ENVIRONMENTAL EDUCATION AND THE DIMENSIONS OF SUSTAINABILITY:
AN ANALYSIS OF THE CURRICULUM OF THE CUYAHOGA VALLEY
ENVIRONMENTAL EDUCATION CENTER

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Abstract

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ENVIRONMENTAL EDUCATION AND THE DIMENSIONS OF SUSTAINABILITY: AN ANALYSIS OF THE CURRICULUM OF THE CUYAHOGA VALLEY ENVIRONMENTAL EDUCATION CENTER (92 pp.)

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Sustainability focuses on the interdependence of human and natural systems and the ultimate limitation of the Earth’s ability to sustain increasing human populations and levels of material consumption. There are two paradigms within sustainability: weak and strong. Weak sustainability presumes that what must be passed on to future generations is only the total amount of aggregate stock (man-made and natural). Strong sustainability assumes that natural capital, along with man-made capital, will be preserved for future generations and that natural capital is “non-substitutable”. This study examines the curriculum of Cuyahoga Valley Environmental Education Center (CVEEC), in order to determine whether or not it is promoting strong or weak sustainability.

The Grounded Theory Method of Qualitative Research was the method used for this study. Through this method, several theories emerged. First, it is theorized that the bioregion provides intangible “identity information” to society. Second, the identity information provided by the bioregion, when valuated, could be considered non-substitutable. Third, the operationalized definition of education for sustainability links education to strong sustainability through the inherent valuation present in decision making (Huckle and Sterling 1996, 2006). The program offers students the opportunity
to put their knowledge to work in a hypothetical decision making process, which in turn gives evidence to ecocentrically based decisions. Ecocentrism is a basic tenant of strong sustainability. Based upon these reasons, the curriculum was determined to be promoting sustainability.

The curriculum of CVEEC was determined to be promoting a mixture of strong and weak sustainability because the program met the expectations that emerged from assumptions that came from analysis of the curriculum, observations notes, and relevant literature. Those expectations are that the curriculum, first, educates students in the three dimensions of sustainability: environmental, economic, and social domains. Second, the program uses identity information from the bioregion as a basis for instruction. Third, the program consists of activities that allow students the opportunity to make decisions regarding environmental issues relating to all three dimensions of sustainability and their convergence and that the decision making opportunities result in ecocentric based decisions. The analysis of this paper serves as the basis for a framework that defines how an environmental education program might be considered to be promoting strong sustainability.

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Chapter 1: Introduction

This thesis explores the theme of strong sustainability within the context of environmental education. Specifically, this study examines and evaluates the Cuyahoga Valley Environmental Education Center's curriculum to determine if the program is educating for sustainability, and, if so, is it of the strong or weak variety.

Background

In 1950, there were 2.5 billion people inhabiting the earth (Wackernagel and Reese 1996). Today, that number is over 6.5 billion and is continuing to increase (United States Census Bureau 2006). Earth’s environment is deteriorating because of population growth and industrialization of societies, which in turn has led to greater affluence and greater consumption rates. Our species is currently threatened by its own success. Our ability to learn and develop technology has allowed humans’ dominion over the earth. In the small span of time that humans have inhabited the earth, we have learned how to increase life expectancy, decrease infant mortality, move mountains, and fly to the moon. Most of us have not taken into account the long-run consequences of being successful (Milbrath 1989).

Sustainability is the movement that policymakers and private citizens have founded in an attempt to balance the economic, environmental, and social health of communities, nations, and the Earth. The movement of sustainability attempts to focus on the interdependence of human and natural systems and the ultimate limitation of the Earth’s ability to sustain exponentially increasing human populations and levels of material
consumption (Mazmanian and Kraft 1999). Recently, there has been increasing support for the sustainability movement. Communities worldwide are trying to find ways to prosper without compromising the ability of future generations to do the same.

There are two paradigms that are inherent to sustainability: weak and strong sustainability. Weak sustainability is based on the belief that what matters to future generations is only the total amount of aggregate resource stock, both man-made and natural (Neumayer 2003; Hemple 1999). According to weak sustainability, it does not matter if the current generation uses up all the non-renewable resources in the world or harms our natural waterways and ecosystems as long as other man-made capital is built up in compensation. Because of this, Neumayer (2003) calls weak sustainability the “substitutability paradigm.” These basic tenets of weak sustainability are considered anthropocentric and do not take into account the larger ecosystem.

Alternatively, strong sustainability realizes that all generations have the ability to deplete ecological resources to a level that will dramatically affect future sustainability. Strong sustainability’s basic tenets are ecocentric: it takes all parts of the larger ecosystem into account and does not attempt to average those natural processes into an “inter-generational balance sheet” (Chiesura and de Groot 2003; Hempel 1999). According to Neumayer (2003), strong sustainability is not as easily identifiable as weak sustainability. Strong sustainability is based on the assumption that natural capital, along with man-made capital will be preserved for future generations and that natural capital is “non-substitutable” (Chiesura and de Groot 2003; Neumayer 2003).
Some believe that future sustainability will only be secured if we change our value systems therefore altering the dominant social paradigm (Brown 1981, Czech 1995). Today, the dominant social paradigm is what is believed to be the dominant western mode of thought that is resource exploitive, growth oriented, and materialistic (Milbrath 1989). According to the World Watch Institute, in order to become a strongly sustainable society, humans need to move away from anthropocentric values found prevalent throughout society (Brown 1981). One such move in this direction can be accomplished through environmental education based in strong sustainability (Detra and Pease 1999).

**Context of Study**

Environmental education takes place in many different forms: in public school classrooms, land labs on school grounds, day trips to nature centers and natural areas, and in residential programs, (EEOC 2000; Detra and Pease 1999). Many studies have found that there are different levels of effectiveness that coincide with those different modes of environmental education. However, it has been found that in all the different modes of environmental education, residential programs are very effective in fostering positive attitude changes (Jordan et al. 1987; Keen 1991). From the starting point of effective environmental education, this study reaches further than presently known research regarding sustainability and environmental education to ask “Does the curriculum at a specific environmental education center promote sustainability concepts, and if so, are they of the weak or strong variety of sustainability?” This thesis explores the dimensions
of sustainability within the context of environmental education at the Cuyahoga Valley Environmental Education Center (CVEEC).

**Objectives and Location of Study**

This study examines the Cuyahoga Valley Environmental Education Center (CVEEC), a residential environmental education program, in order to determine whether or not it is promoting strong or weak sustainability. Based on the available literature, this will be the first study attempted to determine if weak or strong sustainability, specifically, is being promoted in a residential program in the United States. With this information, future environmental education programs can work to address whether they are promoting strong or weak sustainability.

The CVEEC is a residential environmental education program (NPS 2004). CVEEC, part of the National Parks Systems’ Parks as Classrooms initiative, is partially funded through the federal government, as well as outside funding sources such as private donations. Many residential environmental education centers within the United States are required to follow a curriculum set forth by the agencies that fund them. In CVEEC’s case, the curriculum ties into the classroom and state standards for proficiency testing (NPS 2004). Also, because funding is provided by the federal government, the program must be publicly approved, and participants must learn and demonstrate competencies (CVEEC 2001; Mullins 1984).

At the onset of this study, I believed it likely that the curriculum of the Cuyahoga
Valley Environmental Education Center would be found to represent a mixture of strong and weak sustainability. I believed this would occur first because of the general nature of environmental education. Environmental education happens for the purpose of educating us about the natural world, which promotes the value of nature within our ecosystems. Juxtaposed to that idea, our society is comprised of materialistic consumers that function in an anthropocentric world view that relies heavily on technology and man-made capital to support society’s lifestyle (Gigliotti 1992). So, it seemed reasonable to assume that a curriculum written by members of today’s society, albeit for the purpose of nature education, has the potential for weak sustainability concepts to be present.

Overview

Chapter One introduces this study to the reader. Chapter Two provides an interdisciplinary review of the literature which will be organized by themes relating to the context in which the research is occurring, such as the dimensions of sustainability and environmental education. Chapter Three describes the method of research. Because sustainability is a rather new and inter-disciplinary concept, the Grounded Theory Method of qualitative research will be employed (Glaser and Strauss 1967). The Grounded Method allows a researcher the ability to look at the many nuances of social phenomena that cannot be found using quantitative techniques. Grounded Theory is also appropriate for this study because the method allows data to be descriptive of a particular situation, which will in turn generate concepts that will be beneficial to the program being studied.
Using the Grounded Theory method, the theory generated helps people in the situation to make sense of their experience and, hopefully, manage their situation better. Information gathered from this study is not abstractly testing hypotheses, rather, the theories are emergent and became evident as the research progressed. Chapter Four provides an analysis of the data, using the themes brought forth by the interdisciplinary review in association with interviews and observations to determine whether the environmental education program under study promotes strong or weak sustainability. Chapter Five summarizes the findings of this research effort, reflects upon the implications of the findings, discuss the strengths and weakness of this particular study, and offer suggestions for future research.
Chapter 2: Literature Review

Over the past thirty years, since the onset of the modern environmental movement, humans have achieved a tremendous amount of knowledge regarding the degradation of the natural world and have become more cognizant of environmental issues and problems. The response to these concerns has been the emergence of a new “epoch” of environmentalism, the sustainability movement (Mazmanian and Kraft 1999).

Mazmanian and Kraft (1999) define sustainability as the movement that policymakers and private citizens have developed in an attempt to balance the economic, environmental, and social health of communities, nations, and the Earth. With that, sustainability has become a recurring topic of many policy and social debates (Acrury et al. 1986; Hempel 1999).

Sustainability

There are myriad definitions of sustainability found in the literature (Acrury et al. 1986; Hemple 1999; Mazmanian and Kraft 1999; Milbrath 1989). Sustainability, as a definitive term, is conceptually difficult to determine in that sustainability is a relative term and is defined in different ways in order to suit particular applications and agendas (Hempel 1999). The concept of sustainability and its subsequent system of values is often depicted as three overlapping circles (Figure 1). According to Herremans and Reid (2002: 17), “Fien and Trainer (1993) elaborated on Sadler’s original concept of sustainability. [They believed] that an activity, process, region, or project is deemed
The sustainability concept is defined as “sustainable if it maintains, supports, or carries the weight or burden of all three dimensions over the long term.”

Within this tri-dimensional body of sustainability, the economic dimension is defined as “a system of producing, distributing, and consuming wealth, which is generally defined as the means of satisfying the material needs of people through money, property, possession of monetary goods, or anything having economic value measurable in price” (Herremans and Reid 2002: 17). The social dimension of sustainability is defined as “a system of living or associating in groups or communities and considers the importance of maintaining and improving human living standards. It considers the continued satisfaction of basic human needs as well as high-level social and
cultural necessities (Brown et al. 1987: 716). The environmental dimension is defined as “a system providing integrity and preservation of ecosystems and is concerned with continued productivity and function of ecosystems” (Brown et al. 1990: 716).

The most common usage of sustainability is linked with sustainable development. According to the World Commission on Environment and Development (UN 1992), sustainable development is defined as “...development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Sustainable development is often seen by opponents as an oxymoron. Development, such as agriculture or industrial growth, implies that consumption rates will continue to grow, relying on better technology and failing to account for what is taken from nature (Hempel 1999). Most of the definitions of sustainable development focus on material applications. According to Hempel, there is a deeper meaning that goes beyond sustainable development. This definition is one of sustainability that promotes a “strong” sustainability over “weak” sustainability.

