Promoting transformative learning within adolescent students through the use of environment-based education.

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Abstract

The purpose of this project is to examine how environmental education (EE) can be improved through the application of transformative learning theory and environment-based education (EBE) techniques within conventional classroom curricula. This paper will explore reasons why EE needs to be expanded within Ontario’s secondary school system, how transformative learning can be promoted within adolescent students, and how EBE techniques can be applied to create more impactful, meaningful experiences for learners. This inquiry includes a series of curriculum planning recommendations which can be used to create more effective EE for students enrolled in conventional classroom-based learning.
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Chapter 1: Introduction

The end of the twentieth century and the start of the twenty-first century have seen rapid environmental, technological, and societal changes sweep across the planet. During this time humankind has shown it can work together to accomplish seemingly impossible feats. The inspirational words of Neil Armstrong united the world as our species collectively stepped foot on the surface of the moon barely half a century after humans first took to the skies. In the half century following this monumental undertaking humankind’s understanding of the universe has evolved to the point where the molecular design of objects can be manipulated at the atomic level. Probes have passed beyond the outermost reaches of the galaxy, the depths of the Earth’s oceans have been explored, the human genome has been mapped and renewable energy technology has allowed for the creation of electricity from sunlight, wind, and wave power. Despite these technological advances the remarkable evolution of modern societies has come at a great cost to the natural world. Earth’s population has grown almost exponentially since the industrial revolution to the point where today more than seven billion people now call the planet home with forecasts estimating that number will grow to an estimated nine billion by the middle of the century (United States Census Bureau, 2012). The rapid growth of our species has given rise to countless problems around the globe including habitat destruction, species extinction, resource depletion, environmental degradation, and climate change. I am of the opinion that if humans hope to continue to survive and thrive on this planet these issues must be confronted.

Our species is at a critical juncture where the knowledge and power to enact great change exists, yet the collective will and courage to act on these intentions is often lacking. Concepts like peak oil, carrying capacity and the greenhouse effect have become part of collective everyday language, yet these critical issues which threaten the foundations of modern society are
often ignored. The inability to address the impact individuals and societies have on the Earth has resulted in the growth of environmental problems. If humankind is to make a concerted effort to reconcile its relationship with the natural world then change in all aspects of society must be embraced. Changes must be made in the way cities are organized, the way people get to work, the way waste is handled and the way energy, food, water and other natural resources are consumed. Generations of students have been educated in a relatively un-innovative fashion (Orr, 1994). As a result little has been done for students or society other than to train generations of workers and consumers (Wrigley, 2007). Education can play a powerful role in preparing future generations for the rewards and demands of modern life, but changes in the way youth are taught must be put in place to address the complex environmental issues influenced by collective human action. The need to infuse education with opportunities for inspiration and transformation can be addressed by applying a theory commonly framed towards adult education to adolescent learners.

The purpose of this project is to examine how environmental education (EE) can be improved through the application of transformative learning theory and environment-based education (EBE) techniques within conventional classroom-based learning. In this project I will explore how incorporating this theory into curriculum design and delivery using EBE can have numerous impacts on students including fostering connections with the natural world, promoting healthy lifestyle choices, creating more engaging educational experiences, increased cognitive development, and higher levels of academic success. An examination of Richard Louv’s concept of nature-deficit disorder along with discussion of the impact humans have on the natural world and the commodification of learning which is embraced within current education systems will
show why education must incorporate transformative learning theory using EBE in order to mitigate global environmental issues.

Following this examination the paper will conclude with recommendations of how to incorporate these findings within curriculum design and delivery in Ontario’s publicly funded secondary schools. As a secondary school teacher, I have chosen to focus this project towards secondary school students in Ontario. While some EBE and integrated programs do exist there is a need for more in order to reach and impact larger numbers of students of all ages and abilities. Through this analysis and exemplified within the curriculum recommendations found at the end of this paper, I will describe ways which EBE and transformative learning theory in conventional classrooms create more engaging and enjoyable educational experiences for students, thus increasing both ecological literacy and academic success.
Chapter 2: Transformative Learning Theory

To understand why society should promote transformation within students one must first consider what the goals of education are. According to the Ontario Ministry of Education youth are educated to high levels of intellectual and social competence in order to among other things promote the physical and mental well-being of individuals, to encourage active citizenship, and to sustain the economy (Ontario Ministry of Education, 2004). Recent policy frameworks designed to promote EE expand this focus to foster student understanding of “how our individual and collective behaviour affects the environment, and how environmentally responsible lifestyles can contribute to healthy, sustainable ecosystems” (Ontario Ministry of Education, 2009a, pg. 3). While these goals are admirable, the route to achieving success in these areas is undefined and these ambitious ideals can be lost in the hustle and bustle of everyday life both inside and outside the classroom environment.

If the students of today are to be healthy, compassionate, active members and leaders of society in the future then a desire to develop these capacities must be inspired within them. The means to inspire future generations often perplexes teachers. They wonder how to get through to a student who doesn’t understand why a given assignment is relevant, or how to challenge another student to expand upon their current understanding and to explore new ideas. It is this need to infuse education with opportunities for inspiration which connects transformative learning theory to the secondary school spectrum of Ontario’s education system.

Understanding transformative learning theory

Transformative learning theory is a constructivist theory which attempts to explain the process by which adult educators promote transformation of the personal perspectives and beliefs held by their students. As this theory is rooted in constructivist thought it is organized around the
premise that “we develop or construct personal meaning from our experience and validate it through interaction and communication with others” (Cranton, 2006, pg. 23). At the basis of this theory is the concept that adults form their personal understandings of the world around them based on their cumulative life experiences including childhood socialization, formal education, and the distortions which accompany our own personal prejudices, stereotypes, and unexamined beliefs (Mezirow, 1991). Through these processes people create personal perspectives and ways of being based partially on experience and the inherent inequalities embraced by those who socialized and educated them. Mezirow argues that as social practices and values change as part of societal evolution, adults are increasingly finding a need to adapt their ways of knowing to create new perspectives that allow for a greater understanding of the world around them and the forces impacting their lives (Mezirow, 1991). This process encourages adults to adopt new perspectives and ways of being which Mezirow studied and which led to the introduction of transformative learning theory.

Mezirow first began formulating the theory during a study of eighty-three women who were returning to college after years away from formal education (Mezirow, 1975). His subjects each underwent personal perspective transformations throughout their return to school. Each woman underwent a reorganization of the way they looked at themselves, their relationships with others and the world around them (Mezirow, 1975). Mezirow was able to identify that these women underwent individual transformations of their perspectives. How and why this transformation occurred intrigued him. Through elaboration and application within further studies Mezirow identified ten phases a learner passes through. These phases form the basis of what is now known as transformative learning theory. Described by Patricia Cranton (2006, pg. 20) the ten phases of transformative learning theory are:
- Experiencing a disorienting dilemma;
- Undergoing self-examination;
- Conducting a critical assessment of internalized assumptions and feeling a sense of alienation from traditional social expectations;
- Relating discontent to the similar experiences of others – recognizing that the problem is shared;
- Exploring options for new ways of acting;
- Building competence and self-confidence in new roles;
- Planning a course of action;
- Acquiring the knowledge and skills for implementing a new course of action;
- Trying out new roles and assessing them;
- Reintegrating into society with the new perspective;

Mezirow (1991), Cranton (2006) note that while each of the ten phases associated with transformative learning theory will be experienced by a learner, they will not necessarily be experienced in any particular order. A learner may experience a disorienting dilemma which causes them to reflect upon their personal beliefs while another may participate in discussion with peers which leads to personal reflection which may inspire actively engaging in a disorienting dilemma to bring about a change in personal perspectives. The ten phases are intended to provide adult educators with an understanding of how transformations can occur within adult education (Mezirow, 1991). Within his theory Mezirow is careful to define transformative learning as a voluntary learning process which “transforms problematic frames of reference to make them more inclusive, discriminating, reflective, open, and emotionally able to change” (Mezirow, 2009, pg. 22). It is important to note the voluntary aspect of this process as a learner may attempt to undergo transformation, but if they are unwilling to entertain the notion of altering their perspectives or ways of being then there will be no resulting impact and no transformation will occur.
Mezirow states that learning occurs when an individual encounters alternate perspectives and ways of being which call into question their own established perspectives and actions (Mezirow, 2009). This can occur through encountering a single, dramatic, disorienting dilemma which causes a rapid, epochal change or ‘ah-ha’ moment, or it can occur as a more gradual, incremental change resulting from a longer process of examination and reflection (Mezirow, 2009). Central to transformative learning theory is the idea that through exposing students to new perspectives and experiences, encouraging personal reflection, enabling group discussion, providing an opportunity for students to explore new ways of being, and assisting them in acquiring the knowledge and skills necessary to make a transition, teachers can encourage transformation within their students.

A restriction of transformative learning theory is that it is positioned as a method of understanding adult education specifically. Mezirow does not apply this theory to younger learners despite the relative ease with which it can be applied to learners of almost any age. Theorists often write of metacognitive processes, the questioning of commonly accepted societal values, and the process of personal reflection as if they are uniquely adult abilities (Cranton, 2006). The next section of this paper will explore how transformative learning theory is applicable to adolescent learners.

**Transformative learning theory and adolescents.**

While transformative learning theory is repeatedly discussed as a successful framework for adult education the process and goals of this theory can easily be applied to students of all ages including adolescent students enrolled in Ontario’s public school system. While most elementary and secondary aged learners will not have developed their critical thinking and personal reflection skills to the aptitude levels of many adult learners it is possible for younger
learners to engage in the phases of the transformative learning process. Adolescent learners with narrower perspectives resulting from shorter life experiences are still developing the perspectives and habits which will guide their life decisions. These students may avoid the need to reshape problematic frames of reference in adulthood by developing inclusive, reflective world views from a young age.

A number of influential politicians, authors, thinkers, artists, athletes and entrepreneurs from around the world attribute their passion and success to what could be described as transformative experiences from their childhood. The experiences of a few individuals (including Elon Musk, Rachel Carson, and David Suzuki) will be examined in order to understand how experiences from their youth inspired their career paths and life passions. Each of these individuals’ participated in transformative experiences outside of conventional education structures. These experiences triggered a perspective change at a young age and later inspired them towards a lifelong journey of continual personal transformation, exploration and growth. Following these individual narratives a few large-scale organizations which promote transformation within youth will be examined. These programs show how transformative learning can be incorporated into educational planning. If the idea that transformative learning can only be applied to adult learners is to be taken at face value then these types of experiences should have had little or no long-term impact on these individuals.

**Individual Narratives**

A few examples of influential people who underwent this process of transformation during their youth will outline some of the ways transformational learning can occur within younger learners. Elon Musk, co-founder of internet payment company Paypal; co-founder of the world’s only fully electric car company Tesla Motors; CEO and lead designer of the world’s most
successful privately owned space exploration company Space X; and CEO of America’s largest solar installation company SolarCity can trace his history of technological innovation to a transformative experience from his childhood. Musk, a self-professed ‘nerd’ was bullied as a child growing up in 1970s South Africa. He found escape from the trials and tribulations of everyday life through literature and later through computer programming (Biography Channel, 2013). As a child growing up in the years when personal computing was in its infancy Musk was quickly captivated by computers. At the age of ten he acquired his first computer and quickly became enthralled with computer programming. Elon taught himself how to design and write computer software and by the age of twelve he had created and sold his first computer game (Keats, 2013). Musk took this newfound passion for computing and applied it to his formal education and entrepreneurial endeavors which are only now beginning to influence the world in areas of cutting edge technology (Keats, 2013).

In an era when home computing was relatively uncommon Musk’s introduction to computers at a young age served to act as a transformative experience which would forever change his life. It allowed him to explore new ways of thinking, to acquire new knowledge and skills, and to embrace new perspectives relating to computing, space exploration, energy production, and sustainable transportation which are only now becoming evident on a global scale. While Elon Musk’s transformative experience, the acquisition and subsequent mastery of a personal computer occurred at a young age the impact of this experience carried into adulthood. His experience serves to act as a reminder to educators that opportunities for transformative learning should be provided to younger learners not just adult learners.

World renowned author and marine biologist Rachel Carson might be one of the strongest proponents for using the natural world to promote transformative experiences in youth. Carson is
often credited with inspiring the rise of the environmental movement in the United States through her publication of *Silent Spring* in 1962. Her award winning book exposed the impact of synthetic chemicals on the environment (Natural Resources Defense Council, 1997). Carson spent her youth on a family farm in rural Pennsylvania, a setting which would inspire her love of the natural world and transform her world view. Carson’s parents encouraged her to spend countless hours walking in the woods and fields surrounding her home, to read books about nature, and to live with respect for the natural world (Wilderness Institute, 2007). This supportive upbringing and close connection to nature inspired Carson’s lifelong love of the natural world and influenced her personal and professional life. She took this passionate connection with nature with her through her studies at John Hopkins University and infused it within her writings.

While she is most well known for her book *Silent Spring*, Carson was a proponent of introducing children to the wonders of the natural world. Her book, *The Sense of Wonder* (1965), weaves a beautiful narrative of the outdoor experiences shared between herself and her young nephew. Within this book Carson makes a compelling argument about the power of the natural world to inspire youth. “If a child is to keep alive his inborn sense of wonder without any such gift from the fairies, he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in.” (Carson, 1965, pg. 43). This passage speaks to not only the inspirational power Carson felt the natural world held, but also to the importance of children having someone who can help them build an understanding of the world around them. Carson’s parents, especially her mother, modeled this role during her childhood allowing her to guide her own nephew in a similar fashion later in life (Wilderness Institute, 2007). Carson’s story of her youth and her later writings about the power of nature act to remind educators that youth can be transformed and inspired at a young age. Her
transformation shows how experiences embedded within the natural environment can have a lasting impact on one’s perspectives and values.

