better than the average of your three tests. This means you can take the final without fear of lowering your final grade, but with hope of raising it! Successful completion of Service Learning means you worked the equivalent of three hours per week from the date you establish your relationship with your client through approximately April 18, as documented in your ServScript and a journal reflecting on your experience. (You aren’t expected to do Service Learning work during exam week or the week before exams.)

There might also be opportunities for you to enhance your attendance and participation grade if you give a brief review of your experience to class near the end of the semester. Please note that I reserve the responsibility to modify these Service Learning incentives according to individual circumstances.

Course Policies
Holy Days and significant family events
If you wish to participate in holy day and significant family events that interfere with scheduled class days or assignments, please inform me well in advance, preferably during the first two weeks of class.

Missed tests and quizzes
Let me know of conflicts with scheduled tests, quizzes, assignments and exams well in advance. For last minute emergencies, let me know AS SOON AS POSSIBLE. Due to fairness concerns and my desire to provide prompt feedback to the students who take the tests during the scheduled times, I cannot reschedule missed tests without penalty, nor can I write equivalent replacement tests. If you miss a test for an excused absence, you must reschedule the test later. Your grade on that test will be either a), the grade you actually score, or b) the average of your other grades on tests or quizzes during the semester, whichever is lower. In the case of unexcused absences on test and quiz days, I calculate your grade with a zero for that assignment. Under some circumstances, I may also calculate your final grade by repeating the lowest test/quiz in place of a missed test or quiz. Students may be considered absent from a test or exam if they arrive after the first person that completes it leaves the classroom.

Courtesy in the Classroom
Classroom courtesy is necessary to ensure that all students have the opportunity to learn without distractions. This means no cell phones, talking during lectures (unless recognized by the professor or discussion leader), reading newspapers, etc. during class. If you must have a cell phone to receive emergency calls about kids or other family members, keep it on “vibrate.” Entering and leaving is distracting. Therefore, you need to be on time for class and stay until the end. If you must enter late or leave early, please take the seat nearest an exit and enter or leave as quietly as possible. Make sure the door does not 'bang' as you enter or leave. Repeated disruption of class may lead to penalties.
that reduce your final grade. If behavior or tardiness becomes a problem, I reserve the right to ask students to leave the class, or mark them absent even if physically present.

**Honor Code Statement**
Students are expected to uphold the Academic Honor Code published in The University Bulletin and the Student Handbook. The Academic Honor System of The University is based on the premise that each student has the responsibility (1) to uphold the highest standards of academic integrity in the student’s own work, (2) to refuse to tolerate violations of academic integrity in the university community, and (3) to foster a high sense of integrity and social responsibility on the part of the University Community.

**Americans with Disabilities Act**
During the first week of class, students needing academic accommodations should: Register with and provide documentation to the Student Disability Resource Center. Bring a letter to the instructor from the Student Disability Resource Center indicating your need for academic accommodations.

For more information about services available to this university students with disabilities, contact the Student Disability Resource Center

(This syllabus and other class materials are available in alternative format upon request.)

**Syllabus Change Policy**
This syllabus is a guide for the course and is subject to change.
APPENDIX E
HUMAN SUBJECTS APPROVAL LETTER AND
LETTER OF INFORMED CONSENT
Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2763
(850) 644-8673 - FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 11/19/2004

To: Ahmad Qablan
172 Brittain Dr. Apt #1
Tallahassee, FL 32310

Dept.: MIDDLE AND SECONDARY EDUCATION

From: John Tomkowiak, Chair

Re: Use of Human Subjects in Research
Understanding the Dynamics of teaching for Sustainable Development at an American University

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Exempt per 45 CFR § 46.101(b) 2 and has been approved by an accelerated review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If the project has not been completed by 11/18/2005 you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRBO0000446.

Cc: Sherry Southerland
HSC No. 2004.801
Human Subject Committee
Letter of Consent for Adults

I have been informed that:

1. Ahmad Qablan, a graduate student under the direction of Dr. Sherry Southerland in the Science Education Program, Department of Middle and Secondary Education, has requested my participation in a research study of my undergraduate environmental science course in Dr. Smith’s class at the Department of Oceanography.

2. The purpose of this research is to better understand the interaction between the various facets of the activity system that are involved in education for sustainable development into my undergraduate environmental science course.

3. My participation will involve discussing personal beliefs and practices during interviews. I understand that my participation is voluntary during the 2005 spring semester, and if I choose not to participate or to withdraw from the study at any time, there will be no penalty, it will not affect my grade.

4. There are no foreseeable risks or discomforts if I agree to participate in this study.

5. The results of this research study may be published but my name or identity will not be revealed. The researcher will do the following to maintain confidentiality of my records, to the extent allowed by law. I understand that I will be tape recorded by the researcher and that these tapes will be kept by the researcher in a locked filing cabinet. I understand that only the researcher will have access to these tapes and that they will be destroyed by August 1, 2005.

6. I will not be paid for my participation. Although there may not be any direct benefits to me, the possible benefits for participating in this study are an increased awareness of my personal learning behaviors.

7. Any questions I have concerning the research study or my participation in it, before or after my consent, will be answered by Ahmad Qablan at (850) 345-0762, 205 Carothers Hall, Florida State University, amq02@garnet.acns.fsu.edu., or by Dr. Sherry Southerland, his major professor, at 645-4667 or southerl@coe.fsu.edu.

8. If I have questions about my rights as a subject/participant in this research, or if I feel I have been placed at risk, I can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Office of the Vice President for Research, at (850) 644-8633.

I have read the above informed consent form. I understand that information obtained during the course of the study will remain confidential, to the extent allowed by law. I understand that I will be tape recorded by the researcher and that these tapes will be kept
in a locked filing cabinet. I understand that only the researcher will have access to these tapes and that they will be destroyed by August 1, 2005.

I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefits to which I may otherwise be entitled. In signing this consent form, I am not waiving any legal claims, rights or remedies. A copy of this consent form will be offered to me.

Sincerely,

Participant's Signature ________________________________ Date ________
REFERENCES


Balinsky, M., Qablan, A., Caruthers, S., Ok Kim, M., Saka, Y., & Southerland, S. (in review). Why are we doing this? Preservice science teacher’s interpretations of the role of open inquiry in understanding teaching. Journal of Science Teacher Education.


National Round Table on Environment and the Economy (NRTEE) (1993). *Forest round Table on sustainable development.* Ottawa, Ontario, Canada.


BIOGRAPHICAL SKETCH

Ahmad Qablan was born in Irbid-Jordan in 1974. He earned his Bachelor’s degree in Biology from Yarmouk University (Irbid-Jordan) in 1995. He worked as a high school science teacher for five years (1999-2000). During that period, he earned his Master’s degree in Science Education in 2000 from Yarmouk University. He worked as a teaching assistant at the Hashemite University (Zarqa-Jordan) for two years (2000-2002). He was awarded with a scholarship by the Hashemite University to pursue his Ph.D. in Science Education at Florida State University. Currently he works as a biology educator at the Hashemite University in Jordan.