**Strong and Weak: Different Types of Sustainability**

The distinction between strong and weak sustainability separates sustainability into two schools of thought. Weak sustainability promotes the provision of an average stock of “capital” to future generations, meaning that the present generation concerns itself with providing future generations with the resources that are equivalent to the present. Thus, if a resource is depleted because of the present generation, weak sustainability relies on
“ingenuity (strongly attached to advances in technology) to replace the resource by substitution” (Arnold 2005, Goodland and Daly 1996).

Strong sustainability takes into account the larger ecosystem for which present and future generations are a part. As noted, strong sustainability realizes that all generations have the ability to deplete ecological resources to a level that will dramatically affect future viability. Strong sustainability takes the larger ecosystem into account and does not attempt to average natural resources that do not hold the same value. Strong sustainability considers such resources as “critical natural capital” (Chiesura and de Groot 2003; Hempel 1999; Goodland and Daly 1996). Critical natural capital is considered to be comprised of “assets” that cannot be substituted or replaced.

A way to better understand the basic premises of the two different types of sustainability is to consider a recipe put out by Ritz® for Mock Apple Pie, an "apple" pie made without apples (Kraft 2007). This "apple" pie is made of a filling of crackers and sugar and does not contain apples. This recipe can be equated with weak sustainability. Weak sustainability assumes that man-made capital can be substituted for natural. Thus weak sustainability would find the substitution of a cracker and lemon juice filling for apples acceptable, whereas strong sustainability would attempt to preserve access to real apples for future generations.

Gale and Corday (1994) found that attitudes about sustainability could be classified by types or dimensions. The difference between the two types of sustainability, are manifested in their separate approaches, ethics, and values. The differentiation between
strong and weak sustainability is further evidenced in Table 1.

For Gale and Corday (1994) weak sustainability has an anthropocentric ethic. Anthropocentrism is the belief that human needs have a higher value than nature. According to an anthropocentric ethic, humans do not take into account that they are dependent upon a large ecological landscape and the resources it provides (Noss and Cooperrider 1994). On a global level, humans are dependent on the health of the ecosphere for reasons such as clean air and a healthy ozone layer. On smaller scales, human societies are dependent upon the resources the ecosphere provides. “Dependent Social Systems”, a type of weak sustainability, provides that social systems are dependent upon particular resources within the local landscapes. An example of a “Dependent Social System” is a community that depends upon logging for its major source of capital. In such situations, strongly sustainable approaches may not be taken into account and the natural and social systems could collapse (Gale and Corday 1994).

In contrast, strong sustainability is closely related to an ecocentric ethic (Mazmanian and Kraft 1999). Ecocentrism is a philosophy that recognizes that the ecosphere, rather than any individual organism, as the source and support of all life. As such, ecocentrism is a holistic and eco-centric approach to government, industry, and the individual (Ruijork and Goosen 1999). Along with ecocentrism, strong sustainability is about ecological integrity and transformation, and places emphasis on the ecological connections and dependencies that humans have with nature (Fricker 1998). For example, as shown in Table 1, Ecosystem Identity Sustainability, as part of the strong
Table 1

**Dimensions of Sustainability**

**Weak Sustainability**

<table>
<thead>
<tr>
<th>Type</th>
<th>Focus</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dominant Product Sustainability</td>
<td>sustained yield of high-valued products</td>
<td>Timber production under the Multiple Use and Sustained Yield Act of 1960</td>
</tr>
<tr>
<td>• Dependent Social Systems</td>
<td>sustaining social systems that rely upon the particular resource.</td>
<td>Resource-dependent communities involved in logging operations</td>
</tr>
<tr>
<td>• Human Benefit Sustainability</td>
<td>maintains the flow of diverse human benefits which result from intensive resource management.</td>
<td>Sustainable development</td>
</tr>
</tbody>
</table>

**Strong Sustainability:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Focus</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ecosystem Identity Sustainability</td>
<td>maintains general land-use or ecosystem types for the sake of general ecosystem diversity</td>
<td>Bioregionalism</td>
</tr>
<tr>
<td>• Ecosystem Benefit Sustainability</td>
<td>focuses most strongly on nature rather than on humans, sustaining undistributed ecosystems and respecting ecosystems’ rights.</td>
<td>Endangered Species Act, Conservation easements</td>
</tr>
</tbody>
</table>

sustainability dimension, attempts to maintain the general land-use or ecosystem types for the sake of general ecosystem diversity and does not place importance on any single group within the ecosphere. By also taking the needs of the ecosystem into account, along with the social needs of the human population, it is more probable that such communities, human and non-human alike, will be sustained into the future (Gale and Corday 1994).

Bioregionalism is an example of “Ecosystem Identity Sustainability” within the framework of strong sustainability. Bioregionalism is a philosophy and ethic that identifies humans as a component of a greater ecosystem within their geographical locale and attempts to develop an understanding of ecological interconnectedness and a personal stake in the management of ecosystems. Thus, bioregionalism creates a sustainable society that is intimately connected with nature, where social and natural systems thrive together and the well being of people is secured within the confines of nature (Hempel 1999).

Most approaches to strong sustainability, such as the aforementioned, refer to nature’s critical ecological and economic functions as capital. A necessary addition to the discussion and the table above would be the socio-cultural dimensions that ecosystems provide, but that are not directly ascribable to the ecological or the economic domain (Chiesura and de Groot 2003). These functions of nature are intangible. They are informational and are acquired through study and experience. In the socio-cultural dimensions, ecosystems provide for needs like physical and mental health, education and research, recreation, and artistic and spiritual development (See Table 2).
Table 2

Socio-Cultural Dimensions of Strong Sustainability

<table>
<thead>
<tr>
<th>Function of Ecosystem:</th>
<th>Social Need Provided For:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreation</td>
<td>Space for recreation and escape from urban stress</td>
</tr>
<tr>
<td></td>
<td>Aesthetic enjoyment, ‘higher’ experiences and related therapeutic effects (mental and</td>
</tr>
<tr>
<td></td>
<td>physical)</td>
</tr>
<tr>
<td>Scientific and educational</td>
<td>Opportunity for in-situ observations, source of genetic material for scientific research.</td>
</tr>
<tr>
<td></td>
<td>Study material for educational purposes and environmental awareness.</td>
</tr>
<tr>
<td>Cultural and historical information</td>
<td>Signs of personal and collective history</td>
</tr>
<tr>
<td></td>
<td>Cultural identity and heritage values</td>
</tr>
<tr>
<td>Religious and artistic information</td>
<td>Source of spiritual experiences and religious meanings</td>
</tr>
<tr>
<td></td>
<td>Source of inspiration for artistic expressions</td>
</tr>
</tbody>
</table>

Environmental Education and Sustainability

It is the dominant social paradigm of a society that determines its priorities. Activities that make up the dominant social paradigm are driven by three factors: (1) the number of human beings, (2) cultural, social, economic, and political structures that shape human behavior, and (3) the human needs and desires that provide stimulation to act (Gigliotti 1992). Further definition provides that a dominant social paradigm is something that “constitutes a world view ‘through which individuals or, collectively, a society interpret(s) the meaning of the external world...[and]...a mental image of social reality that guides expectations in a society” (Pirages and Ehrlich 1974: 43-44). Specifically, today, “the dominant social paradigm refers to what is believed to be the dominant western mode of thought. [It] is resource exploitive, growth oriented, consumptive and materialistic with little concern for nature” (La Trobe and Acott 2000: 21; Milbrath 1989). Albrecht et al. (1982) adds to this by describing the dominant social paradigm as “[a] paradigm [that] entails: a belief in limitless resources, continuous progress, and the necessity of growth; faith in the problem-solving abilities of science and technology; and strong emotional commitment to a laissez-faire economy and to the sanctity of private property rights.”

To become a strongly sustainable society, western society needs to move away from the dominant social paradigm toward a more sustainable and ecologically oriented social paradigm¹ (Brown 1981; Czech 1995). Some believe that future sustainability will only be

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¹ There has been writing and research regarding the emergence of a new paradigm that challenges the DSP: the New Environmental Paradigm (NEP). This new paradigm asserts the high value of nature where the integrity of ecosystems are protected, careful planning, restricting growth, and of ensuring more balanced relationships between man and nature (Dunlap and Van Liere 1978; Albrecht et al. 1982; Milbrath 1989; LaTrobe and Acott 2000).
secured if we change our value systems therefore altering the dominant social paradigm.

Environmental education is often cited for having the potential to change the attitudes, behaviors, and values (that are manifest as part of the dominant social paradigm) (Birch and Schwab, 1983; Jaus 1984; Ramsey et al. 1989).

The World Commission on Environment and Development produced a group of reports concerning environmental education called *Agenda 21*, *the Rio Declaration on Environment and Development*, and *the Statement of Principles for the Sustainable Management of Forests*. These were adopted by more than 178 governments at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, in 1992. *Agenda 21*, in relation to environmental education, reads as follows:

“Education, including formal education, public awareness and training should be recognized as a process by which human beings and societies can reach their fullest potential. Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues...It is also critical for achieving environmental and ethical awareness, values and attitudes, skills and behavior consistent with sustainable development and for effective public participation in decision-making.” (UN 1992).

According to the Environmental Education Council of Ohio, “environmental education is a process involving life-long learning as we come to understand the complexity of our natural world and environmental issues, using various approaches for individual and societal decision-making based on knowledge integrated from various disciplines, and resulting in our own attitudes and action strategies to ‘make a difference’ in the world” (EEO 2000:4). In other words, environmental education is the core of
providing the knowledge to make intelligent decisions regarding our natural world, and the values, ethics, and skills needed to implement strong sustainability.

Through formal and informal environmental education programs, students young and old are able to learn about the processes and systems that make up the environment, including human systems and influences. Informal environmental education is accomplished through recreational visits to nature centers, parks, and zoos (ECCO 2000). Mullins (1984) interprets formal education as a publicly approved program in which participants are required to learn and demonstrate competencies. An example of formal environmental education would be public school classes that attend residential environmental education centers as part of their curriculum such as they do at Cuyahoga Valley Environmental Education Center (CVEEC 2001; NPS 2004). Residential experiences have been found to foster more positive attitudes towards wildlife, nature, and the environment, than do in-class experiences because residential programs allows students to be in and around nature’s classroom for longer periods, which in turn allows for deeper investigation, and a deeper understanding of how humans are connected to their greater ecosystem (Jordan et al. 1987; Keen 1991; Detra and Pease 1999).
Education for Sustainability: An Added Dimension

Educating for sustainability and understanding of our ecosystems includes educating people to be able to integrate environmental and economic decision-making (Huckle and Sterling 1996; 2006). Education for sustainability should “focus on interconnections: the linkages found in nature and those connecting economic systems, environment, and society” (PCSD 1996: 11). Effective education for sustainability is a process that develops people’s “awareness, competence, attitudes and values, enabling them to be effectively involved in sustainable development at local, national and international levels, and helping them to work towards a more equitable and sustainable future.” (Huckle and Sterling 1996; 2006).

Reminiscent of Sadler’s (1990) sustainability triad (Figure 1), Figure 2 is an adapted theoretical model of the definition of education for sustainability. It demonstrates the interdependence of economic, human, and ecological systems as a basis for economic decision making. Essentially, what can be taken from the definition of educating for sustainability is that there are three areas of sustainability, all interconnected, and all three areas should be taken into account when making decisions (Huckle and 1996; 2006, Paden, 2000).
Summary

Sustainability, most commonly known as sustainable development, is development that meets the needs today’s societies without endangering the ability of future societies to meet their needs. There are two types of sustainability: weak and strong. Weak sustainability believes that what needs to be maintained is an aggregate amount of resources regardless of type that can be passed on to future generations. Under the guise of weak sustainability, a generation can use up all the natural resources as long as something can be created to substitute for those resources that need to be passed on. Strong sustainability holds that natural resources are not substitutable because they cannot hold the same value as something man-made.