Canadian scientist, television host, author, and environmental activist, David Suzuki, can also trace his love for science and the environment back to his youth. Suzuki’s passion for the natural world began during his childhood. Suzuki, a Japanese-Canadian was born in 1936 in Vancouver, B.C. While growing up in British Columbia, David was taken on countless camping and fishing trips into the mountains with his father. His family lost everything during World War Two due to their relocation to government internment camps necessitating a move to Southern Ontario in hopes of a new beginning (Suzuki, 2006). Being a visible minority in rural Ontario, Suzuki was often ostracized by his peers leading him to find safety and solitude in nature. Suzuki reflects that “my sanctuary as a teenager when we lived in London, was a swamp, and I would go home soaking wet, often covered in mud, but triumphantly brandishing jars of insects, salamander eggs, or baby turtles” (Suzuki, 2006, pg. 11). Through these experiences and countless hours spent in nature as an adolescent David Suzuki found himself and his calling. Suzuki’s experiences with nature as a child transformed his views of the world as an adult.

He began to question the impact human systems have on the natural world and the role science played in both creating and mitigating these impacts (Suzuki, 2006). Suzuki took this passion with him through his education and professional career. He went on to teach biology, zoology, and genetics at multiple universities, he founded the science-themed radio show, Quirks and Quarks, for the Canadian Broadcasting Corporation in 1974 and in 1979 he took over as host for The Nature of Things, a position he holds to this day (Suzuki, 2006). Suzuki has since become a Canadian icon, a global leader in the environmental movement, and a strong supporter of indigenous rights around the world. David Suzuki, who was transformed through his personal
experiences with nature as a youth now aims to inspire adults and youth around the globe to build a compassionate connection with the natural world through their own personal experiences. Suzuki’s transformative experiences, like those of Rachel Carson and Elon Musk came from outside the conventional education system, but were supported by further exploration within schools. The stories of these three well known individuals serve to remind educators that transformative learning may best occur in youth and need not wait for adulthood.

Through these three influential individuals it can be seen that childhood and adolescent experiences can inspire transformative learning to occur and carry into adulthood. Elon Musk’s experiences with computers as a child inspired the establishment of some of the most influential technology-based corporations in the world. David Suzuki and Rachel Carson are two of many inspirational authors, scientists, thinkers, politicians, and researchers who have undergone a transformations inspired by experiences in the natural world during their youth. Other examples include former Vice-President of the United States of America Al Gore, who attributes summers spent exploring his family farm as inspiring his lifelong compassion for environmental justice (Gore, 2006). Canadian Member of Parliament and Liberal Party leader Justin Trudeau often speaks of the influence childhood adventures in nature with his father, former Prime Minister Pierre Trudeau, had on his outlook towards the world (Trudeau, 2012). Environmental activist, influential early member of Greenpeace, and co-founder of Sea Shepherd Society Paul Watson can trace his environmental activist roots to an event that occurred at the age of nine when a ‘pet’ beaver of his was trapped (Sea Shepherd Conservation Society, 2013). He set out to destroy traps in the area around his home to prevent other animals from being caught creating a passion he continues to this day (Sea Shepherd Conservation Society, 2013). While not echoed within transformative learning theory these personal narratives speak to the powerful notion that
children and adolescents can in fact be transformed in a manner that can greatly influence their actions and perspectives of the world as an adult.

**Youth Organizations**

The notion that youth can undergo transformations in personal perspectives and ways of being, while not directly stated within conventional education systems is embraced within numerous international organizations. Scouts and Outward Bound are two of the largest, longest-running organizations in the world which promote because they recognize the malleability of a young mind to be transformed. Both organizations offer experiences that can transform through contact with the natural world. Scouts was founded in England in 1907 by Robert Baden-Powell as an organization which promoted personal growth and the acquisition of practical skills through outdoor experiences for youth (World Organization of the Scout Movement, 2007). The organization quickly expanded internationally and over a century later, membership is estimated to include over thirty million youth from over one hundred sixty nations (World Organization of the Scout Movement, 2013). Since its beginning the Scouting movement has undergone many changes leading to its modern emphasis on promoting youth to develop their “full physical, intellectual, social, and spiritual potentials as responsible citizens” (World Organization of the Scout Movement, 2011).

Scouts promotes the education of youth in both individual and community capacities through the use of experiential education methods. Scouts Canada aims to develop “capable, confident and well-rounded individuals” through participation in their camp and ongoing scouting programs (Scouts Canada, 2013). The age-specific programs place emphasis on personal experience including music, story-telling, camping, hiking, canoeing, rock-climbing, and organizing camps for younger participants and community members (Scouts Canada, 2013).
Scout programs encourage participants to learn new skills, to alter their sense of self, to build new understandings of the world around them and their place within it, and they promote a sense of leadership and community amongst members. It is through this combination of personal experience, reflection, and group discussion, all tenants of transformative learning theory, that participants are able to undergo transformations in perspectives and ways of being at a young age. I will highlight a few cases of a few world-renowned former Scouts.

Sir Richard Branson, founder of record label Virgin Records, airline Virgin Airways, and space travel company Virgin Galactic, among dozens of other companies and projects, has shared his views on his experiences in scouting. Branson has stated that scouting taught him more than conventional schooling did and that the program embodies leadership and adventure, attributes which were essential in his own business and personal ventures (Scouting Pages, 2013). Steven Spielberg, a film director best known for producing hit movies including E.T., Back to the Future, Jurassic Park, Schindler’s List, and Lincoln, attributes his success to his time spent as a Scout (McNicholas & Bixler, 2010). Spielberg created his first movie, Gunsmog, which starred fellow Scouts in an attempt to earn his photography badge (McNicholas & Bixler, 2010). Spielberg has repeatedly stated that his time spent in Scouts allowed him to develop the self-confidence needed to break into the movie business (McNicholas & Bixler, 2010). These two former Scouts are just a few of many people who were inspired to greatness through their experiences as youth in the Scouting movement.

Outward Bound, founded in 1941 by Kurt Hahn is an organization which promotes personal growth and social development through outdoor experiential education. The organization has expanded from its humble beginnings in Wales to now include forty official Outward Bound schools around the world with an estimated seven million youth participating in
its various programs (Outward Bound, 2013). Outward Bound, like Scouts recognizes similar experiences that relate to transformative learning theory. Emphasis is placed on challenging experiences that include opportunities for personal and group reflection, for compassion to be developed, and for new perspectives to be formed.

Outward Bound places emphasis on character development through authentic outdoor activity. Focus is placed on developing the “capacities of mind, body, and spirit to better understand one’s responsibilities to self, others and community.” (Outward Bound, 2013). Programs operated by Outward bound aim to develop these understandings through adventure, challenge, and outdoor experiential activity. After World War Two students built boats for local communities. Today urban children are offered opportunities to develop through wilderness travel. Outward Bound experiences require students to reconsider their self-image, question the limits they place upon their abilities, learn to work in groups, assume leadership roles, acquire new skills, and adapt to new environments in order to accomplish goals and successfully thrive in their environment (Outward Bound, 2013). During these experiences students participate in personal reflection and group discussion which are an essential part of the transformative learning process. These opportunities provide students with a safe place to consider their personal experiences and to develop a more complex view of the world around them. The importance of this aspect of transformative learning theory is outlined by Cranton’s (2006) statement that “reflection is still seen as a process of reconsidering experience through reason, and reinterpreting and generalizing the experience to form mental structures” (pg. 33). Personal reflection is often encouraged through soloing experiences when students spend a predetermined amount of time alone in the wilderness. Most programs emphasize soloing experiences to encourage a practice of reflection and personal growth. Programs range in length
anywhere from a week to a few months. Their focus varies from summer programs for students wishing to gain outdoor experience to those which allow troubled youth to experience new ways of being to abused women’s empowerment trips. All programs aim to aid youth in reassessing their perspectives on life and their everyday actions.

Both Outward Bound and Scouts incorporate personal experiences, reflection, group discussion, and active participation in the acquisition of new knowledge, skills and perspectives in the development of youth. When these global youth programs are considered along with the personal transformative experiences of the influential individuals discussed earlier it becomes more apparent that transformative learning theory can be applied to adolescents in a variety of ways, especially those including the use of experiential and environment-based education.
Chapter 3: Why promote transformation within students?

Chapter two outlines personal narratives and organizations which demonstrate that transformative learning can be applied to adolescents. This chapter will discuss why the education system would benefit from incorporating more transformative learning within programs. Discussions will center on three areas: the increasing separation of humans from the natural world, the need for long-term planning in an era where focus is often placed on short-term results, and the increasing corporatization of North America’s current education systems. Through an analysis of these three areas it will be shown that promoting transformation in students is not only an admirable goal, but that it is also a necessary step towards creating a sustainable, compassionate, and knowledgeable society.

The increasing separation of humans from the natural world.

Our species has evolved over tens of thousands of years to survive using hunter-gatherer techniques. It is only relatively recently that human-kind shifted from a rural, agrarian lifestyle to an urbanized, technology-based society. This drastic social, economic, and political evolution has led to the point where for the first time more people are living and working in urban areas than in rural areas (World Health Organization, 2013). One hundred years ago only twenty percent of the global population resided in urban areas, that number has risen to the point where today slightly more than half of the world’s people live in cities and by the year 2050 it is estimated that seventy percent of all humans will reside within urban centers (World Health Organization, 2013). This rapid shift in societal design and lifestyle has led to an increasing separation of humans from the natural world which has had many negative impacts on human health (Louv, 2008). While this shift away from nature results in some alarming effects on human health and society many of these effects can be mitigated using environment-based education infused with aspects of transformative learning theory.
Louv (2008) argues that the baby boomer generation, those born between 1946 and 1964, constitute the last generation of North Americans to share a familial attachment to the land and water. Louv examines this concept in greater detail in relation to the American frontier ideal. He argues that following the close of the American frontier in the 1890s a second frontier was born, that of the family farm. He states that in the year 1900 forty percent of American households were based on family farms with that number shrinking to less than two percent in 1990 (Louv, 2008, pg. 18). With this drastic decline in family farming Louv claims humans are now entering a third frontier, one where current and future generations are completely separated from rural life and the natural world. This third frontier features a severance of knowledge concerning our food origins, a blurring of lines between machines, humans, and other animals, and a complete disconnect from nature for many born in urban areas. Louv (2008) argues that the baby-boomer generation of the second frontier held a bond to the natural world through the family farm. Even if a person was born and raised in an urban center they often had a relative who owned a farm or who was part of the initial shift from rural to urban settlement in the early twentieth century. Louv (2008) argues generations born in the third frontier lack a basic connection to the rural world. Even urban life in this third frontier is different from urban life in the second frontier. Baby boomers may have been raised in cities with natural areas on their urban fringe, whereas generations born in this third frontier often know urban areas connected to other urban areas with little or no undeveloped green space within their borders. Louv states that in this third frontier, images of children playing outdoors seem as outdated as nineteenth-century depictions of knights, and that heroes previously associated with the outdoors such as Davy Crockett have become irrelevant (Louv, 2008).
According to Louv those born in this third frontier suffer from nature-deficit disorder. They are born and raised separated from nature and this alienation may be causing a wide range of physical and mental health problems (Louv, 2008). The idea of a nature-deficit is based upon many factors including an increasing focus being placed by schools on standardized academic achievement resulting in the marginalization of physical education including recess (Louv, 2008). Other factors influencing the rise of nature-deficit disorder include increasingly unhealthy highly processed diets, drastically lower numbers of youth engaging in daily physical activity due to the growth of video games and television, fewer children playing outside due to heightened parental fears of child safety, and increasing litigation resulting from injuries sustained outdoors resulting in restricted access for youth to play outdoors (Louv, 2008). These factors have contributed to create a world where youth spend less time outside interacting with each other and nature then they spend inside interacting through electronic devices such as computers, cell phones, and video games.

According to the World Health Organization the rapid shift towards sedentary, individualistic, technology-driven lifestyles has resulted in a global public health problem (WHO, 2006). Sedentary lifestyles in North America have resulted in higher rates of cardiovascular disease, high blood pressure, childhood obesity, and increased rates of sleep deprivation and diagnosis of behavioral disorders in youth including attention deficit hyperactivity disorder and attention deficit disorder (Louv, 2008). Between 1991 and 1997 the number of American adolescents who were physically active for more than twenty minutes per day declined from 34.2% to only 21.7% (Lowry, Wechsler, Kann, & Collins, 2009, pg. 145-152). The number of American students who attended physical education classes dropped from 42% to 28% between the years 1991 and 2003 (Louv, 2008, pg. 99). This data shows a staggering
decline in the amount of physical activity experienced by North American’s of all ages resulting in drastic effects only now being recognized by society.

Adult obesity rates in the United States increased more than 60% from 1991 to 2000 while childhood obesity rates increased 36% in children aged two to nine (Louv, 2008, pg. 47). In Canada the number of obese children aged seven to thirteen tripled between the years 1981 and 1996 (Carriere, 2003). These numbers are concerning as obesity is closely related to a number of long-term health issues including cardiovascular disease, diabetes and hypertension (CDC, 2012). It is estimated that obesity costs the Canadian economy between five and ten billion dollars per year through direct health-related costs and indirect costs such as decreased productivity (Public Health Agency of Canada, 2011). The amount of money spent on preschool aged students diagnosed with ADHD increased by 369% in the first three years of this millennia (Louv, 2008, pg. 101). While these numbers may be difficult to comprehend the solution to many of these issues might be as simple as spending time outdoors.

The notion that nature holds restorative powers is an ancient one which is only now being examined through a modern scientific lens. Despite centuries of experience using nature to treat stress and mental illness it is only recently that modern science has begun to explore this process. While the focus of studies exploring the benefits of human interaction with nature have varied greatly, the findings are similar. Studies have shown that while recovering from surgery, patients in rooms with views of trees tend to leave the hospital sooner than those in rooms with no view (Frumkin, 2001). Another study found that inmates who were incarcerated in cells with views of the prison interior were sick 24% more often than inmates with views of natural spaces outside of the prison (Louv, 2008, pg 46).
Other studies have shown the immediate impact nature has on human stress levels. Studies carried out in England and Sweden found that joggers who exercise in natural settings feel less anxious, stressed, or depressed than people who exercise the same amount in gyms and built environments (Pretty, Peacock, Sellens, & Griff, 2005). A study from Cornell University found that children who live in areas with high nature conditions, such as views of nature from their rooms or nearby parks and green space are less likely to feel distressed during times of stress than children living in areas isolated from green space and without views of nature (Wells, 2003). Similar research being conducted at Carleton University is finding that students who walk outdoors on their way to class feel less stressed and anxious than students who travel to class using underground path systems (Nisbet, 2012).

The findings of these studies mirror those of a study from the UK which used a mobile EEG machine to measure the emotional responses of individuals walking in wooded areas. Results of this study found that walking in green spaces resulted in lower levels of frustration compared to walking in urbanized areas and also led to higher levels of engagement in work after leaving the green space (Aspinall, Mavros, Coyne, & Roe, 2013). These studies, while having vastly different focuses when taken together show the influence even a small amount of interaction with nature can have on people’s physical and mental well-being. The findings of these studies are significant in that they identify immediate benefits resulting from short interactions with nature. Quick walks through parks or green spaces, taking classes outside, and ensuring classrooms have views of trees and green spaces are ways nature could easily be incorporated with minimal disruption to existing school routines.

While the restorative powers of nature are subject to scrutiny, the increasing body of research in the field is encouraging. A few cases of governments embracing the concept that time
spent in nature can benefit individuals and society as a whole are occurring. Japan provides an alternative political outlook as it uses nature as preventative medicine. Shinrin-yoku, or forest bathing, is an increasingly popular way for the Japanese to escape the noise and stress of the city. Forest bathing is an ancient Japanese tradition founded in Shinto and Buddhist practices which encourages participants to interact with and experience nature using all bodily senses (Miyazaki, 2013). The Japanese government has embraced this traditional concept through the planned construction of one hundred trails designed for shinrin-yoku in the next decade, with forty-eight in existence today (Williams, 2012). Through this complete interaction with nature it is believed that participants can improve cognition, relieve anxiety and stress, and boost empathy.

An increasing body of scientific research is backing up these beliefs including joint studies by Yoshifumi Miyazaki and Juyoung Lee of Chiba University involving over six hundred participants over the past decade (Miyazaki, 2013). These studies have aimed to examine the immediate health benefits experienced by those participating in shinrin-yoku and have found encouraging results. One study examined two hundred eighty-eight participants who took part in day-trips to one of twenty-four forest-bathing locations. The study found that visiting these sites resulted in a 13% average decrease in the stress-causing hormone cortisol and an 18% decrease in sympathetic nerve activity which is responsible for the ‘fight-or-flight’ response to external threats (Miyazaki, 2013). Results also showed a 2% drop in blood pressure and an average increase of 56% in parasympathetic nerve activity which regulates the bodies organs, usually when the body is resting after intensive activities such as eating, digesting, or becoming sexually aroused (Miyazaki, 2013). Another study undertaken by Yoshifumi and colleagues examined the effects of a day in a shinrin-yoku area on twelve male university students in comparison to a day spent in an urban area. Participants were measured for heart rate variability, blood pressure, and
pulse rate at multiple times throughout the day. The results of this study show that while in the woods the participants had lower blood pressure and heart rate variability signifying that participants were in a more relaxed state in the woods than while in the city (Park et al., 2009). While these studies are narrow in their focus, they provide a unique body of evidence which supports the notion that simply spending time in a natural outdoor space can have positive physical and mental health benefits. They also may be the initial signs of how societies can transform by supporting health through contact with nature versus the use of pharmaceuticals only.

The increasing separation of humans from the natural world not only results in negative physical and mental health effects, it has also led to a disconcerting change in the way people view nature. The concept of what nature is has undergone a drastic transformation in recent generations. Through a consideration of Louv’s ideas regarding the various frontier stages in American history one can build an understanding of the changing way in which we value and define nature. As the frontier closed and the continent became more densely developed the idea of nature began to shift from one of common everyday areas such as rivers, fields, forests, and valleys to one of more grandiose, sublime, awe-inspiring settings such as those which became embodied within the National Parks systems of Canada and the United States (Cronon, 1996). This shifting view of nature, coupled with the increasing separation of humankind from the natural world has had a profound impact on modern society. Fewer people building connections with nature leads to fewer people understanding the Earth’s natural systems and how human actions can impact these systems. By incorporating EBE techniques into curriculum planning and design educators can encourage students to build an understanding of their connectedness to all life on Earth.
The increasing separation of humans from the natural world has brought attention to the question of how students are taught. It is important that students are encouraged to reconnect to the world around them, explore their local natural environments and to build an understanding of how their everyday actions impact the world around them. As outlined in this chapter it is important to do this in order to build and maintain healthy, sustainable relationships with the natural world and to encourage healthier lifestyle choices including daily physical activity. The studies discussed in this chapter show that it is possible to reverse physical and mental health trends including increasing obesity rates and stress levels by incorporating nature and daily physical activity within classroom learning. Ontario’s education system is well situated to address such health concerns as many waking hours of children’s formative years are spent in schools. Some means to do this will be discussed in chapters four and five.

**Human impacts on a finite planet**

As all aspects of daily life become increasingly dependent on technology people gradually develop an identity that is separate from the natural world. For many, a day can go by without a conscious connection being made with the natural world. Exponential population growth and the rapid development of societies around the world have resulted in numerous pressures being placed upon the Earth’s natural systems. Resource depletion and climate change are two areas which require immediate action and long-term planning to prevent possible catastrophe. It is important that these pressing issues be addressed and that students become educated about the collective impacts of human activity on the natural world. Many students will graduate from elementary, secondary and even post-secondary school with minimal understanding of the Earth’s natural systems or of concepts such as climate change, resource depletion, or the greenhouse effect (Puk & Stibbards, 2011). This lack of awareness is due to the organizational structure and priorities of Ontario’s education system. Students need new,
innovative, engaging educational experiences which can connect subject matter to real-life, relevant issues. As David Orr (1994) states, “for the most part, however, we are still educating the young as if there were no planetary emergency. Remove computers and a scattering of courses and programs throughout the catalog, and the curriculum of the 1990s looks a lot like that of the 1950s” (pg. 27). The need to address local and global environmental issues is often ignored within this dated system. The next section of this project will build a case for increased EE by examining how climate change and resource depletion have become real, tangible threats. Such issues must be addressed within the education system in order to ensure that future generations of students become ecologically literate.

The date of December 24, 1968 may not stand out as a significant date in human history but an event that occurred on this day changed the way the world is perceived. During Apollo 8’s lunar orbit, a photograph known as ‘Earthrise,’ was taken, which put into perspective the finite nature of the planet (Gore, 2006). This photograph shows the Earth rising above the surface of the moon, providing humanity with a unique view of the Earth as an oasis in the vast emptiness of space. It is through this photo, often cited as one of the most influential photos ever taken, that humans became capable of considering just how isolated the world really is (Gore, 2006). This photograph depicts how everything that sustains life on this planet is found on this one round rock moving through an interstellar ocean.

For much of human history it was believed that the planet was an immense, bountiful place rich in resources which could never be exhausted. Only recently have scientists begun to understand just how limited the Earth’s resources are. This has led to increasing concerns about the carrying capacity of the planet. As the global population skyrockets and consumer culture spreads across the globe almost inconceivable quantities of resources are being extracted from
the planet with little consideration of the long-term effects this will have on the Earth’s systems as well as future human generations.

The concept of peak oil has only recently entered the public consciousness and has had its share of skepticism. Peak oil is a concept first brought to light by Marion Hubbert in the late 1950s (Rifkin. 2002). The basis of this concept is that there is a finite amount of oil on Earth and that at some point production will reach a peak followed by a decline as the resource supply runs out and becomes harder and more expensive to extract. In 1956 Hubbert predicted that the United States would reach its maximum rate of oil production in the late 1960s or early 1970s (Rifkin. 2002). Hubbert’s predictions proved true as the United States saw domestic oil production peak at the start of the 1970s leading to oil and gas shortages, drastic price fluctuations, and increasing American reliance on foreign oil. On a global scale the concept of peak oil is a point of debate. Estimates vary with some stating that global peak oil either already occurred in recent years or it could occur sometime in the next twenty years (Rifkin. 2002). The development of Alberta’s Tar Sands and the increased use of hydraulic fracking throughout North America are driven by increased demand and dwindling supplies of easily accessible oil.

Understanding the concept of peak oil is important as it un_masks and creates an awareness of society’s dependence on abundant, cheap oil for survival. A permanent decline in oil production could lead to significant price increases, supply shortages and even wars based on acquiring or controlling the dwindling supply of this resource society is increasingly dependent upon. The notion that oil production will hit a peak level is an understood truth as it takes millions of years for oil to form and global reserves are known to be limited. What is uncertain is the time at which peak oil will occur, if it has not already, and how quickly production will decline. According to a study by British Petroleum (2012) proven oil reserves stand at 1,653
billion barrels globally (pg. 6). Ignoring the rapid increase in car ownership and oil usage occurring within developing nations, at current usage rates of 88 million barrels per day the global oil supply is estimated to last approximately half a century at which point the remaining oil on the planet may be locked away in places that are too hard or expensive to access (British Petroleum, 2012, pg. 6). While a half century limit on accessible oil is a troubling prospect, others including the United States Geological Survey predict that oil reserves could become depleted somewhere between the years 2020 and 2037 (Rifkin, 2002, pg. 17). Since it is known that at some point this resource will run out it is imperative that youth be educated about conservation and renewable energy technology to ensure the resources modern society are dependent on aren’t depleted before alternative, sustainable replacements are found for them.

Oil, while being the most obvious, is far from the only resource humans are rapidly depleting from this planet. Rare metals, fresh water, top soil, and food are all resources which humankind depends on for survival. Each of these resources are being depleted in incredible quantities which could result in far-reaching effects. Natural gas, often discussed as a replacement for conventional gas, is estimated to have a global supply which at current usage rates could be depleted in less than sixty years (British Petroleum, 2012, pg. 20). The world supply of coal, estimated at 8.6 trillion tons, ignoring increased usage rates, is estimated to be enough to last another one hundred twelve years before supplies dwindle (British Petroleum, 2012, pg.30). The world supply of indium, a rare metal used in producing LCD televisions and screens, will run out in eighteen years if current rates of use continue (Scientific American, 2010). Based on current consumption rates the global copper supply may run out around the year 2044 while easily accessible gold and silver supplies could run out around the year 2030 (Scientific American, 2010). These rare metals make up integral parts of many consumer
products and industrial processes. Running out of these resources in the next twenty to thirty years could have incomprehensible impacts on the global economy and population, yet their rarity and importance is often overlooked. With limited resources remaining on Earth it is important that citizens seek to use these resources to develop truly sustainable technologies. While debate will occur regarding which technologies are truly sustainable, education and problem solving at this level must be encouraged in order to address future issues related to resource depletion.

Metals are not the only resources threatened due to unsustainable rates of overuse. The United Nations predicts that by the year 2025 more than 1.8 billion people will be living in areas of extreme fresh water scarcity with two-thirds of the global population living in areas where water supplies are stressed (Food and Agriculture Organization of the United Nations (FAO), 2012). Water scarcity can have dire impacts on communities in need of fresh drinking water as well as the intricate global agricultural systems which support the global economy. Youth could be engaged in understanding water scarcity by exploring issues such as water usage rates and regulations in their local communities. Phosphorus, another resource of great significance for agricultural fertilization is estimated to have enough global reserves to allow for between fifty to one hundred years of use unless new supplies are found (Global Phosphorous Research Initiative, 2011). The very soil within which food is grown is also under threat. It is estimated that topsoil erosion in the United States is occurring at a rate ten times faster than its natural replenishment while in China and India this erosion is happening at almost thirty times the replenishment rate (Pimentel, 2006). When considered globally an estimated 30% of the world’s arable land has become unproductive over the past forty years due to erosion (Pimentel, 2006). The dwindling global supplies of topsoil, fertilizer, and fresh water is a troubling prospect in the face of rapid
population growth which is expected to increase global food demands 70% by the year 2050 (FAO, 2008, pg. xvii). Students could examine these complex issues and participate in authentic learning experiences which address the root causes of these problems. Organic farming, no-till agriculture, hydroponic farming, aquaculture, and the health of soils can all be studied within EBE through site visits or small-scale community and school-based projects. Examination of these issues and action to address them can promote transformation in students. As the impact of daily routines becomes evident, alternative courses of action can be planned and implemented which address these issues creating more ecologically literate citizens.

As demand for food increases the types of food we rely on continue to decline. In the United States around one hundred kinds of apples are now grown for consumption. This number is down from nearly seven thousand varieties grown in the nineteenth century (Siebert, 2011). Over the past century in the United States the variety of tomato seeds available for sale decreased from 408 to 79; cucumber varieties declined from 285 types to 16; lettuce from 497 to 36; and corn from 307 to 12 (National Geographic Society, 2011). Overall it is estimated that more than half of the varieties of food available around the world have disappeared over the past century (Siebert, 2011). Land-based sources of food are not alone in being pushed to meet the demands of a rapidly developing societies. Over the past half century tuna stocks have been halved and due to increased consumer demands tuna may be extinct within the next half century (Juan-Jorda, 2011). The same industrial fishing practices which threaten the global tuna population have also led to 30% of the world’s shark species being listed as endangered or threatened (PEW, 2013).