There are different types of weak and strong sustainability. Ecosystem Identity Sustainability is an example of a type of strong sustainability (Gale and Corday 1994). It
focuses on maintaining ecosystems for the sake of general diversity or general land use. An example of ecosystem identity sustainability is bioregionalism. Bioregions provide information to societies that are difficult to value because they are intangible, and thus could be seen as non-substitutable and part of strong sustainability. These socio-cultural information types are recreational, scientific and educational, cultural and historical information, and religious and artistic information.

To be able to change to a “sustainable” society, societies need to move away from the dominant social paradigm towards a more sustainable one. Environmental education seems to be one way to achieve that change. Only one definition was found to link environmental education and sustainability, that being “education for sustainability” (Huckle and Sterling 1996; 2006). Education for sustainability is a process that attempts to develop people’s “awareness, competence, attitudes, and values, enabling them to be effectively involved in sustainable development [issues]...it enables people to integrate environmental and economic decision making” (Huckle and Sterling 2006). Linking this process that integrates the three areas of sustainability and the intangible information provided by the bioregion with the area of environmental education seems to be one way to make a shift to a more strongly sustainable society.
Chapter 3: Research Methods

Examining the Cuyahoga Valley Environmental Education Center’s (CVEEC) curriculum, this paper asks “what concepts can be found that may demonstrate the dimensions of sustainability?” Also, this paper goes further to ask, “Does the curriculum of CVEEC promote the concept of strong sustainability?” CVEEC was chosen for this case study because it is a residential environmental education center that holds a very good reputation and was within a distance that was reasonable for research.

The residential learning center is located on 500 acres of woodland and pastures found in the Cuyahoga Valley National Park. The CVEEC program provides students a residential educational experience that integrates science, nature study, environmental issues and the arts. Students and their teachers participate in a four-day, three-night interdisciplinary program focusing on the Cuyahoga River. Students learn about the natural history of the area. They also learn about the concepts of watershed, biodiversity and habitat in the Cuyahoga Valley. Also, environmental issues and the process of environmental decision-making are explored (Chestnut 2002).

The programs at CVEEC are formal environmental education programs. It is part of the United States’ National Park System’s Parks as Classrooms, and therefore is partially government funded, and thus more standardized (NPS 2004; Chestnut 2002). Because funding is provided by the federal government, the program must be publicly approved, and participants must learn and demonstrate competencies (CVEEC 2001; Mullins 1984; Chestnut 2002).
**Grounded Theory**

The Grounded Theory Method of qualitative research created by Barney Glaser and Anselm Strauss (Glaser and Strauss 1967) was employed by this study. Many studies of environmental education have employed the use of the grounded theory method, and a few representative examples are Sivek (2002), Smith-Sebasto and Semrau (2007), and Taylor and Caldarelli (2004). For this study, the grounded theory qualitative approach was chosen because flexibility was needed to explore the nuances associated with the subject of sustainability as it is a broad topic and can take on many different forms. Also, the method was chosen for this study because the goals of the research and analysis did not involve formal theory testing; rather the aim of the study was to generate theory to inform an understanding of sustainability education.

Grounded Theory is “a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon” (Strauss and Corbin: 24). According to Grounded Theory, the analysis begins with background research, data collection, then three steps of coding where theories and themes emerge as the research progresses (Strauss 1987, Strauss and Corbin 1990). Those three steps are: **open coding** - read data (transcripts, etc.) line by line and break it down to its basic level that leads to a grounded conceptualization of general concepts; **axial coding** - research attempts to notice new categories (sub categories) and make the connections between the categories in an new and meaningful way as they emerge from the data; **selective coding** - relate emergent themes from the axial coding to each other in a way that
produces an emergent, grounded theory that is verifiable (Strauss 1987, Strauss and Corbin 1990).

**Research Design**

Background research was conducted to determine what information was available regarding the topic of sustainability as it influences environmental education programs. Little information was found directly linking the two. Research was also conducted to determine if any environmental education program within the United States use sustainability as a platform for their program. To my knowledge, there is not a residential environmental education program in the United States that directly states that their mission is to promote sustainability, weak or strong. Research was also conducted to determine what information was available regarding the areas of weak and strong sustainability. With that, it has been found that there is very little research regarding the differences found between strong and weak sustainability outside of the area of economics, however, some generalized definitions of those two dimensions of sustainability have been isolated.

After completing the initial literature review, permission from CVEEC was obtained to use their curriculum as a part of the data set. Permission was also granted to observe the program as a participant observer during a four day program. Permission was granted to interview key members of staff and the teachers that were accompanying the student groups. The interviews were based upon the general Guiding Questions (Appendix A), and spontaneous interviews that were recorded as part of the participant observation. Data was obtained through participant observation by way of field observation notes and interview notes over a period of four days during the week of June 3, 2002. Data was also
obtained through analysis of the curriculum document as it coincided with review of the field notes from the participant observation. Analysis relied on both participant observation and review of the curriculum.

Data analysis consisted first of the open coding of transcription of interviews, field notes, and analysis of curriculum, and relevant literature. From this open coding, the isolation of the initial themes occurred. The initial themes generated from the analysis of the literature are outlined in Figure 3. Figure 3 demonstrates the flow of connection between themes.

The open coding process generating the initial guiding themes and research framework was informed most by the Literature Review Chapter. Mazmanian and Kraft’s (1999) definition of sustainability, Gale and Corday’s (1994) question of what needs to be sustained, and Chiesura and de Groot’s (2002) analysis of critical natural capital greatly

![Figure 3. Initial Guiding Themes. This diagram represents the initial guiding themes for the analysis as derived from Literature Review Chapter, wherein you cannot have strong or weak sustainability if not identifying all three dimensions of sustainability.](image-url)
informed the research process by defining the initial general research framework. The initial themes found to emerge from the literature review generated a list of general guiding questions (Appendix A) which were refined and eventually became the general research questions.

The themes identified during the open coding were sustainability (relates to the scope and interconnection of the environment, economy, and society and its definition is determined by its application); environment (relates to the components of the Earth and includes, but is not limited to: the complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival; economy (relates to the production, distribution, and consumption of goods and services); society (relates to a community, nation, or grouping of people having common traditions, institutions, and collective activities and interests); weak; and strong. After the initial emergence of the themes, the observation notes, interview transcripts and curriculum were analyzed to determine if these themes were present. The emergence of the initial sustainability themes formed the backdrop for the second round of data analysis.

The second round of data analysis (axial coding) looked deeper into the implications presented by the finding of the initial guiding themes. This round of data analysis relied on the work of Huckle and Sterling (1996), and even more heavily on the work of Gale and Corday (1994) and Chiesura and de Groot (2002). Triangulation occurred between the data set (the curriculum observation notes, and interview transcripts), Literature Review Chapter, and the initial themes (see Figure 3 and Table 3). The result was the emergence
of the data found in Tables 3, 4, 5, 6, their related analyses, and the relationships between them as demonstrated in the Analysis Chapter.

The third step of the coding processes is selective coding. Selective coding involved validating the relationships between the emergent themes to produce a theory. The data was reread many, many times with the intent of finding information that might counter the emergent dimensions, themes, and theories. Finally, the data was read and reread to refine the emergent dimensions and themes of the analysis that formed the theories presented by this paper.
Chapter 4: Analysis

Overview of Curriculum

The Cuyahoga Valley Environmental Education Center’s program was developed in the early 1980s as a small residential nature study program and was part of the Cuyahoga Valley National Recreation Area. Towards the end of that decade, plans were cultivated to develop a major residential facility. By the early 1990s the development of the curriculum began. The process to develop the curriculum included many people, including environmental education professionals, classroom teachers, park staff, students and volunteers. These groups got together and brainstormed ideas, offered feedback, and assisted with evaluations of the developing curriculum and program that eventually became the program studied here in this thesis (Yandala et al. 1996).

“All the Rivers Run” is the central theme of the Cuyahoga Valley Environmental education Center (CVEEC) curriculum (Yandala et al. 1996). Specifically, the program of the CVEEC is based on the Cuyahoga River watershed, which runs through northeastern Ohio. Most of the students in the program live in or near the watershed. According to the United States Environmental Protection Agency (EPA 2006) a watershed is defined as the area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake or groundwater. A watershed provides water for drinking, recreation, and agriculture, and is a rich source of biological diversity that includes habitat for many species. Because of these reasons, the watershed approach allows a direct connection to the student’s lives from the subject matter of the curriculum and program, that being the watershed they live in.

The curriculum is divided into theme-based units. Each of the units are divided into
Core Concepts, Learner Outcomes, and Activities. The Core Concepts are the goals of the units. The purpose of the first unit, *Welcome to the Watershed*, is to welcome the students to the program and to foster a spirit of enthusiasm. This is reflected in the unit *Welcome to the Watershed’s* Core Concepts (Yandala et al. 1996):

- Introduce the students to the watershed idea and the actual area of the watershed that is located within the education center’s;
- Introduce aspects of the unique history of the Cuyahoga River and the surrounding area;
- Introduce the facilities; and
- Familiarize students with the group and instructors.

The learner outcomes are objectives used to determine if the Core Concepts have been conveyed. They are proposed, in the curriculum, at the beginning of each unit. Learner outcomes are not ascertained by direct measurement. However, the objectives can be easily observed and identified through the activities. For example, the learner outcomes of *Welcome to the Watershed* are that children will:

- Participate in the opening ceremony;
- Demonstrate an understanding of the concepts “national park” and “public ownership” which may be accomplished through the Your National Park Activity;
- Recognize the association between the Cuyahoga River Valley and the concept “watershed” which may be demonstrated through the All the Rivers Run Activity; and
• Demonstrate an awareness of the cultural diversity of peoples who have used and continue to use the Cuyahoga River Valley through participation in the watershed activity (Yandala et al. 1996).

Activities are most often the “physical” and “hands on” part of the program that require student participation. The Activities incorporate many disciplines to meet the core concepts and learner outcomes, often combining science and social studies with art and music (Yandala et al. 1996). To meet the core concepts and the learner outcomes from Welcome to the Watershed, the environmental educator/staff member follows these activities:

**All the Rivers Run** - This unit is a twenty minute program where students and instructors played musical instruments such as tambourines and drums while walking around an imaginary “river” and singing a song about watersheds, “All The Rivers Run”. Once the students had a grip on the chorus, the staff members told a story in between the singing chorus. This met the Core Concept where the learner is introduced to the watershed concept and surrounding area. This Activity met the Learner Outcome whereby the student was able to recognize the association between the concept of watershed with the Cuyahoga River watershed.

**The Cuyahoga Story** - After the song, “All the Rivers Run”, the staff members, dressed in period clothing from the 1870s, and told a story of what the Cuyahoga Valley was like “when they were alive”, continuing to welcome the students. The staff continued through the 40 minute session describing the changes that took place in the river valley,
historically and ecologically. This Activity demonstrated the Core Concept where students were introduced to aspects of the unique history of the Cuyahoga River and the surrounding area. This allowed the students to meet the Learner Outcomes for this Activity, which are that the students will participate in the opening ceremony, that they will be able to recognize the association between the Cuyahoga River Valley and the concept “watershed”, and that the students will demonstrate an awareness of the cultural diversity of peoples who have used and continue to use the Cuyahoga River Valley.

The Core Concepts, Learner Outcomes, and Activities of the Cuyahoga Valley Environmental Center’s curriculum, along with participant observation, serve as the data set for this study and the means by which the research questions are understood and answered. The following sections describe sustainability concepts in relation to the data set, and their ultimate relationship to the research questions posed by this study.