When these staggering numbers are considered alongside population growth estimates for the world over the coming decades and centuries it becomes obvious that the human species is
approaching a time of rapid change when the resources which sustain current lifestyles will begin to dwindle. Due to these approaching resource shortages and the societal changes which will undoubtedly accompany them it is important that youth become educated to achieve higher levels of ecological literacy so they can build an understanding of how small individual actions can impact the world when considered collectively. Too often educators simply download this overwhelming and often discouraging information to youth as they themselves are unaware of ways to empower students to deal with it. Educators must remain mindful of this knowledge and the ‘big picture’ while making age-appropriate learning experiences and EE a priority for youth.

Resource shortages are not the only major challenges that humans will face in coming decades. Anthropogenic climate change is a significant problem which is only now becoming understood. There are numerous ways which climate change may impact society in coming decades and centuries. Global temperature increases and rising sea levels are two of the most widely recognized issues which humankind will need to overcome. An educated workforce and populace dedicated to addressing these issues is necessary in order to mitigate the widespread effects these process will have on the Earth’s natural systems as well as humanities global systems including agriculture and commerce. As such it is imperative that meaningful, age-appropriate EE be provided for youth to ensure that future generations understand both the limitations and impact collective individual actions and government inaction can have on the global community.

Students also need to develop critical thinking and analysis skills in order to assess the validity of arguments they are presented with. In an age where smartphones and twenty-four hour news reporting provide limitless access to information it is important that students build an understanding of how private interests are capable of influencing government policy and media
reporting. While privately controlled media outlets including Rupert Murdoch’s Fox News and the Wall Street Journal attempt to convince the public that these issues are all but certain, an overwhelming majority of the scientific community agrees that climate change is occurring and influenced by human activity (Dunlap & McCright, 2010). A recent publication analyzed all peer-reviewed scientific papers related to climate change published between 1991 and 2011. A total of 13,950 studies were considered. The study found that 99.83% of these studies related climate change to human actions (Powell, 2012). The article did not specify the focus of the various studies it considered, but instead coded and analyzed trends in the research to discover the extent to which the scientific community agrees climate change is impacted by human actions. This data shows that the scientific community overwhelmingly agrees that human processes are furthering climate change. What is less certain is exactly what effects climate change processes will have on the world. This paradox between scientific understanding and media-driven denial illustrates the importance of incorporating media literacy and scientific thought within adolescent education.

Depending on the area of study, the modelling procedures followed, and the data being analyzed, estimates for global temperature increase vary between 2 °C and 6 °C by the year 2100 (Intergovernmental Panel on Climate Change (IPCC), 2007, pg. 45). These temperature increases will have numerous impacts including decreasing ice and snow cover in glacial areas which will allow higher levels of solar radiation to be absorbed by newly exposed water and rock; the melting of permafrost which will release large amounts of methane, a greenhouse gas into the atmosphere; changing ocean and air currents which will alter precipitation patterns and disrupt global agricultural production; and sea levels rising anywhere from a few inches to a few feet by the end of the century (IPCC, 2007, pg. 45). Sea level rise could not only threaten hundreds of
millions of people living in coastal areas but it could lead to transportation links being disrupted and fresh water supplies being salinized.

While resource depletion and climate change seem like monumental problems it is possible to take preventative action now to prepare for and mitigate any changes the global community might face. Renewable energy technology can be developed to reduce greenhouse gas emissions. Developments can be planned to use minimal resources and to limit impacts on local environments. Food waste can be reduced. Local, sustainable food can be consumed in place of sources which are currently under threat. Waste can be recycled and reused instead of being thrown in landfills. There are seemingly countless actions that can be taken to minimize the impact humans have on the world. It is now up to individuals to lobby policy makers to demand that society minimize impacts and address the problems created by overconsumption and climate change. Educational programs need to support students’ growth by aiding them in understanding the seriousness of these environmental issues and to provide them with the confidence to take explore new actions and understandings which can address these problems. The need to build an understanding of the Earth’s systems and the impact humans are having on these systems is the main reason why EE must be provided to students of all ages. Unfortunately many schools do not emphasize EE due to a lack of curriculum or support through policy change and teacher education. This trend must be reversed in order to build sustainable communities and societies capable of living within the restraints a finite world places on all living creatures.

**The corporatization of education**

Previous sections of this chapter outlined reasons why it is critical to integrate EE and ecological literacy within the education system. This section aims to consider how the corporatization of education has impacted learning including the study of environmental issues.
This section will also examine how applying transformative learning theory to adolescent students using EBE can act to mitigate the effects of this increasing corporate influence. This will be done by exploring how education in Ontario has increasingly become influenced by corporate ideals and how this process has led to the acceptance of standardized curriculum and testing methods. This will lead to a discussion of how standardized curricula encourages the commodification and devaluation of certain types of knowledge, specifically EE.

The acceptance of corporate culture within North American education systems began in the period following World War Two when neoliberal economic policies were accepted and promoted within society as part of a government driven war on fascism (Lewis, 2012). By embracing these policies it was believed that notions such as liberty and identity, which fueled World War Two could be replaced with the idea that society should embrace values, relationships, and identities based on free-market ideals (Giroux, 2002). Acceptance and expansion of these neoliberal economic policies led to the promotion of personal wealth accumulation and what is commonly referred to as the ‘American Dream’. The growing acceptance of free market ideals brought about a period of public service cutbacks in response to the growing belief that the free market should determine the value of goods and services and that the government should not interfere with market forces (Lewis, 2012). This free-market mentality and the cutbacks it produced brought about a subsequent devaluing of the very civil institutions which once worked to create a sense of community within society (Giroux, 2002). Areas affected by these funding cuts included public broadcasting, libraries, healthcare, and education (Giroux, 2002). The cumulative effect of decades of this process unfolding resulted in school board budget cuts, program closures, staff reductions and increased class sizes (Anderson & Jaafar, 2003).
Public service cutbacks coupled with the expansion of free-market corporate ideals within all aspects of Western society over recent decades has brought about an increasingly corporate focus within education systems. This corporate tone can be understood through an Ontario Ministry of Education and Training report which states that excellence in education should be determined in relation to graduate’s abilities to contribute to the development of the province and “the system’s ability to meet employer and workforce requirements for well-trained graduates” (Ministry of Education and Training, 1996, pg. 5). That is, if the education system is functioning according to government ideals it is producing well-trained, employable graduates with the ability to contribute to the growth of the economy. This statement depicts a view of education as simply a way to produce workers for businesses. There is no mention of creating critically reflexive, engaged, compassionate citizens. Instead a focus arises that emphasized creating workers and consumers to further the expansion of capitalism and corporate culture. This corporatized view of education reflects the ideas of Wrigley (2007) who states that “capitalism needs workers who are clever enough to be profitable, but not wise enough to know what’s really going on”. In effect this statement underlines a corporate need for students educated in subjects that are useful for accomplishing corporate goals including market expansion and increased profits, not graduates who are educated in areas which aim to pursue personal growth or public good.

Michele Foucault states that power comes not from holding knowledge, but from controlling the production and dissemination of knowledge (Rinehart, 2012, pg. 4). The drive behind the corporatization of education can be understood through this understanding of the power of knowledge and knowledge production. If corporations can influence places of higher learning, places where knowledge is created and transferred, then corporations can in effect
produce power and control over other areas of society. The increasingly accepted corporate-influenced view of the purpose of education has had wide-spread effects on program funding, curriculum design, and assessment at all levels of education. These views and policies stand in stark contrast to the opinions of many including Giroux (2002, pg. 429) who view higher education as one of only a few public spaces left where students can learn to question, to become engaged citizens, and to reaffirm the importance of the public good.

The process of standardization in Ontario’s education system came about in the late 1990s under the leadership of Mike Harris and the Progressive Conservative Party (Wein & Dudley-Marling, 1998, pg. 406). The Harris government mandated the streamlining of education across the province through a series of acts which resulted in budget cuts, the restructuring of school boards, and drastic alterations to funding models (MacLellan, 2009, pg. 62). It was argued that these changes would “ensure greater accountability and contribute to the enhancement of the quality of education in Ontario” (Volante, 2007 pg. 4). Later, it was revealed by then Minister of Education John Snobelen that the Harris government was attempting to create an educational crisis. This crisis would allow for drastic changes to be made to the provinces education system including the standardization of the provincial curriculum and the introduction of standardized testing procedures, both of which exist in altered forms today (MacLellan, 2009, pg. 52).

A major shortfall of this standardization procedure is that it places emphasis on teachers to cover fragmented curriculum requirements at the expense of student creativity, reflection, and intellectual engagement (Wein & Dudley-Marling, 1998, pg. 410). The corporate undertone of the education system places focus on efficiently achieving government mandated curriculum requirements with little mention of engaging students in thought-provoking activities which may
inspire them to consider their goals in life and desires for the future. In effect this curriculum acts to turn teachers into “technicians carrying out instructions determined by someone else” as educators become bureaucratic managers responsible for meeting goals and deadlines rather than the needs of their students (Wein & Dudley-Marling, 1998, pg. 411). Through this process the roles and responsibilities of teachers are shifted away from directly addressing the needs of students to meeting the requirements set forth by the government. At the same time the subject matter addressed in schools has become increasingly compartmentalized and pre-determined. Due to a lack of integration within curriculum planning, recently implemented Specialist High Skills Majors programs developed to match student interests with career development often lack subject integration. They are simply a series of individual courses taken to receive special certification. This outlines the hollowing out of the education system as the focus of courses shifts from creating an understanding of subject matter to meeting course requirements for graduating with a special certificate.

The divide between government-regulated educational policy and student needs and interests can be seen through the lack of EE provided in Ontario’s public school system. Studies have shown that younger age cohorts including adolescents and the ‘millennials’ place increased emphasis on environmental issues in comparison to other age groups in society (PEW Research Center, 2011). The Ontario Ministry of Education did not comprehensively address EE until the publication of the Shaping our Schools Shaping our Future report was released in 2007.

The Ministry of Education has repeatedly stated that it has been unaware of a compelling public interest in EE (Information and Privacy Commissioner of Ontario, 2007). Despite these claims a working group was established to examine the need for increased EE within the
province. This group provided the province with thirty-two recommendations for expanding EE including the development of provincial policy which would “signal the importance of environmental education” in Ontario schools (Working Group on Environmental Education, 2007, pg. 11). In response to these recommendations the Ministry of Education created a policy framework for EE which outlines ways in which educators can incorporate environmental themes within their courses. Unfortunately this framework does little more than to recommend how educators can shoehorn environmental issues within existing, segmented curricula. Despite grand statements on the importance of EE the document does little to encourage meaningful change. The report makes bold statements about the benefits of EE such as “research has shown that environmental education not only increases students’ environmental literacy but also contributes to higher academic achievement for all students” (Ontario Ministry of Education, 2009a, pg. 5). The report also outlines the importance of improved and expanded EE by stating “more than ever, it is vitally important that our education system not only prepare students academically but also provide them with the skills, perspectives, and practices they will need to meet the social and environmental challenges of the future” (Ontario Ministry of Education, 2009a, pg. 7). These statements point to the recognized importance of these issues, yet no further action has taken place to ensure EE is implemented throughout the education system. Despite stating the importance of EE and integrated approaches to learning, this framework offers little more than broad recommendations that EE should be incorporated within existing curricula and school structures. The Ministry of Education stopped short of establishing any teacher training programs or mandatory courses for students.

The compartmentalization and regulation of curriculum which continues to affect Ontario’s education system also resulted in the implementation of province-wide standardized
testing procedures. The procedures were put in place as part of a policy aimed to create more transparency within the education system. In reality these government imposed province-wide tests have increasingly taken focus away from classroom teaching as students are required to prepare and practice for standardized tests at the expense of other courses. According to a 2005 poll by the Ontario College of Teachers 71% of teachers across the province view these standardized testing measures as unnecessary and ineffective (Ontario College of Teachers, 2005, pg. 13). Similar sentiment is felt in the United States where only 26% of teachers say standardized tests accurately reflect student knowledge and only 28% of teachers view these tests as an important part of education (Bill and Melinda Gates Foundation, 2012, pg. 29). Teachers argue that standardized testing reflects regional, linguistic, and social-economic disparities and that the money invested into these testing programs would have gone to better use if invested directly into classroom learning (Volante, 2007). Despite these critiques and ongoing opposition from teachers, these testing methods remain in place and continue to be viewed by provincial governments as accurate measurements of student achievement.

The combined results of the standardization process have led to the creation of an education system where students learn in a “high-pressured, disengaged way” a succession of testable facts which often lack context or assist in developing a critical sense of the world (Wrigley, 2007). This way of teaching places emphasis on standardized test scores and teaching students how to take these tests rather than teaching students how to build research and communication skills, how to properly assess information, or how to think critically. In a world where everything is increasingly interconnected it seems counter-intuitive to teach in compartmentalized segments when, upon graduation the next generation of leaders will be faced with problems requiring detailed analysis of intricate global systems (Cortese, 2003).
standardization process, adopted due to the increasingly corporate focus of education was justified as part of a streamlining process which would create a more efficient education system. In reality these changes have worked to commodify knowledge and education and to alter the focus of education away from the common good towards the needs of businesses.

To understand how a move to standardized public education has resulted in the commodification of knowledge one must consider the broader impacts this process has had on all levels of education. The standardization of curriculum and testing across the province works to make knowledge a commodity as it becomes more important to learn test materials and how to succeed in the standardized testing process than to learn how to learn. Knowledge is viewed as a commodity to be gathered and traded on the free-market in exchange for employment, income, and prestige (Lewis, 2004). Through this process some areas of study, such as business and medicine gain increased importance due to the financial benefits they bring students and educational institutions while others, including environmental science and fine arts become threatened due to a perceived lack of benefit or threat to existing power structures (Gruenewald, 2004). Commodification at the post-secondary level also occurs through the downloading of educational costs to post-secondary students through increased tuition costs and the growth of student loan programs which act to turn students into investors. These processes act to further the acceptance of the corporate culture within education and society as a whole and to make knowledge a commodity to be traded in the marketplace (Lewis, 2012).