**Sustainability Themes**

It was necessary to first determine whether or not this program demonstrated sustainability themes before determining whether those themes were of the strong or weak variety. The curriculum does not specifically state that it is trying to convey the concept of sustainability, nor does it state that it is trying to directly emphasize any of the three dimensions of sustainability. However, the concept of sustainability is evident and exemplified through the inherent abstract employment of the three dimensions and their ultimate convergence based on participant observation (See Table 3).
Table 3

Sustainability Dimensions Demonstrated in the Cuyahoga Valley Environmental Education Center’s Curriculum

<table>
<thead>
<tr>
<th>Sustainability Dimension</th>
<th>Example Units/Activities Observed and Exemplified in the Curriculum</th>
<th>Element(s) related to Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Environment</td>
<td>Top of the Watershed</td>
<td>Biological diversity, ecological communities</td>
</tr>
<tr>
<td></td>
<td>Weather Watch</td>
<td>Weather concepts</td>
</tr>
<tr>
<td></td>
<td>Watershed of Life/Plants of the Cuyahoga Valley: Habitat Protection</td>
<td>Biological diversity, habitat loss, plant communities, ecological communities</td>
</tr>
<tr>
<td>• Society</td>
<td>Train, Towpath, and Time/Parade of Human Life</td>
<td>Human history</td>
</tr>
<tr>
<td></td>
<td>River Stories/Through Other Voices</td>
<td>Human history</td>
</tr>
<tr>
<td></td>
<td>River Celebrations/Global Festival</td>
<td>Cultures of world watersheds</td>
</tr>
<tr>
<td>• Economy</td>
<td>Train, Towpath, and Time/Station Road Activities</td>
<td>Area industry, production of goods and services</td>
</tr>
<tr>
<td></td>
<td>Journey to the River/A River Moves Through Time</td>
<td>Area industry and businesses</td>
</tr>
<tr>
<td></td>
<td>Life of a Potato Chip</td>
<td>Production/product life cycle</td>
</tr>
<tr>
<td></td>
<td>Waste Measuring</td>
<td>Consumption as part of consumerism</td>
</tr>
<tr>
<td>• Dimensional Convergence</td>
<td>Watershed decisions</td>
<td>Ecological interactions, interdisciplinary information recall</td>
</tr>
<tr>
<td></td>
<td>River stories</td>
<td>Ecospheric elemental interplay*, human, economic, and natural history.</td>
</tr>
<tr>
<td></td>
<td>Journey to the River/A River Moves Through Time</td>
<td>Ecospheric elemental interplay</td>
</tr>
<tr>
<td></td>
<td>Train, Towpath, and Time/Parade of Human Life</td>
<td>Ecospheric elemental interplay</td>
</tr>
</tbody>
</table>

*Ecospheric elemental interplay occurs when multiple dimensions of the ecosphere and their interactions are identified
Environment

The curriculum is saturated with environmental concepts, and of the three dimensions of sustainability, “environment” is most easily identified. Science concepts, strongly related to the environment are abundant in the program and make up a large part of the curriculum (Chestnut 2002). Very good examples of the environmental dimension of sustainability are found in the units *Top of the Watershed, Weather Watch*, and *Wildlife in the Watershed*.

*Top of the Watershed* - This unit is one of the first ones that students are offered and is considered the foundation for the rest of the week’s activities. All of the activities within this unit revolve around the environmental concept, but one really stands out as lending itself to the concept of sustainability. Understanding biological diversity is intrinsic to the movement of sustainability. The activity titled *Diversity in the Cuyahoga Valley* introduced learners to the flora and fauna of the watershed, along with their natural habitats. This activity goes even further and makes room for students to understand the interactions between the different components of the environment. The students are given cards to find different components of the environment. The different things they are asked to look for range from animal habitats, to insect homes, flower buds, trees with at least three plants living under them, and finding something that is dead and still provides food for a plant or animal (Yandala et al. 1996). For example, one girl was given a card to find a specific leaf and another was given a card to find a mouse. The mouse, of course, is something difficult to find. So, the “mouse” girl looked for small holes in the ground,
while the other searched out the leaves in the shrub layer. The students really seemed to enjoy this activity as it sparked a lot of conversation among the students that revolved around “icky” bugs and “cool” leaves.

**Weather Watch** - This unit demonstrates how weather is one of the major connectors on the planet that is essential to all living communities, therefore demonstrating the environmental component of sustainability, and also the interconnections that are part of the sustainability concept. The entire unit is an activity unto itself, and the extent to which the learner outcomes are met is determined by the age and ability level of the student at the time of their visit. The unit addresses many weather concepts from different cloud types, to weather patterns, wind speed, precipitation, prediction and even touches on erosion. With that, the students observe the weather of the day, measure it, and attempt to predict future weather (Yandala et al. 1996).

**Watershed of Life** - This unit is a field study of the watershed. It is supposed to help the students understand how resources are studied and assessed and gives them basic knowledge about the natural systems of the watershed. According to the unit, it also “helps them to appreciate and enjoy the natural environment” and allows the learner “basic exploration” of the watershed (Yandala et al. 1996).

The activity *Plants of the Cuyahoga Valley: Habitat Protection* is found within the *Watershed of Life* unit. According to the curriculum, the goal of this activity is for the students to “gain skills as resource specialists, learning about plants...including what plants tell us about the health of an area.” The activity also illustrates, very well, how loss
of habitat effects species, resulting in loss of diversity (Yandala et al. 1996). This activity, through its exploration of the natural world and demonstration of diversity, links the curriculum to the environmental dimension of sustainability.

First, the students formed a circle with their bodies, and then passed a string around between them, making a string circle. They were close to the ground while doing this. The string was supposed to represent the boundaries of a forest ecosystem. Then, another student spread out cards of local plant and animal species on the ground within the circle, representing the components of an ecosystem. The group of the children and the instructor talked about the different species and their relationships within the ecosystem. Next, one student left the string circle, and dropped his string. The students made up for the loss by making the circle smaller. The circle growing smaller represented forest ecosystem habitat loss. Any plant or animal species (cards) that were no longer in the circle or that are touched by the string were taken away. Also, if a card that was taken away was touching another card, the card it was touching was also taken. While this is happening, the instructor talked about the web of life, and the interrelations between species, and their dependencies upon each other, thus, reinforcing, in a creative way, the concept of “environment”. With that, this activity demonstrates in a very real way how the environment can be affected by decisions based the social and economic domains due to their inherent link to habitat loss.
The program and curriculum at Cuyahoga Valley Environmental Education Center addresses the social dimension of sustainability. This is achieved by the programs’s ties to different cultures, their histories, and their geographical regions (Chestnut 2002). Good examples can be found in the *Train, Towpath, and Time* unit, where students are taught the history and culture of the Cuyahoga Valley. *River Stories* and *Global Festival* are also units that familiarize students with the social dimension and its connection to sustainability (Yandala et al. 1996).

**Train, Towpath, and Time** - The activity *The Parade of Human Life in the Cuyahoga Valley* addresses the human history of the area, beginning with prehistoric peoples through present day. Through interpretive displays found in the visitor center (such as a display showing prehistoric Native Americans), the children and instructors engage in discussions about past cultures. Discussing topics of the development of a Native American culture and how those people used the river as a resource, to the immigration of people to the area in the early eighteen-hundreds, demonstrates the social interactions with the economic and environmental dimensions of sustainability (Yandala et al. 1996).

**River Stories** - Telling stories is a way to pass information and teach the young. Through our stories we are able learn about our culture and ourselves. In this unit, stories are told about the peoples of the Cuyahoga River Valley, past and present. The activity *Through Other Voices* acquaints students with people from the past that settled within the
valley (Yandala et al. 1996). The curriculum provides the instructor a lot of room for
creative interpretation. The curriculum gives the instructor a script to read, and the
instructors can add any extras they like such as dressing up or putting on an accent. The
specific activity that was observed had the students hike along a path and stop at different
points along the way to open a story box. The story boxes were decorative boxes with
locks that contained stories on tape that the instructor played. The instructors were in
period garb and most of them spoke with an accent. The stories, at different stops along
the hike told of the Native Americans that lived in the valley, the time of the canal boats,
the time of the Underground Railroad, and of the farming communities that originated in
the valley and continue today. Through the interpretive stories told by the instructor, links
are made between the natural and social history of the area, demonstrating the social
dimension of sustainability while touching on the environmental.

Global Festival- All of the activities in the Global Festival unit convey that there
are diverse cultures and landscapes on planet Earth, and that everyone on Earth lives in the
watershed of a river system. Specific to this unit, the students participate in activities that
relate to many cultures of the world. The activities within the unit focus on different
watersheds found throughout the world and those cultures’ relationships to their unique
watersheds. There are two different sections of this unit, one focusing on small group
activities and the other on large group activities. The small group activities divide the
larger group up into four groups, and each small group separately discusses different
watersheds from around the world. In the small groups, the instructors tell the students
about the myths and traditions of the culture that focus on the specific river region they were given for study. During the small group activities, the students also participate in making sculpture, writing, weaving, painting, mosaics, music, and dance from the cultures of the watersheds they are learning about. At the end of the small group activities, the small groups prepare a brief summary of what they learned for presentation to the entire group. The large group activity allow students time to present their summaries and share what they learned (Yandala et al. 1996). Better understanding the cultures of other watersheds, and how those cultures relate to their watershed links this specific activity to the social dimension of sustainability.

**Economy**

The Cuyahoga River, historically, has been a center of productions of goods and services. Through learning the history of the area the student is allowed an understanding of the economic systems that were supported by the river of the Cuyahoga Valley, which in turn, links the curriculum to the economic dimension of sustainability. Very good examples are found in *Train, Towpath, and Time* and *Journey to the River*. Other activities which were observed but were not found in the curriculum merit noting, *Life of the Potato Chip* and *Daily Waste Measuring*.

*Train, Towpath, and Time* - This unit describes the economic history of the Cuyahoga River Valley. Specifically, the activities titled *Station Road Activities* give the
Journey to the River - A learner outcome for this unit is that the students will explore past and present uses of the Cuyahoga River. The activity, *A River Moves Through Time* and its sub-activity, *Lock 29*, meets that outcome by investigating and discussing the Ohio and Erie Canal Towpath and subsequent locks along the canals (a sub-activity is a smaller block of time within an Activity that combines with other sub-activities to meet a Learner Outcome). Much like *Train, Towpath, and Time*, the sub-activity, *Lock 29*, introduces the students to the industrial uses of the river. Another sub-activity, *What We See* goes further to brainstorm and discuss how water plays an important role in other types of businesses and activities of the Cuyahoga Valley. The activity asks the students to observe the area around the lock with their naked eyes. They are then asked to sketch on stickers things they saw other than water. Next, the students are asked to make a map on poster board, identifying the north, south, east, and west directions. Then they place the stickers on the map along the corresponding area of the river. The instructor then asks the students to look at the picture and see how many of them have to do with water and put a wave next to things that have something to do with water. The learner a better look at the river and how the river played an important role in the steel industry. During this last activity of the unit, the learners are introduced to the Pinery Narrows and its feeder canals using aerial maps, photographs, and direct observation. The students are told how the canals supplied water to the American Steel and Wire Company. The students also observe the bridges of the area. They discuss the evolution of the bridges through time and their role in producing goods and services (Yandala et al. 1996).
most obvious things are pointed out, and the instructor questions the students to think more in depth and look at the area. The area around the lock (Peninsula, Ohio) is full of businesses and other services that depend on water as the river weaves its way through the village. Some examples are often overlooked areas, especially the local church who depends on water for bathrooms and drinking, the local artist’s studio that use water to prepare clay and the local restaurant that uses the water for cooking and cleaning (Yandala et al. 1996).

The application of this activity coincided with other activities. In reality, when the students arrived at the trail head (the parking area) the students only had a brief moment to look around the lock system as they debarked from the bus for another part of the program. However, this activity does have the potential to clearly demonstrate, through discussion, the economic dimension of sustainability and its connection to the other sustainability concepts.

**Life of a Potato Chip** - This activity shows the life cycle of a consumable product. This is directly related to the economic domain because it reflects how products are made and get to us, the consumers, with both production and consumption being economic concepts. During lunch time, the instructors asked the children to brainstorm about where a potato chip comes from. The children first said, “the store”. Using questioning skills, the instructor got the children to realize the origination of the chip as a vegetable in the ground, and then its life cycle as it went through food processing and ends up in their mouth. During the discussion they cited all the different sources of energy it took along
the way, such as the fuel for the combines, the energy for the production, and even the human labor associated with the potato chip’s production.

*Waste Measuring* - This activity engaged the students by measuring, at every meal, how much waste they made as a group. They measured all waste: recycling, non-recyclable materials, and even liquid. Although not a contest, noticeably, the amount of waste lessened as the week progressed. This ties to the economic domain because the students are given the opportunity to better understand the concept of consumption, and consumption levels which is an inherent component of economics. It might be suggested that the incorporation of a cost analysis would make a stronger tie to the economic dimension.

**Dimensional Convergence**

As seen in Sadler’s (1990) Sustainability Triad (Figure 1), the point where environment, society, and economy come together is the realm of sustainability. At first, it was necessary to go through the curriculum determining if each dimension of sustainability was present. Upon examination, the point of convergence was found to be quite prolific, and is readily demonstrated throughout the curriculum, but the following unit does the best job of exemplifying this concept.

*Watershed Decisions* - This activity required that the students participate in a fictional scenario of a zoning board hearing, determining the use of a currently undisturbed area. During this activity, the students were separated into small groups and assigned a
specific habitat from the woods to study. Then, the students were told that they were to research whether or not to build an educational center in their undisturbed ecosystem. To make this decision, the students held discussions on the topic. They discussed how their decision would affect the local ecosystem, the people in the area, and the economic systems (they addressed cost of the project). They also did computer-based research on these issues. Sometimes the students came up with the different ideas, concepts, and concerns; sometimes it was the instructor. The students really seemed to enjoy this unit. This unit and its activities allowed the students the opportunity to take the three separate dimensions of sustainability and converge them into the realm of sustainability.

The curriculum and program demonstrates activities that relay the three dimensions of sustainability. Further, the convergence of these three dimensions is also apparent. Next, the analysis turns towards evaluating the curriculum to determine if it is promoting strong or weak sustainability. The first step towards that end is to identify concepts, that when operationalized, might allow us such a determination. Bioregionalism is such a concept because it is part of the larger sustainability dialogue because it centers on reconnecting people with their regional ecosystems and focuses on interconnections between humans the environment.
Bioregionalism attempts to develop an understanding of ecological interconnectedness and personal stake in the management of ecosystems. For example, ecosystem management programs based in bioregionalism often attempt to preserve and/or maintain general ecosystem types for the sake of diversity because it identifies and associates with humans’ ultimate dependence upon biological diversity. Bioregionalism is an ecocentric philosophy and ethic that identifies humans as a component of a greater ecosystem, not “above” nature as anthropocentrism would place humans. Within the framework of bioregionalism, social and natural systems thrive together and people’s well-being is secured within the confines of nature (Gale and Corday 1994; Hempel 1999). Bioregionalism is a concept that is a form of strong sustainability and was operationalized to evaluate the curriculum.

Bioregionalism is an example of “Ecosystem Identity Sustainability” (See Table 1) (Gale and Corday 1994). The theory of “Ecosystem Identity Sustainability” is that an ecosystem can gain an identity through the social needs it provides for people within a bioregion. The gained identity is often unique and specific to an ecosystem and cannot be provided anywhere else. Therefore, an ecosystem (or bioregion) that provides such unique information should be considered natural capital that is non-substitutable (Chiesura and de Groot 2003).

Non-substitution is a basic tenant of strong sustainability. As mentioned previously, the debate between strong and weak sustainability is based around economics
and development, and the production of an aggregate stock to pass on to future
generations. Weak sustainability holds that the current generation can use the resources to
their extinction as long as a suitable substitution can be provided. Weak sustainability
values natural capital (goods derived from nature) equally to man-made capital. Strong
sustainability, however, states that you cannot substitute man-made capital for natural
capital. Nature has intangible value that can be realized by giving nature an identity
through the information it provides as identified by the “Socio-Cultural Dimensions of
Sustainability” (Chiesura and de Groot 2003). This information provided from here shall
be called “identity information”.

CVEEC’s program provides most of the identity information types that are based
on information provided by the surrounding bioregion and derived from the “Socio-
Cultural Dimensions of Sustainability” (Chiesura and de Groot 2003) (See Figure 4). The
watershed serves as the bioregion for this study. As such, any mention of the bioregion
refers to the Cuyahoga Valley River watershed.
The identity information types found in this program are **recreational** (where recreation space is used for recreation and escape from urban stress, aesthetic enjoyment, ‘higher’ experiences and related therapeutic effects [mental and physical]), **scientific and educational** (where it provides opportunities for in-situ observations, provides sources of material for scientific research as well as study material for educational purposes and environmental awareness), **cultural and historical** (where a personal and collective history are made valuable and cultural identity and heritage values are identified), and **artistic and spiritual development** (where nature is the source of inspiration for artistic expressions and spiritual development) (Chiesura and de Groot 2003) (See Table 4).
### Table 4

**Ecosystem Identity Information Types Provided by the Bioregion of the Cuyahoga Valley Watershed as Conveyed by the Curriculum**

<table>
<thead>
<tr>
<th>Ecosystem Identity Information Type (EIS)</th>
<th>Example Units/Activities Observed and Exemplified in the Curriculum</th>
<th>Element(s) that link EIS Type with Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recreational</td>
<td>F.R.O.G.</td>
<td>Fun recreational outdoor game</td>
</tr>
<tr>
<td></td>
<td>Welcome to the Watershed</td>
<td>Education about recreational role of the National Park.</td>
</tr>
<tr>
<td></td>
<td>Watershed Issues</td>
<td>Education about recreational role of the National Park.</td>
</tr>
<tr>
<td>• Scientific and Educational</td>
<td>Night in the Watershed</td>
<td>Ecological communities education</td>
</tr>
<tr>
<td></td>
<td>Watershed of Life</td>
<td>Wildlife education</td>
</tr>
<tr>
<td></td>
<td>Top of the Watershed</td>
<td>Wildlife education</td>
</tr>
<tr>
<td>• Cultural and Historical</td>
<td>Welcome to the Watershed</td>
<td>Local history</td>
</tr>
<tr>
<td></td>
<td>River Stories</td>
<td>Local history</td>
</tr>
<tr>
<td></td>
<td>Train, Towpath, and Time</td>
<td>Local history</td>
</tr>
<tr>
<td>• Artistic and Spiritual Development</td>
<td>Top of the Watershed/Visions of Nature</td>
<td>Poetry, drawing, and silent reflection</td>
</tr>
<tr>
<td></td>
<td>River Celebration/Global Festival</td>
<td>Song and dance</td>
</tr>
</tbody>
</table>

Recreational Information - This identity information type is information gained from the bioregion, that gives an ecosystem identity. This type of information is best evidenced through the daily activities at the Cuyahoga Valley Environmental Education Center that occur after mealtimes and provide recreation for the students (See Appendix A). Many of the recreational activities were not found in the curriculum, such as F.R.O.G. (Fun Recreational Outdoor Game), which use nature as its playground. The F.R.O.G. had the students acting as if they were different animals in the watershed that could be effected by development. Such situations give the learner the opportunity relax, as well as learn, in “Nature’s Classroom” (CVEEC 2001). Many units within the curriculum helped the student to understand and appreciate the bioregion for the recreational information it provides. Some very good examples are Welcome to the Watershed and Watershed Issues.

Welcome to the Watershed. One Learner Outcome for this unit is that students will demonstrate understanding of the concept ‘national park’ (Yandala et al. 1996). During this activity, a National Park Ranger gave a presentation about the park and its functions, such as providing recreational opportunities to the people of the bioregion. The park ranger said that many people used the park systems for hiking, biking, and jogging, especially on the tow path.

Watershed Issues. As previously mentioned, this activity gives student the chance to participate in a hypothetical task force that is trying to decide how to best deal with the local deer population. During this activity, the students are divided into interest groups. One group acts as a recreational group who “enjoys spending their free time exploring the
valley. [The recreation group] is a combination of runners, hikers, horseback riders, photographers, bird watchers, and wildflower hunters concerned that hunting of the deer will disrupt their outdoor experience” (Yandala et al. 1996), thus referencing the park as a source of recreation.

Scientific and Educational Information - This identity information type is the most easily distinguished within the curriculum. Scientific and educational information gives identity to the Cuyahoga River watershed through myriad Units, Core Concepts, Learner Outcomes, and Activities. As mentioned in the introduction, “Nature’s Classroom” is open for the learner to gather information, observe, and experience the biosphere at and around the education center and national park that include many different ecosystem types (Yandala et al. 1996). Many units within the curriculum help the student to understand and appreciate the bioregion for the scientific information it provides (which also adds to the exemplification of the environmental dimension of sustainability). Some very good examples of this information identity type specific to this bioregion are Night in the Watershed, Watershed of Life, and Top of the Watershed.

Night in the Watershed - The bioregion is used to provide educational and scientific identity information for this activity. Specifically, the students found a spot in the woods to sit and be silent, and listen to what is happening in the dark. This experience provided the learner with an in situ observation experience where the students listened for frogs, crickets, and other creatures. They were asked to observe the night sounds, and
according to the learner outcome, “compare and contrast day and night ecological community activity, personal experiences, and physical adaptations” (Yandala et al. 1996).

**Watershed of Life** - The scientific and educational identity information types are further used by the curriculum through the *Watershed of Life* unit where students are introduced to scientific and educational information about the Cuyahoga River watershed bioregion. This information, as described by the learner outcome, helps students to be able to “demonstrate an understanding that the Earth is a dynamic system, recognize and describe natural patterns within a watershed, and show evidence of understanding the value of biological diversity” (Yandala et al. 1996). In this unit, the students learn about the specific wildlife living in the watershed, as well as their adaptations and habitats. This unit also teaches the students skills in studying plants. They are also given the opportunity to learn about plant succession using the forest as an information source.

**Top of the Watershed** - During this unit, the students learn about the natural world using the watershed as an information source for their education. During the Activity, *Diversity in the Cuyahoga Valley* the students searched for different animal signs, for example animal tracks, characteristics of plants, such as different plant colorings, insect activity, and differently shaped leaves by the local foot bridge. This exercise added to their body of knowledge regarding the bioregion, possibly adding to the potential for the bioregion to gain an identity through such knowledge.
**Cultural and Historic Information** - The identity information that is provided by the Cuyahoga River Valley that gives the ecosystem an identity describes the student’s collective heritage, history and cultural identity (and also adds to the provision of the social dimension of sustainability). According to Yandala et al. (1996), learning about the human history of the area is just as important as looking at the area’s natural history. There are many units within the curriculum that use the bioregion as an informational source to furthers the student’s appreciation and understanding of the bioregion. Some very good examples are *Welcome to the Watershed, River Stories*, and *Train Towpath and Time*.