Rarely in life are people confronted by issues which exist in the format which students are increasingly being educated, yet standardization and compartmentalization are commonly accepted and often without question. The process of standardization acts to marginalize areas of
knowledge which are seen to have less value or importance in an increasingly capitalistic society (Orr, 1994). Environmental science was firmly entrenched in Ontario’s curriculum prior to the standardization processes of the Harris government in the late 1990s. When environmental science was removed from the curriculum the possibility for a knowledge gap was created as students graduated and took up careers, including teaching, with little environmental awareness.

In order to learn about environmental sciences students in Ontario secondary schools are expected to be satisfied with the small sampling of the material now covered in other subjects such as geography, or if they are lucky they are able to sign up for one of the few integrated programs offered by various school boards with an environmental focus. This knowledge gap at the secondary level has negative effects beyond the high school. Since environmental science is no longer offered at most schools many students are not given the opportunity to explore their interest in the subject. This results in fewer students applying to post-secondary studies in related areas which can influence program funding at the post-secondary level (Selna, Glaser, Trussel, Chan, & Sullivan, 2006). An example of this devaluing of subject matter can be seen at the university level where only a few of Ontario’s universities offer outdoor education and environmental science teaching certificates to students in Faculties of Education. This results in fewer teachers qualified to teach the discipline at the elementary and secondary level, therefore fewer people are able to address the knowledge gap. Teachers entering the profession today may never have taken a high school or teacher education course, class, or workshop related to environmental education, yet they may be teaching it. Those educators who do address EE in their classes are often motivated by their own self-derived awareness of environmental issues. This creates an uneven mixture of opportunities for students to explore EE in various school boards.
Change in government funding of post-secondary education has also worked to further commodify knowledge and education. Government cutbacks have led to decreasing budgets for many educational institutions and school boards. At the post-secondary level these cutbacks mean students are required to directly fund more of the expenses related to their education through higher post-secondary tuition and student fees (Slaughter & Rhoades, 2009). These costs have greatly increased over the past few decades requiring many students to take out substantial loans in order to pay for their education. In Ontario the average tuition charged to a domestic student enrolled in a Bachelor of Arts program has increased from $1,680 in 1990-91 to $5,160 in 2006-2007, a 207% increase in a decade and a half (Canadian Broadcasting Corporation, 2012). Across Canada the average tuition cost has increased by 6.2% per year, nearly triple the rate of inflation (Macleans, 2012). This process of government underfunding of education causes student’s to become consumers of education and knowledge (Slaughter & Rhoades, 2009). As many students are required to borrow substantial amounts of money to pay for their education focus changes from the quality of the educational experience received to the quantity of monetary return a student can receive on their investment (Lewis, 2012). It is now estimated that over 60% of undergraduate students in Canada will leave university with an average student debt of approximately $27,000 (Macleans, 2012). This increasingly large debt-load incurred by a majority of students in Canada causes students to focus on job prospects and income available following graduation rather than passion and personal interest. This shift in focus feeds into the cycle of devaluing certain disciplines as degrees which promise higher incomes become more attractive to students needing to pay off these large student debts.

This process of commodifying knowledge places corporate ideals at the heart of learning. The effects are felt directly at the post-secondary level where programs are subject to funding
changes at individual institutions. At the elementary and secondary level this process occurs as a result of the standardization of curriculum, increased emphasis on standardized testing and through influencing student’s studies by valuing certain certifications and areas of knowledge more than others. This process can be remediated by expanding the focus of education to include disciplines which are often marginalized in current education systems. Reintegrating and expanding disciplines like environmental studies into the curriculum can act to oppose the commodification of learning in numerous ways. The integration of EBE techniques into conventional classroom teaching can provide an alternative to the standardization of curriculum and testing through the use of project-based and experiential learning, student-driven learning, and alternative forms of assessment. EBE methods can also work to oppose the commodification of knowledge by reconnecting learners with their classmates, communities, and the world around them and by embracing fields of study which are currently marginalized. In order to understand how this is possible it is necessary to understand the way and extent these programs can impact students and communities.

As this chapter has shown there are numerous reasons to increase EE and promote transformation within students. The growing separation of humans from the natural world has led to a subordination of the Earth’s natural systems. Human systems of economics, industry, and agriculture are increasingly viewed as more worthy of protection than the natural processes which sustain all life on this planet. Exponential population growth driven by the predominance given to these human systems has led to widespread resource depletion and global climate change. Expanding EE and embedding transformative experiences within the curriculum works to educate future generations about these issues and to encourage students to adopt habits which address these problems. In order to implement these changes it is necessary to address the
increasingly corporate focus of education. Students must be encouraged to learn experientially, connect with the natural world, and to build relationships with the community and each other in order to create more holistic, engaging, sustainable education and societies.
Chapter 4: How EBE promotes transformative learning within students

This chapter will focus on various ways in which EBE directly benefit students and communities. This will be done by exploring three areas within which EBE works to promote transformative learning and the benefits these processes have on students. Areas which will be examined include taking students outside, the cross-curricular nature of these types of programs and providing students with the opportunity to participate in authentic learning experiences. Through an examination of each of these three areas it will be shown that EBE can promote transformative learning, benefit student’s academic success, social and cognitive development and promote healthy, compassionate communities while at the same time developing students’ ecological literacy.

Taking students outside

While many outdoor programs and field trips promote adrenaline-pumping outdoor activities such as rock climbing and kayaking the benefits of simply taking students outside to interact with and experience the natural world can have wide-ranging and lasting impacts. Today’s youth are experiencing an alarming disconnect between their personal life experiences and the natural world (Louv, 2008). As discussed in earlier chapters there has been an alarming decrease in the amount of daily physical activity experienced by youth in recent years. This decrease in physical activity is often coupled with an increase in time spent using electronic devices such as televisions, computers, video games, and smartphones. A study released in 2006 found that in America children between the ages of eight and eighteen spent an average of 6.5 hours per day or 45 hours per week plugged in electronically (Roberts, Goehr, & Rideout, 2005). This shift away from physically active lifestyles has continued the growing disconnect between humans and the natural world which further perpetuates public health issues including increased rates of obesity and obesity-related health complications (like diabetes), stress-related health
issues and increased diagnosis of behavioral disorders. The increasingly sedentary lifestyles which lay at the heart of these problems can be addressed through EBE programs, which can offer students opportunities to engage in physical activities and experiences often unseen in conventional classroom environments.

EBE programs have the opportunity to connect students to local communities and environments through activities such as gardening, hiking, walking, biking, camping, and canoeing trips as well as through the use of experiential activities in the learning process. These experiential activities can take many forms and should be applied to any lesson to engage students in the learning process and promote physical activity. Macro models are one form experiential activities may take. Macro models are interactive learning opportunities that require students to physically participate in activities which mimic real-world scenarios (T.R.E.E., 2009). Examples of macro model activities include having students run around a school yard gathering ‘resources’ required to build a common consumer product. This activity mimics the movement of consumer products and their constituent materials throughout the global marketplace. Another activity may require students to role-play as chemicals traveling throughout the environment through bioaccumulation. Macro models educate in numerous ways. First they can be used to foster a sense of community in the classroom as students may be required to work in teams or to participate in activities outside of their comfort zone including acting, dance, or sustained physical activity. Second, these experiences can also be used to promote healthy lifestyles through the promotion of daily physical activity. Another important aspect of these activities is their ability to connect abstract concepts to students through enjoyable first-hand experiences that bring concept learning off of the standardized textbook page.
A study by Puk and Stibbards (2011) examines how participating in a series of outdoor macro model activities can impact students ecological literacy. Puk and Stibbards (2011) explored the impact that EBE has on preservice teachers’ understanding of ecological concepts. The study found that preservice teachers, university students completing their Bachelor of Education prior to becoming teachers, often lacked even a basic understanding of ecological concepts yet they would soon be expected to teach such concepts to future students. Puk and Stibbards (2011) considered how the use of macro models and nature-embedded experiential learning impacted the acquisition of ecological knowledge for these preservice teachers. The students enrolled in the course participated in twenty-six macro models over the eighteen week, seventy-two hour course. These macro models involved students learning about subjects such as entropy, waste management, water usage, and photosynthesis in experiential manners which centered on physical activity in an outdoor environment.

Students were asked to define nine concepts related to ecological education at the beginning of the course (eg. ecological literacy, entropy, fossil fuel). The concepts chosen were based upon the concepts found in various curriculum documents from the Ministry of Education and are common in everyday language and life (Puk & Stibbards, 2011). Students were retested on their knowledge of these concepts at the end of the course to examine how their understanding of these concepts had improved throughout the course. The study found that a majority of preservice teachers had poor understandings of the concepts when entering the program despite many students having undergraduate degrees in related areas including geography and physical sciences which should have exposed them to these concepts (Puk & Stibbards, 2011). Upon completion of the course most students had significantly improved their understanding of these concepts after participating in the series of macro models (Puk &
Stibbards, 2011). This study shows that preservice teachers can greatly enhance their understanding of environmental concepts and ecological issues through the use of experiential macro models. These findings are encouraging as the lessons these post-secondary students participated in are transferable to elementary and secondary aged students. Findings of this research are also significant as the improvements noted came about due to participation in hands-on, experiential, physically-engaging simulations as opposed to conventional classroom-based methods of learning.

Aside from the use of experiential learning methods in outdoor environments simply taking students outside and allowing them to commune with nature can be an effective tool in reducing stress, creating a more enjoyable learning environment, and building relationships between students and the natural world. As discussed in previous chapters numerous studies have found that actions as simple as looking at a green space from a window or walking to work outdoors can reduce stress, promote physical and mental well-being and boost efficiency (Frumkin, 2001; Pretty, Peacock, Sellins, & Griffen, 2005; Wells, 2003; Nisbet, 2012). Recent research has also found that time spent in nature or looking at images of natural settings can cause people to place more emphasis on extrinsic, communal values while in comparison time spent in or looking at built environments can encourage people to value intrinsic, self-oriented values (Weinstein, Przybylski, & Ryan, 2013). Researchers state “these results are interesting because they suggest that nature, which is inherently unrelated to human intervention, brings humans closer to others, whereas human-made environments orient goals towards more selfish or self-interested goals” (Weinstein, Przybylski, & Ryan, 2013, pg. 1327). When considered together these studies show that simple interactions with or views of nature which are essential components of EBE programs can promote healthy, supportive communities. This is significant
as “an empowered learner is able to fully and freely engage in critical reflection, participate in discourse, and act on revised perspectives. A person who is oppressed… depressed, or feeling trapped in his or her circumstances may not be able to respond to events in a potentially transformative way” (Cranton, 2006, pg. 59). While increased research examining the benefits nature has on human well-being is encouraging, the ability to transfer these findings to practical educational uses is imperative. Fortunately studies have shown that taking students outdoors is often viewed as one of the most attractive aspects of EBE programs, and that time spent outdoors can result in increased engagement in and enjoyment of the learning process (Puk & Stibbards, 2011; Ernst & Monroe, 2004).

A study, by Fox and Avramidis (2003) provides an interesting look at how taking students outdoors to participate in EBE can effect students with emotional and behavioural disorders. The study considers the effects of an individual EBE program in rural England on a small, yet diverse group of male secondary school students. The study included eleven male secondary school students, all of whom have behavioural and/or emotional disorders which prevented them from successfully integrating into conventional classroom settings. These emotional and behavioural disorders included a combination of attention deficit disorder, attention deficit hyperactivity disorder, oppositional-compulsive disorder, Asperger Syndrome, Tourette Syndrome, dyslexia, and epilepsy (Fox & Avramidis, 2003). The students left their home school to participate in the program one afternoon a week for six to seven weeks. During this time students were exposed to standard curriculum material, but in an outdoor setting using hands-on, experiential methods of learning. The study concluded that students who participated in the program were found to have improved social behaviour and concentration on work during and after attending, but there was no significant improvement in academic measures (Fox & Avramidis, 2003). The lack of
academic improvement is not surprising in this study as fourteen to sixteen hours of instruction spread over six weeks is not enough for meaningful academic growth to be measured. The intriguing results of this study are found in the improved social behaviour noted for a majority of the program participants. According to the authors this is a result of the promotion of group cohesion and confidence building coupled with the group achievement of learning objectives which these specific students often struggle with in conventional classroom environments (Fox & Avramidis, 2003).

The results of this study back up the claims of numerous programs including Outward Bound, the Redcliff Ascent Wilderness Treatment Program, and the Discovery Academy which operate programs, which use outdoor experiences to help troubled youth build trust, relationships, and skill sets in a setting more conducive to their needs than conventional classroom-based learning. This study is noteworthy in that it provides insight into some of the benefits of taking students outside. Larger scale research conducted over an extended period of time is required to address the shortcomings of this interesting but limited study. The study supports how EBE programs which take students outside can provide a safe, stimulating learning environment for marginalized students who often struggle to find their place in conventional classroom environments.

Despite the wide range of foci found in these studies the results show that that taking students outside to learn can have a significant impact on behaviour and acquisition of knowledge. Improvements in mental well-being can be attributed to time spent in natural areas (Louv, 2008; Miyazaki, 2013; Aspinall, Mavros, Coyne, & Roe, 2013; Nisbet, 2012) while higher levels of ecological literacy and knowledge acquisition can be attributed to participating in hands-on, experiential, outdoor-based educational activities (Puk & Stibbards, 2011; Ernst &
Monroe, 2004). Taking students outside promotes daily physical activity which serves to oppose the increasingly sedentary lifestyles embraced within modern technology-based societies and conventional classroom-based education.