*Welcome to the Watershed* - The watershed itself, along with its unique history of river burnings, and canals, is used as an example to demonstrate the history of the area, and is the site that provides a necessary demonstration space for the educators. The Activities of this unit, according to the Core Concept, “review aspects of the unique history of the Cuyahoga River” (Yandala et al. 1996). The Learner Outcomes suggest that students will “gain...awareness of the cultural diversity of peoples who have used and continue to use the Cuyahoga River valley” and be able to “distinguish between at least two cultures and their use of the Cuyahoga River valley in the past”.

*River Stories* - Much like *Welcome to the Watershed*, this unit uses the bioregion as a backdrop for students gain information that links the area to cultural and historical events of the Cuyahoga River Valley. According to the curriculum, the students “explore how dominant cultural groups have used the river in the past”(Yandala et al. 1996). With
that, the ecosystem gains an identity by supplying information whereby students “participate in cooperative integration of historical and ecological concepts of the Cuyahoga River valley” (Yandala et al. 1996).

**Train, Towpath, and Time** - This unit uses the bioregion in many ways as an important source of identity information regarding the history and culture of the Cuyahoga Valley. The Cuyahoga Valley National Park has preserved the canal and lock system leading up to the Cuyahoga River. During this unit, the students study, at length, the canal and lock systems, discussing the historical events that have surrounded the canals and the Cuyahoga River.

**Artistic and Spiritual Information** - According to Yandala et al. (1996) the curriculum is “committed to integrating the arts into [the] young people’s experience at the center”. Throughout the curriculum the students are given opportunities to use the bioregion and the nature within it as a basis for artwork. That sentiment demonstrates that the watershed can be a source of artistic and spiritual identity information, thus giving the biosphere (watershed) an identity. Good examples are found in the units *Top of the Watershed* and *River Celebration*.

**Top of the Watershed** - In the *Top of the Watershed*, students “express observations and understandings of the river valley in stories, poetry and other artistic activities” (Yandala et al. 1996). During this unit, students were asked to use their imaginations and the watershed as the source of information to describe the natural world
of the watershed through poetry, or to sketch what they have seen so far in the bioregion. If they didn’t want to do those things, they wrote creative stories from the perspective of a plant or animal that they thought might be found in the watershed.

This unit also allows for students to connect more deeply with nature. During the *Visions of Nature* Activity, students are asked to take time to be still, take in what surrounds them. They are asked to be silent, take deep breaths, and reflect on the reading of words from the Navajo Indians, William Wordsworth, Hazrat Inayat Khan, and John Muir. With that, the biosphere provides identity information and assumes an ecological identity through artistic expression, which in turn lends itself to non-substitution and strong sustainability.

**River Celebration** - During this unit, the Learner Outcomes expected that students will “express a personal affinity with the river via song, dance, and other art activities” (Yandala et al. 1996). The emphasis for this unit is to capture the student’s creativity and provide fun ways the student can celebrate life on a deeper level. In *The Global Festival*, students participate in song and dance in order to “compare and contrast the Cuyahoga River to other rivers on the planet” (Yandala et al. 1996). In application, this activity differed from the curriculum in a few minor ways logistically (they theme was more oriented around the flight of a bird around different parts of the world during migration rather than small groups specifically discussing different rivers). The students heard and sang songs about the different rivers. The biospheres of the different rivers (and their watersheds) provided identity information and assumes an ecological identity through artistic expression, which in turn lends itself to non-substitution and strong sustainability.
**Decision Making: Operationalizing Definitions**

According to the United Nations (1992), environmental education is critical for improving the capacity of the people to achieve environmental and ethical awareness, values, and behavior consistent with sustainability. It is known that environmental education fosters positive attitude changes regarding the environment and helps humans understand the complexity of the natural world (Jordan et al. 1987; Keen 1991; EECO 2000). The curriculum demonstrates the awareness and environmental education’s ability to foster change. According to the curriculum:

“The opportunity for students to spend a significant amount of time in the outdoors understanding natural processes and seeing life firsthand is invaluable. The exploration experience helps students see the value of natural resources. The outdoor experience is then built on by integrating investigation into the units. While discovering natural resources of the Cuyahoga Valley, students explore the way resources are threatened. Problem solving and critical thinking skills are used to help students consider solutions to environmental issues. The goal is to enable students to have adequate knowledge, awareness and skills to act on environmental issues” (Yandala et al., 1996).

Huckle and Sterling’s (1996; 2006) definition of education for sustainability, expands on the idea that environmental education adds to people’s awareness, resulting in more sustainable behaviors. Numerous authors have cited behavioral change as the means by which our society will move from the current anthropocentric dominant social paradigm (and its relationship to weak sustainability) to a new ecocentric environmental paradigm that is more closely related to strong sustainability (Birch and Schwab, 1983; Jaus 1984; Ramsey et al. 1989). The definition provided by Huckle and Sterling (1996) goes further than most to transform behavior change into decision making, an action
coming out of behavioral change.

The curriculum is saturated with units and activities that impart the importance of decision making and give the learners a chance to make hypothetical decisions regarding resource issues. With that, the operationalization of education for sustainability and its inherent link to decision making means three things: first, the students are given a chance to use the information that they have received during the week. That, in turn, gives the students an actualized need to look at all the dimensions of general sustainability where they otherwise might not. This gives them more opportunity to understand the interconnectedness of the three dimensions of sustainability. Second, the students can use the identity information they garnered from experiencing the watershed (bioregion) and apply the information to “real” world situations. Third, a decision making component in the curriculum makes way for the possible determination of whether or not the program is effective. Outcomes of decision making can demonstrate whether or not the decision students make are anthropocentric, or ecocentric, which correspond to the promotion of either weak or strong sustainability.

As stated, the curriculum is saturated with units and activities that impart the importance of decision making. Very good examples of the education for sustainability concept can be found in the units Connections, Watershed Issues, and Watershed Decisions.

**Connections** - According to the curriculum, during this unit, students are introduced to activities directly related to decision making. According to the Learner
Outcomes of the unit, The students will:

- Describe how choices made today affect the future.
- Express a personal sense of responsibility for making sound environmental decisions.
- Suggest ways to take personal and class environmental action (Yandala et al. 1996).

**Watershed Issues** - Within the unit Watershed Issues, the activity titled Populations has specific Learner Outcomes that state the students will make age-appropriate informed decisions applicable to current and potential deer population problems in the Cuyahoga Valley (Yandala et al. 1996). During the Populations activity, the students act as a Community Council, setting out to gather information about the local deer population. The students begin by learning information about deer and population basics. They learn a broad spectrum of deer behavior patterns and from there conduct a simple study about deer activity, trying to determine how many deer are in the Cuyahoga Valley National Park area. After the completion of the study, the students form small groups, each representing different interests in the watershed. The information garnered from the study is used to as the basis for discussion (Yandala et al. 1996).

**Deer Management Task Force Forum** is the sub-activity of the activity Populations. The forum is the section of the unit that directly addresses decision making. The small groups that make up the forum represent opinion groups from the watershed. They are as follows: the homeowners and farmers of the valley, people who recreate in the
valley, and local sport hunters. The instructor acts as an official from the government sent to educate the council and mediate the meeting. The different groups are given reports that summarize their opinions as interest groups. In combination with these opinions, the groups use information from the deer population study to come up with management plans for the deer population. Each group presents their opinion to the larger forum. A group discussion follows. After the discussion, the students are allowed to vote personally on various deer population management issues (Yandala et al. 1996). This activity has the potential to relate to sustainability because the decision making process makes room for the students to take the larger ecosystem into account along with the social and economic information that may be provided during their discussion.

_Watershed Decisions_ - This activity is the capstone of the program. This activity is the chance the students get to use all the information they have learned through the week. This activity set up a fictional scenario of a decision to be made by a local zoning board to determine the future use of a currently undisturbed area. In small groups, the students prepared a creative presentation of their choice and presented their findings to the rest of their classmates, teachers, and interns. Using technology such as computers, artistic expression, such as song and dance, the student groups presented small programs that explained why and how they determined their choice based upon the information they learned throughout the week that referenced the three dimensions of sustainability. They took into account the cost (economy) the benefits to humans (society) and the effects on the environment and, to some extent, evidenced the interdependent nature of the three.
**Anthropocentrism vs. Ecocentrism: The Dividing Line**

The differences between anthropocentrism and ecocentrism represent a dividing line between weak and strong sustainability. Because their basic tenets are so much a part of the sustainability debate, they were operationalized to evaluate the curriculum. For that reason, revisiting the topics of anthropocentrism and ecocentrism and their relationships to sustainability is necessary for their use.

Anthropocentrism is the belief that human needs have a higher value than nature. According to anthropocentrism, the value of nature is maintained for human beings. Also, an anthropocentric ethic provides that humans can rely on technology to override human consumption and destruction of nature, much like the “substitutability” paradigm central to weak sustainability (Noss and Cooperrider 1994). Weak sustainability is strongly linked to an anthropocentric ethic in that humans do not take into account that they are dependent upon a large ecological landscape and the resources it provides.

Contrary to anthropocentrism, ecocentrism “values ecological systems as a whole, including natural processes, relationships, and non-living parts of the environment” (Parker 1996). Ecocentrism is central to strong sustainability because, like ecocentrism, strong sustainability takes into account the larger ecosystem therefore realizing that all generations have the ability to deplete ecological resources to a level that will dramatically affect future viability (Chiesura and de Groot 2003).

Units and activities within the curriculum demonstrate characteristics of anthropocentrism. Some demonstrate characteristics of ecocentrism (See Table 5). What
is significant about the line between anthropocentrism and ecocentrism is that the differences between the two, as related to weak and strong sustainability, have potential to demonstrate whether or not this analysis is meaningful in its application to the curriculum as measured by the outcome of the hypothetical decision making process the students go through. This significance can be ascertained by combining together the hypothetical decision making process in this program with operationalized concepts of anthropocentrism and ecocentrism.

First, we will look at the concept of anthropocentrism and its presence in the curriculum. It is important to see if anthropocentrism is present because its presence could suggest that the program promotes weak sustainability. Second, we will look at the concept of ecocentrism and its presence in the curriculum. Finally we will look at how a decision making process allows us to determine if this program promotes strong or weak sustainability.

**Anthropocentrism** - Anthropocentrism is not directly identified in this program. Nowhere does it state that the program takes an anthropocentric approach in teaching the students. The program, however, does promote concepts that could possible be linked to anthropocentrism, one being ownership. Ali (2002), found that the concept of ownership of [nature] within an [African] National Park was determined by whether or not people benefitted from its existence or if people were able to derive value from it. The program speaks frequently on the topic of ownership, which inherently assumes a hierarchy of
value, which could be seen as ascribable to anthropocentrism.

Ownership- Ownership of the National Parks and the Cuyahoga Valley National Recreation Area (now the Cuyahoga Valley National Park) is a central theme of the program. Multiple references throughout the curriculum reference ownership (Yandala et al. 1996). One Learner Outcome specifically states that the students will “demonstrate an understanding of the concepts of “national park” and “public ownership” (Yandala et al. 1996). This occurred during the opening activity of the program, Welcome to the Watershed, and during the canal walk with the park ranger during Journey to the River.