**Cross-curricular studies**

The cross-curricular nature of EBE programs is another aspect with which transformative learning can be promoted within students. Many existing EBE programs operate either as standalone full-day, multi-credit packaged programs or as school-wide programs which integrate individual courses through the use of overarching environmental themes. The cross curricular nature of these programs encourages students to learn in a transformative manner because the acquisition of new knowledge and skills in a unique integrated manner supports transformation of perspectives and ways of being. Many of these programs foster transformation by fully engaging youth in group discourse and personal reflection at a developmental time in their life where peer opinion is important. Cross-curricular studies also provide students the opportunity to examine issues from multiple perspectives allowing for the development of sound understandings and beliefs built upon solid research and informed decision making. Examining issues from multiple perspectives is an important step in the transformative learning process as students learn to put aside personal biases to explore views and opinions of others (Mezirow, 1991). By encouraging students to learn through exploring multiple perspectives educators are not only teaching students subject matter, but they are guiding students towards the establishment of sound research methods and critical thinking skills which will work to create more critically reflexive citizens in the future. Due to time-constraints and the narrow focus of curriculum requirements conventional, compartmentalized, classroom-based learning often lacks
the ability to allow students to examine subject matter in great depth or from multiple perspectives.

Studies which examine the benefits associated with EBE programs often point to the cross-curricular aspect as a driving force behind their success (Ernst & Monroe, 2004; Glenn, 2000). Recent studies examining the cross-curricular nature of these programs have found numerous benefits to this style of learning including increased cognitive development, increased academic success, and increased enjoyment of and engagement in the learning process. One such study undertaken by Ernst and Monroe (2004) considered the impact of EBE on students’ critical thinking skills and disposition towards critical thinking.

The study involved four hundred and four, ninth and twelfth grade Florida secondary school students chosen from EBE programs and conventional classroom-based learners, who served as the control group. The EBE programs considered in this study were independently designed courses which used the environment to integrate multiple courses (Ernst & Monroe, 2004). Control group students were taken out of conventional classroom-based environmental science and social science courses, similar to the credits granted to students enrolled in the environment-based programs. Students were given tests at the beginning and end of the school year which measured critical thinking skills, the Cornell Critical Thinking Skills Test – Level X, and disposition towards using critical thinking skills, the California Measure of Mental Motivation (Ernst & Monroe, 2004). The results were analyzed using multiple linear regression to determine whether or not the students enrolled in EBE programs saw higher increases in critical thinking skills or in their disposition towards using critical thinking skills than students in the conventional classrooms.
When controlling for GPA, gender and ethnicity, analysis found a significant difference in the critical thinking skills of both grade nine and twelve experiential environment-based learners when compared to their control group cohort. Grade nine students in the EBE program scored 4.33 points higher than control group students on the Cornell Critical Thinking Skills Test while grade twelve students scored 5.54 points higher than their grade twelve control group cohorts, both groups scoring out of seventy six (Ernst & Monroe, 2004, pg. 514). In relation to disposition towards critical thinking there was no statistical significant difference between the grade nine groups, while the grade twelve EBE learners scored 3.96 points higher than the grade twelve control group students on the fifty point California Measure of Mental Motivation test (Ernst & Monroe, 2004, pg. 515). The authors suggest that there was no statistically significant difference between groups of grade nine students in their disposition to use critical thinking skills as neither group was likely to have been exposed to this type learning before so both groups were in the early stages of mastering this ability (Ernst & Monroe, 2004).

Along with quantitative results showing that students enrolled in EBE programs can achieve higher levels of critical thinking skills and disposition to use these skills, a qualitative analysis was done to explore what aspects of the program were most successful and could contribute to these results. Site visits, interviews with program coordinators and interviews with students were undertaken in order to examine which aspects of EBE programs students and teachers found to be the most successful and which characteristics were seen to influence critical thinking skills and disposition to use these skills (Ernst & Monroe, 2004). Through inductive analysis it was found that the integration of multiple courses through the use of a common theme, environmental issues, was seen to be the most important aspect of EBE programs in relation to the development of critical thinking skills (Ernst & Monroe, 2004). Students and
teachers both reported that the environmental context of these courses was “useful for blurring the lines between classroom learning and real-life applications, thus providing opportunities to develop and use thinking skills” (Ernst & Monroe, 2004, pg. 516). The study also found that the cross-curricular nature of EBE programs allowed students to more freely participate in open-ended projects requiring hypothesizing, investigation and research. Opportunities for reflection and group discourse allowed students to connect their learning to real-life, local issues familiar to the students. These compelling findings support previous research which also aimed to explore which aspects of EBE programs most benefited students.

A study commissioned by the State Education and Environment Roundtable (SEER) and conducted by Lieberman and Hoody (1998) aimed to identify the most successful aspects of EBE programs. The study considered forty EBE programs across twelve states, which used the environment to integrate multiple courses. These forty programs were compared to provide an understanding of the major concepts related to these programs; to look at the success of these programs across the United States; to identify the characteristics and strategies associated with successful programs; and to analyze the implications these programs have for student learning, success, and instruction (Lieberman & Hoody, 1998). The study included EBE programs operated by fifteen elementary schools, thirteen middle schools and twelve secondary schools with each program, like those currently operating in Ontario, having its own locally developed, individually designed curriculum. The study considered standardized test scores, grade point average, survey results, site visits and interviews with more than four hundred students and two hundred fifty teachers and principals when compiling findings (Lieberman & Hoody, 1998).

The results of the study found, among other things that EBE programs which use the environment to integrate subjects had reduced classroom management and discipline problems,
higher levels of student engagement and enthusiasm for learning, students enrolled in these programs took greater pride and ownership in their accomplishments and students performed better on standardized measures of academic achievement in reading, writing, math, science, and social studies in comparison to students in traditional classroom settings (Lieberman & Hoody, 1998). Of those teachers whose students participated in the study seventy-seven percent reported improvement in standardized test scores while seventy-three percent reported increases in student grade point average since enrolling in the program (Lieberman & Hoody, 1998, pg. 31).

The authors argue that these findings are due to EBE programs providing comprehensive, integrated educational frameworks compared to conventional courses which often compartmentalize learning (Lieberman & Hoody, 1998). In other words EBE programs have the ability to relate concepts and theories from multiple courses into overarching themes which act to connect rather than separate the understanding of learners. The authors of this study conclude that the cross-curricular nature of EBE programs is responsible for the increased academic success of the students enrolled in these programs. While the results of this study are compelling, it is important to note the reliance on teacher perceptions and standardized measures of academic achievement in interpreting results. Teacher perceptions of achievement often lack the evidence found in mathematically derived findings like those used by Ernst and Monroe (2004) while there is great debate surrounding the validity of standardized testing measures, as has been discussed in earlier chapters. Despite these shortcomings the findings of this study reflect those of other, similar studies which seek to understand how and why EBE programs benefit students.

Building upon the research of Lieberman and Hoody (1998), the State Environment and Education Roundtable (SEER) completed a two part study examining the impacts of EBE programs on elementary and secondary school students in California. These studies, titled the
California Student Assessment Project – Phase One (SEER, 2000) and Phase Two (SEER, 2005), built upon the findings of Lieberman and Hoody (1998). Unlike the studies by Ernst and Monroe (2004) and Lieberman and Hoody (1998), studies conducted by SEER focused on entire schools which use the environment to integrate learning rather than individual programs which do so.

The first phase of this study applied Lieberman and Hoody’s conclusions to a study of eight, paired California elementary and secondary schools. Half of the schools involved in the study used the environment as an integrating theme for course materials, the other half were more conventional schools which did not focus on environmental issues or use them to integrate individual courses. Elementary and secondary schools that used the environment in an integrating context were paired with another elementary or secondary school which did not use environmental issues to integrate learning. The academic success of students enrolled in these paired schools were compared to see which students performed better. The study found that students in schools which used the environment to integrate course materials often scored as well as or better on academic assessments than students enrolled in conventional schools (SEER, 2000). Students in the schools which used the environment to integrate materials scored as well as or better on seventy-two percent of academic assessments including seventy-six percent scoring as well or higher in language arts, sixty-three percent scoring equally well or higher in math assessments, sixty-four percent scored the same or higher in science, and seventy-percent scored as well or better in social sciences (SEER, 2000, pg. 20).

The second stage of the California Student Assessment Project, conducted in 2005, attempted to revisit the schools which participated in the first stage of the project. Of the schools which participated in the first stage of this project only the four elementary schools were deemed to be acceptable for further study due to changes in administration, school curriculum and policy.
The four were paired with four different elementary schools which acted as the control group for this next stage of the project which compared standardized test scores gathered over a five year period (SEER, 2005). Test scores were compared in the same subjects as those considered in the first stage of this project including language arts, math, science and social science. Schools which used the environment to integrate subject material scored higher than control group schools in a total of one hundred thirty-four measures while control group schools scored better in only twelve instances over the five year span (SEER, 2005, pg. 22).

These results build upon the findings of the first phase of this study to provide compelling evidence that using the environment to integrate courses can increase student achievement in comparison to conventional schools and educational programs. These programs, while different than the individually-designed EBE programs considered by Ernst and Monroe (2004), provide evidence that EBE can promote academic growth for students in a variety of settings. These studies provide a compelling look at the effects the cross-curricular nature of EBE programs can have on student academic success and growth. The studies completed by Lieberman and Hoody (1998), SEER (2000, 2005), and Ernst and Monroe (2004) combine to establish a strong research base related to EBE. While sometimes lacking in individual strengths the findings of these studies work together to build an understanding of the impacts the cross-curricular nature of these programs can have on student growth and academic success.

The cross-curricular nature of EBE programs lends itself well to the promotion of transformative learning within students. Building a sense of community among students is an important step in encouraging transformative learning to occur (Alvares, 2007). As each student will have already acquired personal perspectives of the world through socialization and acculturation it is important to build a sense of community between students (Taylor, 1998). This
is essential in order to enable students to feel comfortable enough to share personal beliefs and perspectives during group discourse. If a student is to undergo a transformation and to acquire new perspectives they must be able to relate their feelings to those of classmates and to discuss and reflect upon these beliefs (Cranton, 2006). These essential steps in the transformative learning process are embraced within the cross-curricular, integrated nature of EBE programs.

**Authenticity in the Learning Process**

Central aspects of successful EBE programs include providing students with the opportunity to participate in authentic experiences and to foster authentic relationships between students, teachers, and the community as a whole. An essential part of authentic learning is providing students with the opportunity to learn through real world inspired, open ended, multi-disciplined, hands-on activities. These authentic activities encourage collaboration between learners, engagement in the learning process, personal reflection, and the investigation of multiple perspectives in assessing a given issue (Reeves, Herrington, & Oliver, 2002). Through these types of authentic learning activities students are exposed to subject matter in a more intimate manner, which allows for the construction of deeper connections to and understanding of subject matter.

A central aspect of transformative learning theory is that learners must undergo a disorienting dilemma or participate in an experience which causes them to question their commonly held beliefs and assumptions (Cranton, 2006). Such perception altering experiences are essential as they provide the basis for students to begin to question their actions, beliefs and understandings of a given subject. EBE can provide students with the opportunity to understand new ideas while they identify concerns with their fellow classmates, educators, and community members. The recognition that a learner is not alone in the process of questioning understandings
and beliefs allows for the establishment of authentic relationships with teachers and peers. These relationships promote a sense of belonging and security which encourages the learner to participate in personal reflection and group discourse (Taylor, 2009). Students build an understanding that others have previously gone through the same process of questioning and rationalizing that they are experiencing and that new perspectives, beliefs, and ways of being are possible to attain (Mezirow, 1991). Classmates who build authentic relationships and experience a disorienting dilemma together are well situated to identify that they are not alone in their situation and that they have peers with whom they can discuss ideas (Langan, Sheese, & Davidson, 2009). As students become comfortable participating in group discourse they are able to create new understandings, beliefs, and routines which assist in the implementation of new perspectives and actions.

In EBE programs, transformative and authentic experiences may include a wide range of activities designed to encourage students to challenge their sense of self, overcome personal fears and/or to question their understanding of the world. By encouraging students to safely push their limits and understanding educators can promote personal growth and development within their students. These activities relate to the disorienting dilemma phase of the transformative learning process (Cranton, 2006). Learners participate in an experience which causes them to question their personal beliefs and actions and encourages exploration of new understandings and ways of being. Camping, hiking, and climbing experiences can work to challenge students to learn about their limits. Activities including high-ropes courses or open water paddling can act to allow students to confront long held personal fears in a safe, supportive environment. Class projects involving visits to landfills, recycling centers, power generation facilities, or farms can act to expose students to aspects of life they may never have thought about before. Contacting city
councillors and stakeholders to examine local environmental policy can also establish new understandings about the impacts humans have on the world around them. Such authentic learning experiences are essential to the transformative learning process as they engage higher level thinking skills, increase ecological literacy, and provide personal experience from which students build an understanding of complex issues.

A report compiled by Joanne Lozar Glenn (2000) examined the successful elements of EBE programs in the United States along with the benefits these programs had on the students enrolled within them. The study considered five individual American schools which focused on EBE as well a larger board-wide program which encompassed five individual schools, and a separate state-wide program which incorporated EBE in all of its schools (Glenn, 2000). Each program was examined to understand what aspects of its organization and curriculum were most successful and to understand what impact EBE programs have on students. One of the programs considered in this report, The School of Environmental Studies at the Minnesota Zoo, offers 400 students a unique hands-on learning environment within the zoo facilities. Students focus on real-world, group-based, hands-on learning opportunities such as designing websites for environmental charities, teaching younger students about the environment, and building trails and docks in and around the zoo facilities (Glenn, 2000). Students learn through using experiential hands-on activities using a flexible schedule which adapts to the needs of individual students and the projects they are working on.