As mentioned, this may be some students’ first time in a National Park so they are introduced to the park systems. During the opening unit a National Park Service Ranger told the children about the Cuyahoga Valley National Park. She specifically discussed where the park is, how large it is, and its part in the National Park system. Moreover, she discussed how the students were co-owners of the park and how it is there for their use. Understanding that sustainability infers use, further discussion about other roles of the National Park System’s in relation to management, would have been beneficial to add to the promotion of sustainability. Also, this is not saying that ownership is for sure promoting anthropocentrism, but rather has the potential and may be the reason for the possible promotion of weak sustainability. These same concepts came up again during the canal path hike with the ranger during Journey to the River.
Ecocentrism - Ecocentrism is not directly identified in this program. The curriculum does not state that it is coming from an ecocentric vantage. Keeping in mind that ecocentrism focuses on the entire ecosystem, looking at the individual units of this program does not lend itself to a holistic and intricate web of dependencies within the ecosphere. Most activities focus on the ecosystem in its separateness, looking individually at the natural communities, or the social communities separately. However, one unit that is presented at the end of the week has the potential to erase any doubt that through its dynamic actions; that Activity is Connected Web found within the unit Connections.

Connections - The Learner Outcome for this Activity is that the students will “demonstrate an appreciation for the opportunity to be in a national park” (Yandala et al. 1996); it might more accurately read “demonstrate an understanding of ecocentrism and the interconnected web of life.” According to the curriculum, the students are given cards with different concepts written on them. The concepts include, but are not limited to, “watershed”, “Cuyahoga River”, “weather”, “Lake Erie”, “Atlantic Ocean”, “dissolved oxygen”, “Sweet corn, the sweetest you have ever tasted”, “Mr. Gilson (the local farmer)”, “cattails”, “Polaris, the North Star”, “Africa”, “dragon fly”, and “Yosemite National Park” (Yandala et al. 1996). The students are then asked to sit in a circle, and a card that says “watershed” is placed in the middle. Then all the cards are passed out. Next, “the students are to create a web, much like they did in the Communities unit; however this time, they will show how concepts and ideas are connected to each other” (Yandala et al. 1996). When a student lays down a card, they are asked to “define or describe what their
card is and how it is related to another card...[helping them to] see connections between concepts and objects they discovered during the week” (Yandala et al. 1996).

What this activity seems to be attempting to do is to make all the ecological connections from the local to the global level. This activity represents a very good example of how one would look at the world through an ecocentric lens. In relation to strong sustainability, this might well be the curriculum’s strongest unit.

Table 5

Strong and Weak Sustainability Dimensions Demonstrated through the Operationalization of Ecocentrism and Anthropocentrism in the Cuyahoga Valley Environmental Education Center’s Curriculum

<table>
<thead>
<tr>
<th>Example Units/Activities Observed and Exemplified in the Curriculum</th>
<th>Element(s) that link(s) Strong Sustainability and Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strong Sustainability (Ecocentrism)</strong></td>
<td>Connections/Connected Web</td>
</tr>
<tr>
<td><strong>Weak Sustainability (Anthropocentrism)</strong></td>
<td>Welcome to the Watershed, Journey to the River</td>
</tr>
</tbody>
</table>

Ecological Connections

Ownership
**Decision Making: Ecocentric or Anthropocentric**

The differences between ecocentrism and anthropocentrism can help us in understanding whether or not the sustainability information (as determined by this analysis) that the students learned through the week was of the strong or weak type. This will happen by determining if the decisions the students make are anthropocentric (weakly sustainable) or ecocentric (strongly sustainable). Are they making the decisions solely for the benefit of humans and not taking into account the other components of the ecosystem or do they take into the account the entire ecosystem?

**Watershed Decisions**- This activity “is an opportunity for students to apply the skills they practiced in the field experiences to the type of decision making for which scientific information is used. The simulation is intended to provide an enjoyable and workable context for students to draw meaning from their week’s experiences. The simulation sets up a fictional scenario of a decision to be made by the local zoning board to determine the future use of an undisturbed area” (Yandala et al. 1996).

According to the curriculum, “several methods are feasible for involving students in the fictional hearing, but they depend on the level of student’s understanding and amount of time devoted to the exercise” (Yandala et al. 1996). The alternative most closely related to the actual application of the activity was a simpler variation that allowed for more creativity. Specifically, one “in which students are assigned the roles of the petitioners and must defend their petition by creatively addressing the potential impacts of their land use request.” (Yandala et al. 1996).
Table 6

Observed Outcomes of the Curriculum's Fictitious Decision Making Process and Their Relationships to Strong and Weak Sustainability

<table>
<thead>
<tr>
<th>Group</th>
<th>Reasons Given for Decision by Groups/Elements of Process that Demonstrate Reasoning (Final Decision of Student Group)</th>
<th>Ecocentric or Anthropocentric (Strong or Weak Sustainability)</th>
<th>Element(s) that link Decision Reasoning with Strong/Weak Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Niagara</td>
<td>Did not want to throw off balance of nature/Picture of a dead forest</td>
<td>Ecocentric/SS</td>
<td>Indicates awareness of ecospheric interplay</td>
</tr>
<tr>
<td></td>
<td>“Breaking the circle of life”</td>
<td>Ecocentric/SS</td>
<td>Indicates awareness of ecospheric interplay</td>
</tr>
<tr>
<td></td>
<td>Intrinsic value of nature</td>
<td>Ecocentric/SS</td>
<td>Value of biodiversity</td>
</tr>
<tr>
<td></td>
<td>Possibly build small building, however cost of the loss of nature outweighed financial cost of building</td>
<td>Ecocentric/SS</td>
<td>Indicates awareness of ecospheric interplay, Value of biodiversity</td>
</tr>
<tr>
<td></td>
<td>(Decision: No Building)</td>
<td>Ecocentric/SS</td>
<td>Accounting of the social, economic, and environmental dimensions</td>
</tr>
<tr>
<td>• Ontario</td>
<td>Natural Landmarks</td>
<td>Ecocentric/SS</td>
<td>Connection with nature</td>
</tr>
<tr>
<td></td>
<td>Tree naming</td>
<td>Ecocentric/SS</td>
<td>Connection with nature</td>
</tr>
<tr>
<td></td>
<td>Desire to maintain open space</td>
<td>Ecocentric/SS</td>
<td>Indicates awareness of ecospheric interplay</td>
</tr>
<tr>
<td></td>
<td>Financial cost of building</td>
<td>Anthropocentric/WS</td>
<td>Accounting of human financial costs</td>
</tr>
<tr>
<td></td>
<td>Transplanting vegetation</td>
<td>Ecocentric/SS</td>
<td>Intrinsic value</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>Ecocentric/SS</td>
<td>Opportunity to understand ecocentric concepts</td>
</tr>
<tr>
<td></td>
<td>(Decision: Building)</td>
<td>Ecocentric/SS</td>
<td>Total of reasons balance in favor of ecocentrism</td>
</tr>
<tr>
<td>• Erie</td>
<td>Decomposition</td>
<td>Ecocentric/SS</td>
<td>Ecological concepts</td>
</tr>
<tr>
<td></td>
<td>Costs: animals would lose homes, financial costs, loss of resources</td>
<td>Ecocentric/SS</td>
<td>Accounting of the social, economic, and environmental dimensions</td>
</tr>
<tr>
<td></td>
<td>(Decision: No Building)</td>
<td>Ecocentric/SS</td>
<td>Accounting of the social, economic, and environmental dimensions</td>
</tr>
</tbody>
</table>
The students were questioned about whether or not to build an education center in the forest ecosystem they visited earlier in the week in the Cuyahoga Valley Environmental Education Center property. They presented their decisions and reasoning processes in a variety of creative skits. The first group to present was the Niagra group.

The Niagra group decided that they would not be building anything on the site. They started their skit off by showing a picture of a dead forest. They stated as part of their reasons that they did not want to throw off the balance of nature.” They mentioned that they could build a small building, but felt that any structure would be “breaking the circle of life.” They also identified the intrinsic value of the flora and fauna of the ecosystem as a reason for not building. Finally they said that the building’s cost would not be worth what was lost.

It is reasonable to say that this group’s argument and ultimate decision is ecocentric and therefore references strong sustainability. The students took into consideration the natural world, along with the human components. They did not say that the reasons they wanted leave the area undeveloped for future human use, which would be the cause of looking more deeply into possible anthropocentric roots. Quite the contrary, they indicated intrinsic value of nature outside of any value to humans, and directly referenced the balance of nature and the interconnected web of life, both ecocentric concepts.

The Ontario group presented next. They began by going over a map and pointing out the natural landmarks of the area. Next, they presented a slide of a tree they had
named “George”. Another tree they named “Green Guy II.” This group eventually decided to build. At first, it sounded as if they would decide not to build. They began by anthropomorphizing the trees. Then they said that building the education center would be too expensive. They also said that they would like to continue to have the open space. However, by the end of the very minimal presentation, the students said for educational reasons, they had decided to build. They said that it would not affect the plants because they would transplant them to another site. This group’s decision making process is most easily assigned to the anthropocentric realm. Their argument did reference multiple aspects of the ecosystem while making their decision. Although they did decide to build, they went further to even preserve the plants by relocating them. Ecocentrism would have been more easily identified if they had sited interconnections in the reasoning process. Their basic reasoning process did take into account many different aspects of the ecosystem. For these reasons, this decision seems to be closer to ecocentrism than to anthropocentrism, therefore, this decision most likely should be seen as representing ecocentrism and strong sustainability.

The final group to present their decision was the Erie group. This groups presented a very creative skit. They began with the self-written song “Who Cut the Forest Down?” during which they described the different levels of decomposition and the roles decomposition played in the ecosystem. The first three slides they presented described the forest, and the next slide argued against building because the ecosystem provided a home for plants and animals. Next, the group played a game of “Forest Feud”, animals
versus humans. They presented reasons for building and not building in a general format. The answers did not come from any specific “side” (for example, one might think that the argument against it would be from the “animal side”, and the reasons for from the “human side”). The reasons to build were for education, providing jobs, and other benefits to humans. They brought up cost as a reason not to build, and that resources would be lost. They also mentioned destroying the homes of animals as a reason to not build. Ultimately, Erie group decided to not build by a vote of seven to six.

This final group’s reasoning appears to be ecocentric because they took into account the entire ecosystem. Their argument would have been strengthened (in regards to ecocentrism and strong sustainability) if they had cited interconnections and the interdependencies in the ecosystem. However their reasoning process also did slightly touch on interdependencies when they brought up the resources that they would be losing, such as open space. Ultimately, the balance tips in favor of ecocentrism(and strong sustainability) because of final decision to not build combined with their touching on interdependencies.
Chapter 5.

Summary, Discussion, and Conclusions

Summary

Sustainability continues to be a growing topic of many environmental, economic, and political debates, and is a central topic for this research paper. The purpose of this study was to determine if sustainability concepts were demonstrated by the Cuyahoga Valley Environmental Education Center’s curriculum. Also, this paper went further to ask, “Does the curriculum promote the concept of strong or weak sustainability?”

The analysis of this study first addressed the three dimensions of general sustainability. The dimensions were analyzed as presented by the literature and as they emerged from the analysis of the curriculum. Specifically, the dimensions of environment, economy, and society were identified through analysis of the literature in conjunction with participant observation, and study of the curriculum’s Core Concepts, Learner Outcomes, and Activities found within its many units.

To address the second research question, the analysis addressed the concepts of bioregionalism, decision making, anthropocentrism, and ecocentrism. These concepts were also analyzed as presented by the literature and as they emerged from the analysis of the curriculum. The concept of bioregionalism was addressed by addressing its relationship to “Ecosystem Identity Sustainability,” the information provided by the bioregion (Gale and Corday 1994), the “Socio-Cultural Dimensions of Strong Sustainability” (Chiesura and de Groot 2003) and the sum of their relationships that became the formation of “Identity
Information”.

Decision making became part of the discussion through the operationalization of “education for sustainability” (Huckle and Sterling 1996; 2006). Decision making turned out to be the platform that informed the research as to whether or not the program might be promoting the concept strong sustainability. Finally, through the decision making platform, the concepts of anthropocentrism and ecocentrism were operationalized as the indicators which would assist in determining whether this program was promoting strong or weak sustainability.

**Discussion**

The first research question asks if the curriculum of the Cuyahoga Valley Environmental Education Center demonstrates sustainability. The general concept of sustainability is found to be promoted by this program. Many examples found in the analysis demonstrated how students learn about different facets of the environment, such as animal habitats and weather patterns. Examples throughout the analysis also demonstrated the opportunity for students to learn about the social dimension of sustainability through activities that teach about the culture and history of human societies, past and present, and cultures of other watersheds around the world. The economic dimension of sustainability was evidenced through activities that relate to consumption, consumerism, and the past economic use of the watershed. Also, the realm of sustainability, where the three dimensions merge, was demonstrated through activities that related to hypothetical decision making processes, where students use information from all
three dimensions to determine whether or not to develop a currently undeveloped piece of land, and how to manage a deer population.

The second research question asks if the strong or weak dimension of sustainability is being promoted. It has been found that strong sustainability is being promoted. However, unlike the general concept of sustainability, strong sustainability was not as easy to detect. Strong sustainability was not directly indicated, but there are concepts that point to it through inherent ideas not direct examples. Strong sustainability can be viewed through the combination of the operationalization of the definitions of education for sustainability and ecocentrism.

As mentioned, education for sustainability is a process that develops people’s “awareness, competence, attitudes and values, enabling them ... to integrate environmental and economic decision making” (Huckle and Sterling 2006). The operationalized definition of education for sustainability links education to strong sustainability through the inherent valuation present in decision making. Decisions, generally, are based on information and related values. Through decision making, the program offered students the opportunity to put the information they gained through the week to work in a hypothetical decision making process during the activity Watershed Decisions. During this activity it was evident that the students pulled from the economic (cost), social (human needs and interests), and environmental (bioregion identity information) realms to determine what the best course of action would be regarding a currently undeveloped piece of land. Using all these different types of information represented the convergence of the
three dimensions of sustainability, and the realm of decision dependence as defined by education for sustainability (Huckle and Sterling 1996, 2006, Paden 2000). This link to general sustainability was important because the realization of the promotion of general sustainability concepts allowed the analysis to move forward. Moving through this door opened by general sustainability, the analysis proceeded into understanding if the program promoted strong or weak sustainability. Understanding whether or not the curriculum was promoting strong sustainability also depended upon the decision making process.

As previously mentioned, during the activity, Watershed Decisions, the students had a chance to apply all they learned throughout the week to a fictional decision making process. In small groups, they were to determine the future use of an undisturbed area (Yandala et al. 1996). Specifically, the students were questioned with whether or not to build an education center in the forest ecosystem within the boundaries of Cuyahoga Valley Environmental Education Center. The small groups presented their decisions through a variety of creative skits. The first group of three decided not to build on the undisturbed site. Their reasons for not building are based in ecocentric concepts, inherent to the strong sustainability argument. The second group said that they would build for educational reasons. This group’s decision making process was also assigned to the ecocentric realm (as it relates to strong sustainability). The final group decided to not develop the undeveloped woodland site and their decision was also ascribed to ecocentrism (as it relates to strong sustainability).

The student responses (decisions) reflected ecocentrism which, in turn, reflected a
promotion of strong sustainability because of the understood link between the ecocentrism and strong sustainability. Next, discussion turns toward understanding how this curriculum could be promoting strong sustainability. The answer lies in the character and quality of information provided to the students by the curriculum.

Both ecocentrism and anthropocentrism (as tenets of strong and weak sustainability respectively) are represented in the curriculum. Ecocentrism, a philosophy that holds that ecosystems are an intricate interdependent web of all life, is directly evidenced by its appearance in the curriculum through the Activity Connections. In Connections, students participated in an activity that demonstrated how many parts of local and global communities are dependant upon each other as part of an interconnected “web” (the connections activity literally made a web that tied different aspects of the ecosphere together). There are few activities other than this that directly bring all three dimensions together, and directly point to ecocentrism, another being the hypothetical decision making process.

Anthropocentrism may also be found to be part of the program possibly guised as ownership. Public ownership (and its relationship to the students as citizens of the United States) of the National Parks and the Cuyahoga Valley National Recreation Area (now the Cuyahoga Valley National Park) is a central theme of the program. Many references throughout the curriculum reference ownership, specifically, the activities Welcome to the Watershed and Journey to the River. This concept of ownership may be seen as anthropocentric because of the inherent hierarchy associated nature’s valuation through
human utility, and if the decision during the hypothetical decision making processes had proved to be of the weak sustainability type, then more research into this area would have been called for.

Strong sustainability (as evidenced through the operationalization of ecocentrism), was found to be pervasive as different parts of the ecosystem (represented as dimensions of sustainability) are often promoted. The program does promote strong sustainability. Along with ecocentrism, “Ecological Identity Sustainability” (EIS) (Gale and Cordy 1994), as part of the strong sustainability dimension, maintains the general land-use or ecosystem types for the sake of general ecosystem diversity. EIS does not place importance on any individual, group, or system within the ecosphere. The research pointed to the combination of EIS (with its basis in bioregionalism) and the “Socio-cultural Dimensions of Strong Sustainability” (Chiesura and de Groot 2003) as the basis for the possible “equal” valuation of the environment. This was thought to be possible because the combination of them gave us information that is intangible and invaluable, and therefore, could be considered non-substitutable. This non-substitutable nature of the information could lead a learner to look differently at nature. This information could allow the learner to look at nature in a way that makes it “equal” to humans which, analogously, places humans and nature within the same ecosphere, therefore referencing ecocentrism and strong sustainability (as evidenced by the outcome of Watershed Decisions).

At this point, some assumptions can be made about the flow of reasoning. These
assumptions emerged from the analysis and constant triangulation between the literature, curriculum, and observation notes:

- The curriculum demonstrates the promotion of the dimensions of sustainability;
- The operationalized definition of education for sustainability provides the arena in which evidences decision making (Huckle and Sterling 1996, 2006);
- Decision making inherently opens the door for valuation.
- Valuation opens the door for determination of anthropocentrism or ecocentrism;
- The bioregion provides Identity Information that adds to the promotion of strong sustainability by allowing the learner to identify with the ecosphere.
- Components of the program demonstrate ecocentric concepts; and
- The outcomes of the fictitious decision making activity were ecocentric which could represent the internalization strong sustainability themes.

Conclusions

The curriculum of the Cuyahoga Valley Environmental Education Center promotes strong sustainability concepts. This study presumes that for an environmental education center to be promoting general sustainability and strong sustainability, the following expectations should be met:
• The program will educate students in the three dimensions of sustainability: environmental, economic, and social domains, and especially the realm of convergence where all three come together.

• The program will use information from the bioregion as a basis for instruction that are of the recreational, scientific, educational, cultural, historical, artistic, and spiritual types.

The assumptions presented in the discussion section give form to these expectations. The assumptions, on their own, represent a framework for which an environmental education center might build upon when trying to promote a program based on general sustainability based in both weak and strong sustainability. The expectations provide a realized and specific means to such ends.

The findings of this study are important because they imply the need for further research into sustainability education and its relationship to environmental education. These assumptions and expectations are important for the field of environmental education as it could well serve as a basis for broadly determining whether or not programs across the globe are educating for sustainability. Hopefully, this analysis helps the Cuyahoga Valley Environmental Education Center look more closely at whether or not their program is promoting sustainability.

This type of study benefitted greatly from the use of the Grounded Theory Method of qualitative research (Glaser and Strauss 1967). Grounded Theory allows the researcher to look at many nuances of social phenomena that cannot be found using quantitative
techniques. Grounded Theory is appropriate for this type of study because the method allowed the descriptive data to generate concepts for analysis. The analysis of this study was not necessarily testing hypotheses, rather, the analysis generated theories that emerged as the research progressed.

There were some limitations of this study. First, it would have been beneficial to observe more than one group to see if variations occurred between them, particularly variation within specific activities. Some of the curriculum was not witnessed in action because it was not chosen for use. One activity that was not chosen to be used for the learners was *Connections*. That activity could have greatly influenced the analysis, first, if it differed in application from the curriculum. Second, the activity may have influenced the learners’ decision during the fictitious development decision meeting process (because *Connections* is a very ecocentrically/strong sustainability based activity).

Additionally, it would have been beneficial to watch different instructors teach the same activities. Teachers often add their own personalities and knowledge to the activities; such could influence the students. Also, it would have been beneficial to observe the learners in non-classroom time to determine what they talked about and how it related to the program (informal peer to peer processing). Interviews with the students before, during, and after the program would have been beneficial in determining, among other things, what knowledge and experiences students brought with them.

This analysis infers that more research, in general, needs to be completed regarding the ties between strong sustainability concepts and formal environmental education.
programs because of the general lack of research that ties the two. Specific to this study, further research regarding the identity information concept would be beneficial. With that, research into “Ecosystem Benefit Sustainability” (Gale and Corday 1994) would be beneficial to this analysis along with any research regarding the operationalization of the “Socio-cultural Dimensions of Sustainability” (Chiesura and de Groot 2003) and anything linking the two, perhaps concepts related to ecosystems management, or other facets of bioregionalism. Along with that, researching ways to expand the “identity information’ outside of the socio-cultural domain might prove useful.

More research into the current understandings of weak and strong sustainability and their dimensions would definitely add to this research. Further understanding of ways to operationalize weak and strong sustainability in relation to their practical applications could be of benefit. Also, the relationship between sustainability and decision making would benefit this research.

Further research into the concept of ownership and its relationship to the sustainability debate would be beneficial. Ownership can be seen as linking the learner to their place, but the concept, as discussed in this paper, also lends itself to valuation of nature that places human’s “above” and thus outside of the ecosystem. With that, deeper research into anthropocentrism and ecocentrism and their ties to sustainability would also add to future analysis. Research in all these directions might allow for finding a better way to value the environment for the intrinsic value it may hold. That in turn could allow nature equal and independent valuation, which would lead to a strongly sustainable future.
Bibliography


D.C.: Island Press.


Appendix C

Guiding Questions for Analysis

Sustainability:

1) Does the program teach about climate change, deforestation, and population growth?

2) Does the program teach about levels of material consumption?

3) Does the program reference generations and how the actions of one effect another?

4) Does the program identify the three spheres of sustainability: ecology, economy, and society?

Weak Sustainability:

1) Is the program anthropocentric or biocentric (doesn’t represent ecosystem)?

2) If the program references generations and how the actions of one effect another, does it represent the future generation as having used ingenuity to “replace” the resource?

2) Is the program able to identify humans as part of a large ecological landscape upon which they are dependent?

3) Does the program represent the value of ecosystems as being for human benefit sustainability in that the ecosystem is heavily managed for that purpose?

4) Does the program represent ecosystems having value because social systems are dependent upon particular resources?
5) Does the program represent ecosystems as having value due to dominant product sustainability?

Strong Sustainability:

1) Is the program ecocentric? (Does it teach about connections?)

3) Does the program identify the human within the ecosystem?

2) Does the program focus most strongly on nature rather than on humans?
   A) Does the program discuss land use and how it can ecosystems can be maintained for the sake of general ecosystem diversity?

4) Does the program identify the intrinsic value of nature and/or identify the non-substitutable aspects of ecosystems?

5) Does the program portray themes related to critical natural capital?

6) Does the program value nature through informational functions?

Environmental Education and Sustainability:

1) Does the program allow for the students to demonstrate competency regarding strong sustainability?