Students achieve curriculum requirements as dictated by the local school board but do so through by focusing on environmental issues and through participation in authentic learning experiences. These experiences provide students with the opportunity to explore new perspectives and ways of being while the group focus associated with the hands-on, experiential,
project-based learning provides students with the opportunity to build relationships with classmates, staff, and community members (Glenn, 2000). Students are given ample opportunity to reflect on their learning through the use of journals and group discourse, central aspect of transformative learning theory. Through an examination of this program it has been found that the students enrolled within it succeed above the national standards and local achievement levels for mathematics, science, and language and that through the use of authentic learning experiences students are more motivated and self-directed than students enrolled in conventional classrooms (Glenn, 2000).

Conduit Elementary School in Bellaire, Texas, another school examined in this study, is home to a unique program which was examined to explore the impact of EBE on elementary learners. Students in the EBE program were encouraged to become scientists by researching environmental issues, developing their own questions, and collecting and analyzing their own data (Glenn, 2000). The EBE class spent a significant amount of time outside of the classroom participating in hands-on, investigative activities including, on average three out of five days per week spent outside of the classroom. On the contrary, students in conventional classrooms at the same school learned the same subject matter using classroom-based learning techniques such as themed art projects, completion of worksheets, and through reading books.

It was found that students enrolled in the EBE class were able to transfer knowledge and learning skills between subjects better than students enrolled in conventional classes at the same school (Glenn, 2000). The increased ability of these students to transfer knowledge between subjects stems from the innate opportunities for higher-level analysis and synthesis to occur in EBE environments in comparison to conventional classrooms (Glenn, 2000). As the EBE course progresses students are required to connect ideas and concepts from different parts of the course
within their current work. This process works to make knowledge and skill transfer more of a habit for these students than is normally seen in conventional classroom learning where subject matter is often compartmentalized and decontextualized. This aspect of authentic learning relates to transformative learning theory as students examine issues from multiple perspectives, acquire new skills and knowledge, and establish new understandings and actions based on their personal experiences (Cranton, 2006). Through an examination of this program it can be seen that providing students with the opportunity to engage in and direct their learning and teaching them how to problem-solve can lead to higher levels of knowledge and skills transfer between courses than conventional classroom learning can, even at a young age (Glenn, 2000).

The two programs discussed from this study show what impacts authentic experiences within EBE programs can have on younger learners’ educational success. Hands-on, project-based, experiential education can promote skills and knowledge acquisition and transfer more successfully than conventional classroom learning. Students are taught how to examine a problem from multiple perspectives and are given the opportunity to work out a solution rather than to simply learn about a solution. Students are also encouraged to communicate and brainstorm with their classmates to solve complex problems and to draw from relevant information to problem solve multifaceted issues. This cooperation between students is a central aspect of EBE programs and of authentic learning experiences whereas conventional classrooms tend to promote competition between students rather than encouraging cooperation and open dialogue.

These findings build upon those of Ernst and Monroe (2004), SEER (2000, 2005), and Lieberman and Hoody (1998) which note that the cross-curricular nature of EBE programs provides students with opportunities to learn in compelling, hands-on, experiential ways. By
offering students experiential learning opportunities rooted in authentic activities instead of just reading or researching, these programs can encourage the development of critical thinking skills and can result in higher rates of student success and engagement. EBE programs can also promote the main tenants of transformative learning theory while at the same time encouraging students to develop research skills and ecological literacies emphasizing active citizenship.
Chapter 5: Curriculum Recommendations

This chapter will highlight five ways which educators can create engaging experiences for students by incorporating EBE and transformative learning theory into classroom-based instruction. These include using macro models or simulations to incorporate experiential education in the classroom; emphasizing the use of authentic learning experiences through project-based learning; incorporating nature into the learning environment; encouraging personal reflection and group discourse; and the use of cross-curricular planning to integrate isolated curricula using the environment as a central theme. These techniques address the recommendations put forth by the Ministry of Education while providing educators with opportunities to encourage students to challenge their personal perspectives, achieve higher levels of ecological literacy and to apply their learning through the establishment of new ways of being.

In 2007 the Working Group on Environmental Education published a report examining the state of environmental education in Ontario. The focus of the report was to “analyze needs and research successful approaches to teaching and learning about the environment in elementary and secondary schools” (Working Group on Environmental Education, 2007, pg. 3). A total of thirty-two recommendations were provided which outlined how environmental education in Ontario could be improved and expanded. In conjunction with this report the Ontario Ministry of Education released a policy framework document outlining how the recommendations would be enacted within the provincial curriculum. Within this framework the Ministry of Education stated that it is “vitaly important that our education system not only prepare students academically but also provide them with the skills, perspectives, and practices they will need to meet the social and environmental challenges of the future” (Ontario Ministry of Education, 2009a, pg. 7).
Despite acknowledging the benefits and importance of environmental education the document provides little concrete advice for educators on how to create meaningful environmental education experiences for students.

**Macro Models as a Form of Experiential Education**

Within the environmental education policy framework document put forth by the Ontario Ministry of Education (2009a) it is stated that schools are expected to “develop learning opportunities that will help students understand the underlying causes, the multiple dimensions, and the dynamic nature of environmental issues” (pg. 14). Individual educators, schools and school boards are expected to address this requirement without recommendations on which learning strategies best address this need. Fortunately some educators have determined effective ways to examine complex environmental issues through the use of EBE within school-based courses.

As outlined by Puk & Stibbards (2011) and Glenn (2000), incorporating experiential activities into classroom routines is an effective way educators can connect subject matter to students in an enjoyable, engaging manner. While experiential activities are an important aspect of integrated programs the need for strict course scheduling in large schools creates time constraints which limit opportunities for these types of experiences to be incorporated within conventional classrooms. This limitation can be addressed by using macro models to incorporate experiential learning into the short timeslots found in conventional classrooms. Macro models are short simulations which allow students to examine abstract curriculum-based concepts through hands-on, physically engaging activities. These activities can take on many forms, cover a wide variety of subject matter, and can be performed in almost any location. This adaptability
provides educators with an ideal way to get students outside and connected to the learning process while promoting healthy lifestyles using physical activity.

The use of macro models has been shown to improve students’ comprehension of complex environmental concepts over a short period of time (Puk & Stibbards, 2011). These short, simulated activities can be used to examine complex environmental issues and to address existing secondary school curriculum requirements including those found in the grade nine Geography of Canada (CGC1D) course. One such requirement asks that students are able to “describe the characteristics (e.g. complex, interconnected, affecting natural systems, driven by solar energy) of natural systems (e.g. climate, biomes, the lithosphere, the hydrosphere)” (Ontario Ministry of Education, 2005a, pg. 30). A macro model which addresses this requirement could ask students to become part of the hydrological cycle. Students could mimic the movement of water molecules by running through a school yard transporting buckets of water between stations which represent various aspects of the hydrological cycle. Students would experience various stages of the water cycle such as being locked away in the depths of the oceans or polar ice sheets, evaporating then raining onto a suburban lawn, being pumped through a kitchen tap, and eventually flowing back into a lake only to repeat some aspects of this cycle again. Human impacts which disrupt this cycle (including the drilling of aquifers and the damming of rivers) would provide challenges for the students hoping to complete the water cycle (as buckets representing aquifers may be continuously draining to represent agricultural and residential uses).

Through this short, experiential activity students learn the processes involved in the movement of water (such as evaporation and precipitation), the various places and ways water is stored within this cycle (including groundwater, surface water, and atmospheric storage in
clouds) and students learn about the impacts human activities have on these processes (such as drilling into and draining aquifers for agricultural and commercial use, and urban development’s blocking rain from soaking into the ground). Such a simulation can result in students learning about a single topic (the water cycle) through multiple lenses (modelling hydrologic processes, examining human uses of water, hypothesizing the effects of altering the water cycle).

Simulations could also be organized to get students moving around the school yard as they make their way through various ecological systems or to model how local urban sprawl and land-use changes impact local ecosystems. These activities work to connect abstract concepts to students in a manner that is enjoyable, engaging, relatable, and does not require long periods of inactivity and unbroken concentration. According to Knapp (1992) experiential learning requires students to become actively involved in meaningful experiences, participate in personal reflection and group discourse, develop new understandings of the world, and to apply this new knowledge within their lives. Macro models organized to fit into conventional classroom scheduling allow students to participate in experiences which connect subject matter and the learning process to the student more intimately than processes often found in classroom-based learning such as copying overhead notes, viewing documentaries and extended periods of textbook reading. Personal reflection and group discourse can be integrated into the macro model itself or can be the focus of later classes as students reflect on how these experiences altered their understanding of a given issue. The end goal of these processes would be the development of new knowledge and actions from students in response to the learning experiences.

While participating in experiential activities such as macro models will not guarantee that a transformation in perspective or actions will occur within students, these activities can work to build awareness of complex issues through a physical simulation of multilayered issues. Active
participation in the learning process also works to establish the classroom as a safe, open community which is necessary for students to comfortably participate in group discourse and personal reflection, essential components of the transformative learning process (Taylor, 2009). If properly planned and implemented macro models can effectively incorporate EBE techniques within conventional classrooms, they can further the transformative learning process in adolescent students and they can address environmental education requirements set forth by the Ontario Ministry of Education.

**Authentic Learning Experiences**

The Ontario Ministry of Education (2009a) has stated that in order to “build student capacity to take action on environmental issues” schools are required to “create opportunities for students to address environmental issues in their homes, in their local communities, or at the global level” (pg. 15). Individual educators, schools and school boards are expected to address this requirement without recommendations on which learning strategies best address this need. Glenn (2000) found that authentic learning experiences, or hands-on educational experiences based on relevant real-world issues can work to increase students’ understanding of complex concepts resulting in improved academic achievement and engagement in the learning process.

Authentic learning experiences require students to examine relevant, local issues from multiple perspectives, research and plan learning objectives and outcomes and to work with others in the class and community to address complex issues. These activities promote the use of higher level thinking skills as students are required to partially direct their own planning and research, reflect upon the learning process, and to incorporate their work into tangible projects (Ernst & Monroe, 2004). Rather than focusing on textbook work to learn abstract concepts and
written responses only shared with teachers, these activities encourage learners to work together and apply their knowledge to address real, local issues.

Authentic learning experiences can occur in many forms and can be used to address many curriculum requirements. Within grade twelve Environment and Resource Management (CGR4M) planting school gardens or working in neighbourhood gardens can be used to address curriculum requirements such as “explain ways in which we can improve our protection of natural systems while continuing to meet human needs (e.g. through organic food production, wetland restoration)” (Ontario Ministry of Education, 2005b, pg. 107). Gardening can allow students to build an understanding of organic food production, plant and soil health, and the agricultural food system which sustains the modern world. Students apply this knowledge through hands-on, authentic experiences which can work to transform students’ perceptions and actions in relation to food production and consumption. Students enrolled in grade ten Healthy Active Living Education (PPL2O) could use food from a school or community garden to achieve curriculum requirements such as “explain how eating healthy is beneficial to various physical activities” or “analyze the relationships between healthy eating, physical activity, and body image” (Ontario Ministry of Education, 1999, pg. 15). Students enrolled in grade nine Exploring Technologies (TIJ1O) could examine ways to reduce dependency on the electrical grid by designing and building solar ovens to cook food or solar chargers for cell phones. These activities would achieve curriculum requirements such as “apply the steps of a design process or other problem-solving process to plan and develop products and services” (Ontario Ministry of Education, 2009b, pg. 47).

Students in a grade ten Introduction to Business (BBI2O) class could make short films or advertisements exploring environmental issues resulting from the actions of local or
multinational businesses. This would meet curriculum requirements including “explain controversial business issues from a local, national, and global perspective (e.g. accounting scandals, environmental impact of some business practices, insider trading, fraud)” (Ontario Ministry of Education, 2006, pg. 28). There are seemingly limitless opportunities for educators to address environmental issues using authentic learning activities. Each of these activities require students to examine an environmental issue, to hypothesize ways to address the issue, and to actually produce a tangible product (possibly a meal, a solar charger, or a short documentary) which explores and addresses the issue.

Authentic learning activities, while promoting increased student achievement and engagement also embrace the main tenants of transformative learning theory. These activities require students to examine issues from multiple perspectives, to explore new actions and understandings, plan a course of action, acquire the knowledge and skills required to implement a plan of action, and to actually engage the plan within the real world. Each of these actions reflect stages of the transformative learning process (Cranton, 2006). Students are encouraged to learn by doing rather than to learn by reading about someone else doing. As such these experiences work to create lasting impacts in students’ that participate within them. Assignments and course work become directed at making meaningful changes rather than focusing solely on achieving curriculum requirements.

As the transformative learning process itself is voluntary the use of authentic learning does not guarantee that students will undergo a change in perspective or alter their actions in the presence of new knowledge. These activities do however connect students to the community and natural world through personal experiences which, according to McNamee (1997) is required in order to educate citizens who care about the environment. These authentic experiences can also
address Ministry of Education guidelines which state that schools should “develop learning opportunities that will help students understand the underlying causes, the multiple dimensions, and the dynamic nature of environmental issues” (Ontario Ministry of Education, 2009a, pg. 14).

Incorporating Nature within the Classroom

Another requirement set forth by the Ministry of Education states that schools are responsible to “enrich and complement students’ classroom learning by organizing out-of-classroom experiences and activities (such as the naturalization of the school yard)” (Ontario Ministry of Education, 2009a, pg. 17). As outlined in previous chapters of this paper, the inclusion of nature within the learning environment can promote higher levels of ecological literacy within students. Studies have shown spending time outdoors or looking at natural settings can lead to decreased levels of stress (Miyazaki, 2003; Nisbet, 2012) and increased emphasis being placed on extrinsic, communal values (Weinstein, et al., 2013). By taking students outside of the classroom to interact with nature, providing views of natural settings through classroom windows, or by even bringing plants, aquariums, or pictures of natural settings into the classroom educators can promote mental well-being within students (Weinstein, et al., 2013). The use of outdoor classrooms have also been found to promote higher levels of academic achievement in comparison to learning in conventional classrooms (Beard, 1998).

Students can be taken outside to participate in learning which addresses numerous curriculum requirements including those found in grade nine academic science (SNC1D) which asks students to “assess, on the basis of research, the impact of a factor related to human activity (e.g. urban sprawl, introduction of an invasive species, overhunting/overfishing) that threatens the sustainability or a terrestrial or aquatic ecosystem;” (Ontario Ministry of Education, 2008, pg. 49). Students could be taken to a local green space to participate in primary research examining
how housing developments, road construction, or recreational areas such as golf courses can impact local ecosystems. Taking students outside to examine and experience local ecosystems and developments or on field trips to nearby locations can also address curriculum requirements found in the grade eleven geography course The Americas: Geographic Patterns and Issues (CGD3M). Curriculum requirements including “describe the causes and effects of environmental degradation in specific areas of the Americas” or “describe the natural characteristics of selected regions that have led to the development of primary industry” can met by incorporating field trips and outdoor experiences into course planning (Ontario Ministry of Education, 2005, pg. 57). Connecting students to their learning through site visits allows learners to use all of their senses when building an understanding of issues such as environmental degradation or the historic growth of industries and cities.

Field trips, time spent outdoors, the use of class aquariums and plants, keeping curtains open in classrooms to allow for natural light and views of natural spaces can all act to improve student well-being while addressing Ministry of Education requirements that schools “encourage environmental learning for all students inside and outside the classroom” (Ontario Ministry of Education, 2009a, pg. 15).

**Encouraging Reflection**

Within the environmental education framework set forth by the Ministry of Education it is stated that “by the end of grade twelve, students will acquire knowledge, skills, and perspectives that foster understanding of their fundamental connections to each other, to the world around them, and to all living things” (Ontario Ministry of Education, 2009a, pg. 11). This statement emphasizes the importance of building personal connections between students, their community, and the learning process itself. To achieve this goal educators must plan beyond
achieving subject-specific curriculum requirements to encourage personal reflection and group discourse.

If students are to establish a holistic understanding of their connection to the world around them it is important that they become comfortable reflecting upon their own understandings of the world and how they relate to it. Mezirow (1991) states that by encouraging learners to engage in reflection of the learning processes and course content educators can promote “the elaboration, creation, or transformation of meaning schemes” (pg. 6). This process can be extended within group discourse as learners engage in discussions with peers which encourage the examination of personal beliefs and ways of being from new perspectives. As Cranton (2006) states, the purpose of transformative learning is to have people “critically examine their habitual expectations, revise them, and act on the revised point of view” (pg. 19). As such personal reflection and group discourse should be incorporated into classroom routines in order to encourage personal growth and development within students.

Ernst & Monroe (2004) report that reflection within EBE through a variety of actions including verbal and written reflective pieces and class presentations works to connect students to the purpose and processes of their learning. Qualters (2010) states that deep reflection is integral to the success of EBE as it connects experiences to subject matter and the learning process. It is important to incorporate the acquisition, practice, and use of reflective practices within the curriculum as “reflection, like critical thinking, is a learned skill, difficult to do well, and so it needs to be taught with patience and understanding, with safety and structure” (Qualters, 2010, pg. 97).

Reflective practices can be incorporated into classroom learning by routinely encouraging students to share emotional reactions and stories of their experiences, reflect upon the impact
experiential activities had on their feelings and understandings, and to analyze personal beliefs or habits. Practices including journaling, blogging, group discussion and artistic presentations can be used to encourage students to reflect upon course content. These activities promote personal and group reflection in both conventional classrooms and outdoor environments. Within grade ten applied English (ENG2P) students are asked to “explain how their own beliefs, values, and experiences are revealed in their writing” (Ontario Ministry of Education, 2007, pg. 92). Within grade nine applied Geography of Canada (CGC1P) students are asked to “describe the collective and individual / personal methods used in the community to reduce waste and conserve energy and water” (Ontario Ministry of Education, 2005, pg. 38). Reflexive activities can be used to encourage students to think critically about the learning process, the information they are presented with by media outlets, and the impact collective daily actions can have on global systems.

**Cross-Curricular Planning**

The Ministry of Education has also requested that schools “provide opportunities for students to acquire knowledge and skills related to environmental education in all subject areas, and encourage them to apply their knowledge and skills to environmental issues” (Ontario Ministry of Education, 2009a, pg. 12). Despite the Ministry of Education acknowledging the importance of environmental education the subject remains fragmented as teachers are asked to embed environmental issues within existing, course-specific curricula. If students are to truly understand environmental issues it is important that they progressively be examined from multiple perspectives. Cross-curricular planning allows teachers to create educational experiences which allow students to achieve curriculum requirements in individual courses by using common topics and themes to integrate learning.
Examining environmental issues from multiple perspectives can allow students to build an understanding of how their daily actions impact the world. A topic such as carbon emissions can be explored in various courses providing students with new ways of viewing complex issues. In grade nine math (MPM1D) students could be asked to calculate ideal and quantifiable carbon footprints for themselves and the global community as a whole. This activity would fulfil curriculum requirements which ask students to “solve problems that can be modeled with first-degree equations, and compare algebraic methods to other solution methods” (Ontario Ministry of Education, 2005c, pg. 31). In grade nine academic Geography of Canada (CGC1D) examining the carbon cycle, how carbon is released through human actions and climate change, and what effects this could have on the Earth’s systems addresses curriculum requirements which ask that students “explain the terms and concepts associated with regions (e.g., biome, ecozone, “ecological footprint”, boundaries, transition zone, ecumene” (Ontario Ministry of Education, 2005a, pg. 30). In grade nine Integrated Arts (ALC1O) students could create and present works depicting carbon footprints or resource usage rates of people from various regions of the world. This activity would require students to “demonstrate an understanding of and apply appropriate standards, conventions, and practices associated with the preparation, promotion, and presentation of art works, including integrated art works / productions, for a variety of purposes” (Ontario Ministry of Education, 2010, pg. 84). By integrating courses through the use of common topics students are able to examine local and global issues much more in depth than would be possible within a single course in a conventional secondary school.

Studies have found that the cross-curricular nature of EBE programs is attributed to being one of the driving forces behind these programs successes (Ernst & Monroe, 2004; SEER, 2000; SEER, 2005). Providing students with the opportunity to examine subject matter from multiple
perspectives is an effective way of promoting the acquisition and development of critical thinking skills (Ernst & Monroe, 2004). The promotion of higher-level thinking skills through cross-curricular studies has also been found to improve academic achievement in comparison to conventional, subject-specific learning (SEER, 2000; SEER, 2005; Glenn, 2000). The transformative learning process is also furthered through the use of cross-curricular studies. Students are able to examine complex issues and personal beliefs from multiple perspectives while new understandings and courses of action can be planned using a wider, more inclusive knowledge base.

By integrating multiple individual courses through common themes educators can encourage students to expand and apply their learning in ways that create new perspectives and understandings. The aim of transformative learning is for students to make tangible changes in the way they perceive the world and interact with it (Cranton, 2006). This end goal can be achieved by embracing cross-curricular studies using the environment in an integrating context. As stated by Glenn (2000), “the environment as a subject is naturally inter-disciplinary, place-based, and lends itself to inquiry-based learning and team teaching… It’s interdisciplinary nature helps students to understand the world around them and sharpens their ability to think systematically” (pg. 13).
Chapter 6: Conclusion

Recent recommendations from the Ontario Ministry of Education state there is a need for increased environmental education for students of all ages (Ontario Ministry of Education, 2009a). Unfortunately these recommendations do little more than suggest ways to include environmental themes within existing, fragmented, standardized curricula. The Ministry of Education states that educators are to strive to “promote changes in personal behaviour and organizational practices that will allow us to minimize our ecological footprint, while also fostering greater community engagement” (Ontario Ministry of Education, 2009a, pg. 4). Simply stuffing environmental issues into existing segmented courses or skimming over the topic if time permits at the end of a course is not going to actively engage students in a meaningful way. The basis of EBE courses is to encourage students to build a connection with and understanding of the Earth’s natural systems in order to ensure they truly recognize how their actions can impact those around them.

The increasing separation of humans from the natural world combined with progressively magnified human impacts on the Earth’s systems including human-influenced climate change and resource depletion create a growing need for engaging, meaningful EE for students of all ages and abilities. These educational experiences must inspire students to recognize appropriate ways they can transform their actions and understandings to address these issues. As outlined within this paper, incorporating EBE techniques and transformative learning theory into conventional classroom-based learning can work to promote higher levels of ecological literacy and academic achievement in students while encouraging healthy lifestyle choices and reconnecting students to the natural world. Combining these processes can also act to encourage students to undergo a process of transformation. Newly acquired perspectives, knowledge, and
understandings of the Earth’s natural systems and the impact human actions have on these systems can inspire students towards new sustainable actions and ways of being.

It is important that educators integrate experiences which will inspire students to make changes in their lives to address environmental issues within conventional classes. Simply educating students about topics such as climate change, deforestation, or overfishing will not inspire new courses of action. Educators must encourage learners to critically examine the issues from multiple perspectives, understand the impact their actions can have on the world, and to acquire the knowledge and skills necessary to create new habits and actions which encompass these understandings. As David Suzuki poignantly stated in a speech given in Vancouver, “…biology dictates our absolute need for clean air, clean water, clean soil, clean energy, and biodiversity in order for us to survive and live in a healthy way. Those are laws of nature and we can’t change them, we have to live within their boundaries…” (Suzuki, 2011).

In order to mitigate human impacts on the world and to create healthy, sustainable societies it is imperative that EE be expanded. Unfortunately as the Ontario Ministry of Education has yet to take any meaningful steps to ensure that all teachers and students are educated about the environment. Individual school boards and educators are expected to find the most appropriate and effective ways to incorporate EE within existing educational structures (Ontario Ministry of Education, 2009a). The incorporation of EBE techniques and transformative learning theory into the learning process can work to promote lasting change in students’ perspectives and ways of being. Reconnecting students to nature and establishing engaging EBE experiences can help foster appreciation and understanding of the Earth’s natural systems and how individual and collective actions can impact on the world.
While it is acknowledged that EE should be provided for all students (Ontario Ministry of Education, 2009a), the Ministry of Education stops short of making any meaningful recommendations such as establishing curriculum requirements for mandatory EE. Steps taken to shoehorn EE within existing curriculum fall short of meeting student needs in many ways. EE is not a core aspect of teacher training in Ontario. Educators who are now expected to incorporate environmental issues within existing courses may have little understanding of the subject matter they have been asked to teach or the methods which most effectively promote the acquisition of this knowledge. Policy framework documents and resources provided to educators by the Ministry of Education lack meaningful information or recommendations on how to teach environmental issues. The vagueness of these documents leaves important curriculum decisions to the discretion of individual teachers. If teachers lack an understanding of the basic concepts they can’t be expected to plan engaging, age-appropriate experiences for their students. What is needed is the creation of clear curriculum expectations and educational mandates which emphasize the benefits and importance of mandatory EE for teachers and students of all ages and abilities.

I have been fortunate enough to have been able to participate in two of Ontario’s teacher education programs which focus on EBE. These programs have altered my sense of self, transformed my views towards education, and have changed my opinions concerning the role teachers have in society. Through researching this project I have come to see that EE is both a problem which must be overcome and a solution to many problems facing society today. It is a problem in that poorly planned, ineffective EE plagues the province at a time when is most needed. The United Nations Decade of Education for Sustainable Development comes to a close in 2014 with little progress made towards creating inclusive environmental education accessible
to all students. The most recent steps taken by the Ministry of Education to address this need fall far short of establishing meaningful policy or encouraging significant change. The grandiose educational goals and undeveloped strategies for achieving these goals set forth within the Ministry’s policy framework document are accompanied with numerous reminders that EE policy decisions are the responsibility of individual school boards, schools, and educators. If the Ministry of Education truly believed EE was an important endeavor they would take meaningful steps to ensure its establishment as a mandatory subject of study with improved teacher training and dedicated curriculum and teaching strategy documents available.

Despite the Ministry’s lack of effort towards improving EE within Ontario the subject remains a hopeful reminder of how an education system can change to meet the needs of students and society. A relatively small number of integrated programs, outdoor centers, and inspirational teachers have brought meaningful EE to students in pockets around the world. These educators and the programs they have established provide models from which the Ontario Ministry of Education, local school boards, and individual teachers can learn from. Research undertaken within these programs has shown that properly planned, age-appropriate EE can occur in a variety of settings resulting in numerous benefits for students, communities, and society. These individual courses and programs operating at local schools and outdoor centers have shown how EE can lead to the promotion of healthy lifestyles, increased engagement in the learning process, increased development of critical thinking skills, increased transfer of knowledge between subjects, and higher levels of academic achievement. These programs show that EE which incorporates EBE and transformative learning theory are the best ways to address the pressing environmental issues facing the world today. This project is a reflection of my effort to pull many diverse ideas and educational theories together to offer strategies for taking EE in a new
direction. Until the Ontario Ministry of Education takes the steps needed to establish EE as a mandatory course with its own curriculum documents and learning strategies it is left to individual educators, schools, and school boards to find ways to incorporate EE into existing curricula. This project offers a few strategies for educators to effectively incorporate EE into their existing courses. While these strategies can work to improve EE embedded within conventional classroom learning and existing curricula it is important that the Ministry of Education be encouraged to take the steps necessary to give EE the attention it deserves.
References:


