

Hunter, T. Using Student Journals to Facilitate Kolb's Model of Experiential Education  
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An environmental science class consisting of 34 high school seniors participated in this study, which evaluated the success of journaling in regards to four hypothesis' concerning experiential learning. The study was completed as a response to increasing standardized testing and curriculum. Experiential learning is student centered and is built upon the theories of Dewey, Piaget, Hahn, and Kolb. Student journal entries were transcribed, broken down and paired with Kolb's model with the hope of showing how successful journaling promoted learning through Kolb's model. Evidence was also sought of critical thinking, social development, and the validity of using journals as a means of assessment. Using evidence directly from student journals, along with student attitude surveys and teacher observations, journaling was found to be overall effective at promoting learning.

USING STUDENT JOURNALS TO FACILITATE KOLB'S MODEL OF  
EXPERIENTIAL LEARNING.

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To Sarah,  
We have fun together.

There are no vacant lots in nature.

Edward Abbey

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## CHAPTER I

### INTRODUCTION

A luncheon with the local Rotary Club got me out of school for half a day. A half of a day with no school! I never got to miss school! This group of imposing, towering, gigantic adults was honoring me, just a sixth grader. Apparently I'd grown some really amazing Marigolds. A few months before I'd filled out a post-card at the local nursery on a whim, thereby entering myself into a contest, and never heard a thing until an invitation to the luncheon arrived in the mail. I remember thinking to myself, "What's the big deal? They're just flowers!" But, I was excited. At the lunch, I didn't get the 'why', but I was very aware of the importance these adults were placing on this honor. Of course, being a sixth grader and having the best Marigolds isn't something you go bragging about. While the experience came and went with little discussion, it, along with many others, had a huge impact on me. This was one of the few times as a child that the natural world around me was revered, and it got me thinking.

Jumping ahead a few years, I'm old enough to be watching my little brother during the summer days. Where do we go... outside of course. Having discovered where our parents hid the fireworks, we devised a number of experiments involving the dismantling and reconstruction of various pyrotechnic devices with the goal of producing the most

impressive mushroom cloud possible. With full access to a garage and basement full of tools and materials, the possible permutations of explosive devices were endless.

Fortunately for our parents, our supply of fireworks and matches were not endless.

Similar days found us playing with dry ice from the pharmacy down the road, or magnifying glasses and many deceased insects, or water balloon launchers and rotten apples. All outside of course.

A few more years down the road, nearing the end of my high school career with a few trips to the Boundary Water Canoe Area Wilderness and multi-state bicycle tours under my belt, I found myself packing up for a month of backpacking in Wyoming with the National Outdoor Leadership School. The following summer I embarked on a similar adventure with the same organization, this time specifically for people who are educators. Being only 18 and having just graduated high school a few days before, I once again found myself surrounded by imposing, towering, gigantic adults. This time, its not just for lunch, its for 30 days. Luckily, backpacking, mountaineering, rock climbing, bad weather, heavy packs, and burnt food are great equalizers of age. This again was all outdoors.

A decade later, I ask myself, “Why do I remember these things?” Having earned an undergraduate degree, found a job teaching that I enjoy, gotten married, bought a house, all the things one is supposed to do... I wonder why I am who I am. Is it my education? Did the schools I go to decide who I have become? Is it because my parents are

computer nerds who also love the outdoors? Is it because of a teacher or a certain class I took? Marigolds? The questions and variables are endless, but there is a commonality among them. They are all experiences originating outside of a formal classroom. I do not remember the classes from my K-12 education. I do not remember specific academic lessons I participated in. I do not remember what we were tested on in Pre-Calculus. I do not remember what a prepositional phrase is, and before writing this paper I had to ask Google about APA formatting.

I do remember the marigolds, the mushroom clouds and my little brother screaming (out of joy- not pain), the process of calculating distance on a map for our next day's hike in the mountains of Wyoming, and the requirements for constructing climbing anchors. I remember thinking how powerful the minds were of the 13 adult-ish figures I spent 30 days with. I remember their reverence and knowledge of the natural world we lived in. I remember the feeling of sustained awe as we descended on foot from the alpine world to the temperate-rainforest world. I remember pedaling over the Cascades on a bicycle, in one day leaving that moist landscape of the West and entering the dry rain shadow of the East. Why do I remember such things? They do not help with scoring high on the ACT or SAT or getting a higher GPA. Memories of Pre-Calc would be much more beneficial in those regards.

Is it possible that this last thought is simply wrong? Is it possible that these memories I have retained are actually what has allowed me to become who I am? Is it possible that

my SAT, ACT, MBST, MCA, and GPA performance was more influenced by the experiences that produced these memories than the specific lessons I participated in while in a school building? These thoughts do not find themselves at home in the traditional classroom, yet I find myself teaching in one of these traditional classrooms, often wondering how important what I am teaching really is. Will my students ever remember this stuff? Will they remember the role of adiabatic cooling in cloud formation? Or the relationship between Force, Mass, and Acceleration as expressed by Newton's Second Law?

No. Well, probably not. Answering this, how can I expect my students then to regurgitate this information on a test, thereby proving to me that they learned it? But, this statement itself is not an accurate reflection of what I want from my students. That is not how I learn, yet how many lessons and units have I and other teachers structured in this manner. Teach, repeat, regurgitate for grade. Does this practice of teaching actually result in learning? Wait a second, that's how I was taught in school... and how much of that do I remember?

I remember experiences. While I do have memories of sitting in classrooms as a student, there is no content knowledge attached, only a feeling of resentment of such an environment. When I look back at the "knowledge" I have, the content that stands out, it is all tied to an experience. This is how I learn. A taste, a smell, a sight, an emotion... these are the ties between myself and the knowledge I have gained. This is the key to

how I learn. Is this true for other people, too? Is this the key to determining the true nature of learning?

I imagine a world before the common person went to “school.” With no school, did learning occur? Absolutely! Humanity had achieved great things without ever sitting in a classroom. The development of agriculture, animal husbandry, blacksmithing, architecture, baking, plumbing – just a few examples of the knowledge humanity gained without establishing a school. But, in truth, school did exist. It was life. People learned what they needed to, either by just doing it or by informally learning from someone else or maybe in an apprenticeship. What is common to each of these methods of gaining knowledge is that they are experience based. They all involve *doing* that which is to be learned. This tells us some things about the nature of learning; it is a natural human capability and it happens through experience.

These same concepts are still present today even with the existence of formal schools. Looking out the window at the 13-year-old boy expertly skateboarding down the street performing tricks that seem to defy gravity and all of Newton’s Laws is evidence of it. Where did he learn that?! I guarantee it wasn’t in a cinder block classroom. He clearly isn’t thinking about Newton’s Laws, yet with each trick he shows a physical mastery of those concepts, possibly without even knowing who Newton is! Also, how important are the intangible lessons that he is learning? Risk taking, hard work, confidence- all on display. Again, will these things be taught in school on Monday? Will this time-

consuming, life-defining place ever capitalize on or place value upon what he knows? Or is it more likely that this young man will become one of the countless students who forever view school as pointless, full of worthless teachings? Are his hours of skateboarding dismissed by society as worthless play?

Looking at those experiences that stand out in my past, many would be dismissed as play, not learning or work, by society. Yet, is this view which society has placed upon play misguided? What is the difference between the skateboarder and the particle physicist? They both spend countless hours studying, dissecting, analyzing the tiniest of details and movements, trying to find just the right combination of variables to produce a desired outcome- whether it be a trick or a new sub-atomic particle. Why not view skateboarding as the education of a particle physicist? Why has it come to be that the concept of play is negatively viewed, but work is a positive? How are they truly different? And has this distinction between work and play changed the way we view the educational process? Do we favor work over play? How would student's conception of school be different if it was play oriented rather than work? And again, what is really the difference?

If learning is a natural human process, that often is tied to experiences, and is often disguised as play, does our educational system reflect this? What would a school or classroom look like that was dictated by these concepts?

As I look back at these experiences of mine, another commonality emerges. They are mostly outside. Whether in my backyard or another state or country, the experiences I have had outdoors greatly outnumber those not. What is it about the outdoors that sets the stage for the formation of so many experiences and thereby learning? Examining the power of the natural world to impart lasting impacts on humanity is greater than the scope of this paper, and is exhaustively discussed in Roderick F. Nash's "Wilderness and The American Mind." But, the millions of visitors to the country's National and State Parks, Monuments, Forests and the success of international programs such as Outward Bound and the National Outdoor Leadership School will attest to the recognized power of the natural world.

In his book, *Last Child in the Woods*, Richard Louv discusses nature's role in the development of children. As he succinctly puts it, "Nature inspires creativity in a child by demanding visualization and the full use of the senses." (2008, pg. 7) He also points out that, "Most scientists today began their careers as children, chasing bugs and snakes, collecting spiders, and feeling awe in the presence of nature. Since such untidy activities are fast disappearing, how, then, will our future scientists learn about nature?" (2008, pg 144) Where will the experiences come from that provide the foundation for learning as students spend more and more time in classrooms, computer labs, living rooms, offices, etc. staring into computer screens? There is no place richer in the raw materials needed for learning to occur, for experiences to be had, than the outdoors. Would having school in an outdoor setting provide for better learning opportunities?

Here we arrive at a challenge. Can a classroom setting be established which promotes learning as a natural process tied to experiences in the outdoors? In an ideal world, creating this environment should be easy, as it seems to be natural. However, with large class sizes, state standards, common assessments, and societal expectations of education, classrooms, teachers and students are not in an ideal world. Yet, despite these limiting factors, can such an environment of learning be established within a traditional school? Can these concepts be applied given the schools, attitudes, and students we have today?

Tackling this challenge encompasses an infinite number of possible tactics, and it is my belief that there are countless teachers attempting to meet this challenge today in their own classrooms around the world. It is my aim to take one approach and to evaluate it's effectiveness. By providing experiences in an outdoor setting, tying those experiences to content through reflection via student journals, it is my hope to create an environment for my students where genuine learning occurs naturally and has lasting impacts upon their lives.

## CHAPTER II

### LITERATURE REVIEW

#### **Education Today**

Educational reform is nothing new. Ask a veteran teacher how many fads and gimmicks they have watched come and go and there are not enough fingers to go around. However, as Linn (2000) points out, there is a commonality to the reforms of the last 50 years: assessment and accountability. While the concept of using standardized assessments as a means to hold educators accountable for what and how they teach with the aim of student education may have at one time originated with good intentions, those intentions may no longer be the driving force. In 1993 Madaus wrote:

It is now widely recognized that the state testing programs of the 1970s and 1980s have had a negative effect on students, teachers, instruction, and learning (American Educational Research Association, 1991; Darling-Hammond, 1991; Jaeger, 1991; Koretz, Linn, Dunbar, & Shepard, 1991; Madaus, 1991; Shepard, 1991; Stake, 1991). (p. 3)

Linn, quoting Madaus, described testing and assessment as “...both the focus of controversy and the darling of policymakers.” Linn lists a few reasons why these tools have stuck around:

- 1) “First, tests and assessments are relatively inexpensive.”
- 2) “Second, testing and assessment can be externally mandated. It is far easier to mandate testing and assessment requirements at the state or district level than it is to take actions that involve change in what happens inside the classroom.”
- 3) “Third, testing and assessment changes can be rapidly implemented. Importantly, new test or assessment requirements can be implemented within the term of office of elected officials.”
- 4) “Fourth, results are visible. Test results can be reported to the press.” (2000, p. 4)

Despite the recognition of negatively impacting education and being largely politically driven, state and national mandates continue to dominate educational reform today.

More recently, the national No Child Left Behind Act was passed with the intent “to hold schools accountable for ensuring that all students in grades three through eight achieve proficiency in reading and math by 2014.”(Cronin, Dahlin, Xiang, & McCahon, February 2009) This has allowed each state to create “...their own academic standards, select their own tests, and define proficiency in reading and math as they like,” (Cronin et al., February 2009) culminating in students defining their competence via performance on standardized tests.

Upon examining the No Child Left Behind Act (2001) and why the public has come to accept standardized testing as a means to establish accountability, Arnold Dodge turns to

the phenomenon of availability heuristics. “Broadly, a heuristic can be defined as a mental ‘short cut.’” (Dodge, 2009), a construct that allows people to “rely on simplified operations to explain complex phenomena.” (Dodge, 2009) Dodge states:

The average citizen may be overwhelmed by the nuanced, organic, multi-faceted, and nonlinear nature of a student’s educational development. To the rescue is a simpler and more convenient answer to fill the void. Politicians, the business community and the media encourage the trade off of complexity for simplicity so that school and student progress can be reduced to “understandable” numbers that appear “legitimate.” (2009, p.3)

Dodge goes on to conclude that the public has been hypnotized by the “...drumbeat of those claiming to have a simple answer: *if we can test each child, we can help each child.* This powerful short cut has hijacked the public’s imagination.” (2009, p. 6)

While the public may be primarily concerned with finding an easy way to improve education by holding schools accountable with standardized tests, the evidence continues to mount that these efforts are flawed and more importantly, this shortcut is reinforcing a one-size-fits-all philosophy of education. One test that measures all students makes a large assumption about the nature of educating students and predicates the idea of “one right way.” As a result of this thinking, many districts are implementing district wide curriculum, formative and summative assessments, labs, homework... in effect making the classroom standardized with the hope of guaranteeing success on the standardized

tests.

The far-reaching impacts of this movement towards national accountability/standardization are now being seen as teachers adapt their methodology in response to the demands of succeeding relative to these measures. As stated by Ives and Obenchain (2006) regarding the standardized tests being utilized,

“these high-stakes tests measure lower order knowledge and skills (e.g., recall and comprehension) as opposed to higher order thinking (e.g., analysis, synthesis, evaluation) (Chudowsky & Pellegrino, 2006, Volume 29, No. 1 63 2003; National Academy of Education, 1997; Neill, 2003)”. (p. 62)

As a result, a

...negative consequence of a high-stakes testing policy is a narrowing of the curriculum as teachers teach to a single high-stakes measure (Abrams & Madaus, 2003; Darling-Hammond, 2004; Marchant, 2004; Pennington, 2004). Narrowing the curriculum includes choosing to focus on the recall of basic information over in-depth understanding as well as focusing primarily on information that teachers believe will be tested. (Ives & Obenchain, 2006 p. 63)

Going back, this system of assessment and accountability had at one time the good intentions of improving student education, but today it is serving to sterilize classrooms, teachers, and students.

“...educational reform has failed because we are conceiving of education in the narrow terms of academic achievement: reading scores, mathematical skills, knowledge of our Constitution and slim factoids, such as ‘Where in the world is Canada?’”(Ryan, 1997 p. 82)

Teachers are expected to teach content within certain boundaries and within certain timeframes and with certain methods. Students are expected to conform to one standard of excellence, one method of learning, one style of performance. Dodge (2009) accurately describes modern education viewing students as a factory that produces “widgets, uniform and shatter proof.” (p. 13) American education is training students, as opposed to educating them. Training is what sandwich artists get on the first day of the job at Subway, and day two onwards is application. Education is what will turn the sandwich artist into a business owner, an innovator.

Further implications of this system are being seen outside of the educational realm. In his book *Play* (2009), Stuart Brown describes a dilemma the Jet Propulsion Laboratory, “the United States’ premier aerospace research facility,” faced:

As the lab neared the new century, the group of engineers and scientists who had come on board in the 1960s, those who put men on the moon and built robotic probes to explore the solar system, were retiring in large number. And JPL was having a hard time replacing them. Even though JPL hired the top graduates from top engineering school like MIT, Stanford... the new hires were often missing

something. They were not very good at certain types of problem solving that are critical to the job. (p. 9)

JPL's response was to research the difference between the retiring engineers and newly hired engineers.

“They found that in their youth, their older, problem-solving employees had taken apart clocks to see how they worked... The young engineering school graduates who had also done these things, who had played with their hands, were adept at the kinds of problem solving that management sought.” (p. 11)

While Stuart's book focuses on the importance of play in personal development, his point in this example can be applied directly to education. Problem solving of this magnitude is an example of the higher order thinking which is not being promoted in classrooms today. Which leaves us with the question: Are schools preparing students for the real world?

In 2000, a National Environmental Education and Training Foundation report titled *Environment-Based Education: Creating High Performance Schools and Students*, found that United States' “business leaders say they need better-educated, ‘renaissance’ workers.” (p. 13) Quoting the National Business Education Association's 1999 Yearbook, *The 21<sup>st</sup> Century: Meeting the Challenges to Business Education*, the report states that industry wants employees with the following characteristics:

- Can work in teams
- Create analytical reports
- Interpret data
- Make decisions
- Are leaders and visionaries
- Are critical thinkers
- Skilled communicators
- Self-starters who are flexible and ethical (p. 13)

As the United States finds itself amid hard economic times, changing world leadership, and constantly accelerating technological abilities, a movement is growing in the practical world, the business world, to change American education. As stated in a report from the Alliance for Childhood that looks at the long-term implications of standard-based education in early education, “leaders of major business corporations are saying that creativity and play are the future of the U.S. economy.” (Almon & Miller, March 2009 p. 4) The report also discusses Daniel Pink’s book, *A Whole New Mind*, which says that “people have to be able to do something that can’t be outsourced, something that’s hard to automate...” (p. 4)

The real world is demanding well-educated students, but the ideology of our educational system does not match these demands. Today,

...the majority of high-stakes assessment instruments used by states and schools...

focus on mastery of lower order thinking skills, (while) society in general, and educators, in particular, believe that students should also master higher order thinking skills. (Newmann, Bryk, & Nagaoka, 2001). While the acquisition of basic information requires lower level thinking, the ability to evaluate this information for use in new settings, as well as the ability to use it effectively, involves higher order thinking (Kornhaber, 2004). (Ives & Obenchain, 2006 p. 64)

It appears quite evident that the tools of assessment are driving a change in education that is not truly beneficial to our students or society.

Academic achievement is not the only aspect seen to be lacking from our educational system today. In a 2007 survey of over 1,300 business executives in California, it was found that:

...executives rated reading, personal responsibility, and work ethic as the skills that should be considered the highest priority for K-12 schools to teach students. On a scale of one to ten, with ten being the highest priority and one being the lowest priority, reading received an average rating of 9.2, and 59 percent of executives gave this skill a score of ten. Personal responsibility was not far behind – it received an average rating of 9.1, and even more (63 percent) gave it a ten. Work ethic was also ranked as a high priority, receiving an average rating of 9.1 and 61 percent giving it a ten. (Tulchin & Muehlenkamp, March 12, 2007)

Given these priorities, the same executives think our schools are not doing a good job. In regards to teaching personal responsibility, 28% rate schools as fair, with a majority (57%) rating as poor. Teaching work ethic is similarly rated, 27% fair and 60% poor. (Tulchin & Muehlenkamp, March 12, 2007)

Today we find a push to include in our school curriculums what is now known as character education. However,

...teaching of morals and values is not a new phenomenon; rather, it has been part of democratic thought throughout history. Plato and Aristotle in the Greece of the 4th century B.C.E. believed the role of education was to train good and virtuous citizens. John Locke, the 17th-century democratic philosopher, believed that learning was secondary to virtue. "Reading and writing and learning I allow to be necessary, but yet not the chief business [of education]. (Editorial Projects in Education, 2004)

In a 2003 speech at the First Ladies' Summit in the Dominican Republic, Laura Bush stated:

...we want our schools to teach more than just reading and writing. Respect and responsibility are also important. We want all children to be rich in skills, and rich in ideals. Children must learn to make a living and they must learn how to live. One of my country's great presidents, Theodore Roosevelt, said: "Character, in the long run, is the decisive factor in the life of an individual and of nations alike."

The future success of our nations depends on our children's ability to understand the difference between right and wrong and to have the strength of character to make the right choices. To help them reach their full potential and live with integrity, we must teach our children to be responsible and honest. Schools can play a crucial role in teaching the values that will help children succeed.

(Bush, October 15, 2003)

At the moment, there appears to be a disconnect between what outcomes are desired from our educational system (academic achievement and character education) and what is being measured and therefore reinforced and taught in schools (lower order thinking skills). In order to create a setting in which students can become the successful, contributing citizens we want and need, an educational philosophy must be implemented which encompasses the whole student's development; academic and social.

### **Environmental Education**

As humanity has progressed industrially and technically, fewer and fewer people are living in areas dominated by natural landscapes and making a living by working the land. The move from country to city has been repeated in every country that has found itself a world player in politics and business. This change is global in its reach, and it is altering the people of every culture, changing the cultures themselves. Just a few hundred years ago, the majority of the world's population did not live in centralized

urban areas, but dispersed throughout the land as a necessity to survival. How people lived, their food, water, necessary skills, was determined by the land and their knowledge of it. Sustainability was the norm. Today, with no connection to the land, people no longer have reason to maintain the wealth of knowledge regarding living with the land that had been painstakingly gathered over hundreds of generations' time.

However, the growth of cities has not come without its problems. Over time, people have noticed. With clean freshwater becoming scarce, hazardous waste sites filling, health problems from poor air quality increasing, etc. the impacts of concentrated humanity on the world are becoming an obvious problem. Now, the concept of caring for the physical world, of protecting the environment, of tapping into that once common knowledge of how to live with the land is making a comeback. Sharing this knowledge is a little different now. Rather than being passed from generation to generation, it is being disseminated through our schools.

The concept of environmental education is often credited to Jean-Jacques Rousseau, author of *Emile*, Louis Agassiz, and Wilbur Jackman, author of *Nature Study for the Common School*. In the 1930s, the Dust Bowl necessitated federal and state government reactions, kick starting what some refer to as the conservation education era, resulting in the creation of required teacher preparation in some states, establishment of conservation education degrees, and the formation of many non-governmental organizations such as

the Nature Conservancy, Conservation Education Association, and Association of Interpretative Naturalists. (McCrea)

Modern environmental education is identified as coming into existence with the establishment of The National Environmental Policy Act of 1969, followed by the National Environmental Education Act of 1970. At this point in history, there is a massive growth in public concern towards the state of the environment and throughout the 70s national and international efforts begin to focus and develop the idea of formal environmental education. (McCrea)

In 1977, 265 delegates from 68 countries gathered in Tbilisi for the first Intergovernmental Conference on Environmental Education (UNESCO & UNEP, October 1997). The product of this meeting, known as the Tbilisi Declaration, was to provide guiding principles for environmental education around the world. Concerning the role of environmental education, the Tbilisi Declaration states;

The ultimate aim... is to enable people to understand the complexities of the environment... help create an awareness of the economic, political and ecological interdependence of the modern world... a holistic perspective which examines the ecological, social, cultural and other aspects of particular problems.

(UNESCO & UNEP, October 1997)

Even then, it was recognized in the Tbilisi Declaration that environmental education has the ability to be “inherently interdisciplinary” (p. 12) and “should be integrated into the whole system of formal education at all levels to provide the necessary knowledge, understanding, values and skills needed by the general public” (p. 12). Following the Tbilisi conference, Hines, Hungerford, and Tomera (1986-1987) crafted a definition of environmental education that, as Coyle describes;

goes far beyond the mere imparting of information... (including:)

- A working knowledge of environmental issues
- Specific knowledge of approaches to address those issues
- The ability to make appropriate decisions, and
- Possession of certain affective qualities (attitudes) that make people care about and pay more attention to environmental conditions. (Coyle, 2005, p. 52)

It would appear that given its’ definition, environmental education has the potential to serve as a vehicle towards effective cognitive education. A teacher of environmental education looking at this definition would supplement it with a list of characteristics that often accompany this method of educating:

- Integrated learning across disciplines,
- Problem solving,
- Decision making,
- Independent and group learning,

- Issues-based instructional activities, and
- A balance variety of perspectives (Glenn, September 2000)

What is interesting to note in this attempt to wholly define environmental education is that the aim is not solely content or concerned with a particular body of knowledge, but focuses building awareness and the ability to act as an independent person within the human and environmental system. Environmental education is a truly holistic philosophy.

However, even in 2005, Coyle described the field of environmental education as “still in its youth compared to many other academic subjects” (p. 52). Despite the aims of the Tbilisi Declaration, environmental education “is still mostly considered an educational "extra" – grafted on to a core syllabus as an enhancement. After 35 years of effort, the environment has yet to achieve "core subject" status in our schools.” (Coyle, 2005)

It is time to re-evaluate the position of environmental education in public education. In his report titled *Environmental Literacy in America: What Ten Years of NEEFT/Roper Research and Related Studies Say About Environmental Literacy in the U.S.*, Coyle states that “...years of data... show a persistent pattern of environmental ignorance even among the most educated and influential members of society.” (p. vii)

In 2006 the Organization for Economic Co-Operation and Development (OECD),

consisting of 30 democratic governments working “together to address the economic, social and environmental challenges of globalisation” (Organisation for Economic Co-Operation and Development, 2009) conducted its’ third PISA (Programme for International Student Assessment) study.

The OECD’s Pisa 2006 assessment of the science competencies of 15-year-olds offers the first comprehensive international comparison of what students know about the environment and environment-related issues. This evidence comes at a time when global environmental challenges, such as climate change and biodiversity, have never been greater. Young people’s knowledge, skills and attitudes in this area will be crucial in terms of the ability and willingness of a new generation to respond to these challenges. (p. 9)

The 2006 PISA gathered information regarding:

- A profile of student performance in science including environmental science and geoscience.
- Measures of students’ attitudes towards learning science and towards environmental issues.
- Measures of school contexts, instruction and activities that promote learning about environmental issues, and parental perceptions of environmental issues. (p. 16)

After assessing the environmental knowledge and skills of over 400,000 students in 57 countries, a strong case exists for the United States to step up its environmental education programs. With a mean performance score of 491 on the environmental science index, the United States ranks 33<sup>rd</sup> out of the 57 countries surveyed (Organisation for Economic Co-Operation and Development, Table 2.3 p. 38). Only 17.1% of the United States' students scored at the A level of proficiency, while Finland topped the list of OECD countries at 30.9%, and neighboring Canada scored 26.3% (Organisation for Economic Co-Operation and Development, Table A2.1 p. 82). 17.3% of U.S. students scored in the lowest range, Below Level D, while the average percentage of students in OECD countries scoring at this level were only 15.5% (Organisation for Economic Co-Operation and Development, Table A2.1 p. 82). Academically, the United States' students are not competitive when it comes to environmental science knowledge and skills, and given the interdisciplinary nature of the field this may be a valuable indicator of overall science education.

The 2006 PISA survey not only assessed knowledge and skills, but also gathered data on students' familiarity with, feelings of responsibility for, and optimism towards environmental issues. Interestingly, it appears that although students in the U.S. do not perform as well as their international peers on environmental matters, there exists a high level of familiarity and responsibility towards such issues. Specifically, the percentage of students in the U.S. who report they are familiar with environmental issues (air pollution, energy shortages, extinction of plants/animals, clearing of forests, water shortages,

nuclear waste) was consistently over 90 (Organisation for Economic Co-Operation and Development, Figure 3.1 p. 51). More importantly, the percentage of students with feelings of responsibility concerning these same issues (believing these issues are a serious concern for themselves or other people) are consistently over 80% (Organisation for Economic Co-Operation and Development, Figure 3.2 p. 52).

It appears that students in the United States and across the world are “taking a strong interest in environmental issues, and accept they need to take responsibility for environmental outcomes.” (Organisation for Economic Co-Operation and Development, 2009) The evidence is showing us that the U.S.’ students are not as well educated on environmental issues as other students, but that as a whole they are motivated and personally invested in the concept of environmental education. This is a powerful realization when considering how to improve academic achievement in today’s schools. It would be safe to say that such feelings of motivation and responsibility do not exist at the same high level for traditional science topics such as biology, chemistry, and physics.

Strong positive opinions towards environmental education have been documented in adults, too. Coyle (2005), in discussing the NEEFTF/Roper report, states that “In 2000, 75% of adults (U.S) said learning about the environment in school should be as important as math or English” and “Similarly designed statewide studies showed equivalent levels of general support for environmental education for school children in Minnesota (90%) (Murphy, 2002)” (p. 66). Expressing surprise, the NEETF/Roper continues;

The 1997 NEETF/Roper Report Card – and every subsequent report card – found that adult Americans, including parents, overwhelmingly want environmental education for school children. Prior to conducting the research we expected a majority to be supportive. We never expected the magnitude of the majority: fully 95% of adults and 96% of parents support the practice of teaching school children about the environment (NEETF & Roper, 1997). (Coyle, p. 67)

The survey goes on to describe how influential adults believe environmental education can be;

...the 2000 data also show that Americans believe that an appreciation and understanding of the environment creates well-rounded children who are better prepared to be part of society (NEETF & Roper, 2001). (Coyle, p. 66)

and;

...85% of American adults think that environmental education contributes to a young person's thoughtfulness, consideration, and character in the form of respect for the people and places around them. (Coyle, p. 66)

It appears that not only are students motivated towards environmental education, but their mothers and fathers want them to learn it and see great value in it.

Coyle continues by making the point that not only is there a desire by the public for environmental education to be a part of school curriculums, but that there is a definite

need.

The NSF Advisory Committee on Environmental Research and Education (2003) points out that 80% of all students decide before entering high school to opt out of advanced math and professional scientific pursuits. The report identifies environmental education as a heuristic tool for making science more relevant and appealing to young prospective scientists. (Coyle, p. 70)

This is not a new concept, as schools around the world have adopted environmental education in a variety of manners; infusion, imposition, insertion, and framing (*How environmental education is used in schools*, 2004). Coyle discusses a number of studies, which have evaluated the success of these programs, and the findings have been positive.

For example;

- The SEER study found that environmental-based education stimulated science interest (Hoody, 2002). (Coyle, p. 70)
- “All educators who observed thousands of children in these programs perceived improvements in the learning of science in both its 1997 and 2002 studies. While most students in integrated environment-based programs show improvements across the board, science is the one educational subject where 100% of the students improved. Moreover, 89% of educators perceived improvements in understanding of complex scientific systems.” (Coyle, p. 70)
- SEER research since 1997 has shown that environment-based education

improves academic performance and learning across the board, regardless of socioeconomic or cultural factors (Hoody, 2002). Indeed, environment-based education appears to be a kind of educational equalizer, improving reading, science achievement, and critical thinking skills across ethnic and racial groups. (Coyle, p. 75)

Coyle also makes the point that “Environmental education could have a positive effect on the participation of women in the science professions. Today there are roughly twice as many men in science-related professions as women.” (p.81)

Because the environment is somewhat more important to women, it may also be an appealing way to approach scientific education for girls. If this higher level of interest can be captured and sustained through environmental education, environmental education could even help turn around current trends by encouraging and fostering more female scientists.” (p. 81)

In the National Environmental Education and Training Foundation’s report *Environment-based Education – Creating High Performance Schools and Students*, Glenn (2000)

discusses a number of successful environmental education programs:

- The School of Environmental Studies (SES) at the Minnesota Zoo, Apple Valley, Minnesota: Located in Minneapolis’ southern suburbs, it is a unique school for 200 juniors and 200 seniors... organized the curriculum around environmental education.(Glenn, p. 29)

- Test data collected over the last two years shows that SES students have exceeded state and national norms, as measured by ACT raw scores, in all academic areas. (Glenn, p. 29)
- Condit Elementary School, Bellaire, Texas: Implemented an environmental education program called *Nature at Your Doorstep*. (Glenn, p. 41)
  - The experimental group succeeded at far transfer (higher-order thinking) in a statistically and educationally significant manner. (Glenn, p. 42)
- Pine Jog Environmental Center Partnerships, West Palm Beach, Florida: The Pine Jog Environmental Center partnered with 11 local elementary and middle schools to create school-wide model environmental education programs.
  - Of the five schools in the partnership from the start, all showed improvements on two Florida state assessments, in both math and writing. (Glenn, p. 39)

Formal environmental education in mainstream public education is a relatively new movement, but successes from existing programs are providing evidence of its ability to improve students academic performance on established assessment tools. The SEER website ([seer.org](http://seer.org)) summarizes over a dozen research studies that have shown this relationship.

Environmental education programs have also shown a number of qualitative benefits to schools, students, and teachers. In a study titled *The Effects of Environment-Based*

*Education on Students' Achievement Motivation*, Athman and Monroe concluded, after surveying 400 9<sup>th</sup> and 12<sup>th</sup> graders, that such programs are a statistically “effective way to engage high school students in learning by increasing achievement motivation” (p. 21) among all levels of student academic achievement (as determined by GPA). This may have to do with environmental education’s relevancy to students’ lives.

Coyle (2005) reports additional examples of positive changes in discipline as a result of environmental education programs being implemented:

- The Hotchkiss School in Texas, for example, saw a 91% reduction disciplinary referrals among students in the environment program.
- At the Little Falls School in Minnesota, the students in the environment program comprised just 28% of reported discipline problems although they represented 46% of the student body (Hoody, 2002).

As Glenn claims in the 2001 report *Using Environment-Based Education to Advance Learning Skills and Character Development*, schools with such programs have the capability to serve as character educators;

Environment-based education can help teachers become character educators without being overly “preachy.” The messages of environmental conservation — don’t waste, take care, restore, respect the rights of others — are foundation blocks for building character education. Using the environment as an integrator offers a politically neutral but compelling avenue for implementing character education in

the schools. (p. 13)

and leadership developers;

Leadership ability is built on many of the skills that environment-based education fosters: cooperation and the ability to act in appropriate, socially acceptable ways; letting all who want to be part of the action participate, either individually or as part of a team or group; showing concern for others; demonstrating active leadership and participation in the democratic process; and connecting to the community. In issues-oriented instruction, students are invited to actively solve problems, often connecting with the community in environmental service learning projects. Because it is inquiry-based (that is, learning and knowledge evolve from student questions and curiosity within a framework of agreed-upon academic standards), environment-based education is an excellent vehicle for helping students develop and practice the critical thinking and decision-making skills needed in the democratic process. (p. 12)

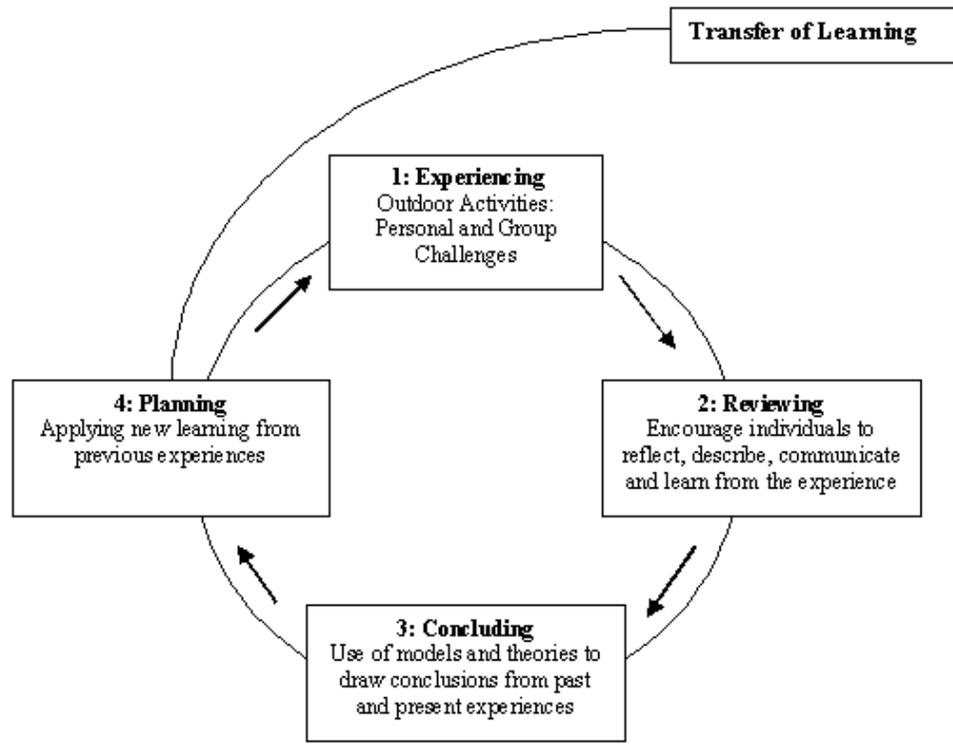
As a whole, it appears that environmental education, if implemented correctly into mainstream education, has the potential to not only improve academic performance, but to also help students develop the life skills they will need to be truly successful.

### **Experiential Education, Outdoor Education, and Adventure Education**

Often used interchangeably, the terms experiential, outdoor, and adventure education (along with many other variations) are philosophically similar, most often different as a result of physical environment and educational context, but also differing in methodology and purpose.

Experiential education, while often thought of as occurring in outdoor environments, is truly a philosophy of education for all settings. The Association for Experiential Educators defines experiential education as “a philosophy and methodology in which educators purposefully engage with learners in direct experience and focused reflection in order to increase knowledge, develop skills and clarify values.” (*Association for Experiential Education: What is Experiential Education?*, 2010) In regards to general experiential education, recognition is often given to John Dewey and his philosophy of education and experience for laying the groundwork (Neill, 2004), along with scholars Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire, and Carl Rogers (Kolb & Kolb, 2005). “Dewey’s approach to learning envisioned the classroom as a microcosm of society in which students learned how to function and succeed in society by functioning and succeeding in the classroom community.” (Gardner, Ives, & Obenchain, 2007) Dewey’s conception of the nature of human experience in the role of learning was built upon by many and developed into a variety of Experiential Learning Cycles. Kolb’s 4-stage cycle is one of the most commonly known;

**Figure 2.1: Kolb's Model of Experiential Learning (Neill, 2004).**



This model suggests that a participant has a Concrete Experience, followed by an opportunity for Reflective Observation, then the formation of Abstract Conceptualizations before finally conducting Active Experimentation to test out the newly developed principles. (Neill, 2004). “Kolb (1984) summarized the characteristics of the experiential learning process into the following definition. ‘Learning is a process whereby knowledge is created through the transformation of experience’ (p.38) (Martin, 2001) Kolb’s model, a visualization of his experiential learning theory, draws upon six propositions shared by Dewey, Piaget, and others;

1. Learning is best conceived as a process, not in terms of outcomes.
2. Learning is best facilitated by a process that draws out the students’ beliefs and

ideas about a topic so that they can be examined, tested, and integrated with new, more refined ideas.

3. Conflict, differences, and disagreement are what drive the learning processes.
4. Learning is a holistic process of adaptation to the world... thinking, feeling, perceiving, and behaving.
5. Learning results from transactions between the person and the environment.
6. Learning is a process of creating knowledge. (Kolb & Kolb, 2005)

The model applies to all situations, not just formal education, which explains why experiential learning as a formal style of teaching often results in teaching opportunities in all environments/situations – or anywhere experiences can be had.

As Neill (2004) points out, “There are other stage models to be considered, and many critiques have been made”, as Kolb’s is not the only model describing the process of experiential education. Ives and Obenchain (2006) do a great job of summarizing the “philosophical underpinnings and definitions of experiential education” (p. 65) by identifying three elements of “well-constructed experiential education-based curricula”:

1. Learning should include opportunities for student-direction.
2. Learning should include real world connections.
3. Critical reflection is essential. (p. 65)

The common thread through all experiential learning models is that experience is

followed by reflection, and reflection produces a change in the person (learning). This can be seen in everyday situations. For example, imagine a young child who lets curiosity get the best of him in the kitchen. He reaches up and touches the side of a pot of boiling water (the experience), is burned and begins to cry. Reflection occurs subconsciously and most likely that child will not repeat that experience again, meaning he has learned. As an educator, why would we assume learning in school should be any different?

Turning our focus to the non-traditional classroom of the outdoors, as Kraft (1985) stated, “no discussion of the theory of experiential education would be complete without some recognition being given to Kurt Hahn” (p.15) (Martin, 2001). “Hahn believed that experiences created diverse feelings and that these feelings of internal conflict were responsible for the educational process of self-discovery, growth and learning (James, 1990).” “His philosophy was based on providing experiential education programmes that empowered young people to fulfill their potential (Stetson, 1996).”(Martin, 2001). Hahn viewed experiential education as a means to develop youth cognitively as well as socially and morally.

Kurt Hahn went on to found the well-known organization Outward Bound, whose mission statement today is:

To inspire character development and self-discovery in people of all ages and walks of life through challenge and adventure, and to impel them to achieve more than

they ever thought possible, to show compassion for others and to actively engage in creating a better world. (*Outward Bound Educational Framework and Mission*, 2010)

Outward Bound goes on to describe their “Design Principles,” one of which is “Learning through Experience”:

- Facilitating engaging, relevant, sequential experiences that promote skill mastery and incorporate reflection and transference.
- Learning from success as well as adventure.

According to their stated purpose and guiding principles, it can be seen that the Outward Bound model is experiential education. As Martin (2001) describes, Outward Bound capitalizes on the idea that experiential learning is “an active process (King, 1988) involving the learner being placed in unfamiliar environments, outside their positions of comfort and into states of dissonance (Gass, 1993). This lack of harmony requires problem solving, inquiry and reflection (Kraft & Sakofs, 1991)” (p. 12) Outward Bound is an internationally respected example of experiential education in practice.

The concept of Kurt Hahn and Outward Bound, taking experiential education into the outdoors, is fairly common today, as can be seen by the explosion in the number of similar organizations, such as Paul Petzoldt’s National Outdoor Leadership School. In this context, experiential education often passes under the guise as outdoor or adventure education. Martin (2001), in discussing MacArthur (1975), states that he

...identified similar characteristics between adventure education and outdoor education: the learner is placed in demanding situations, which necessitate the mastery of new skills, followed immediately by responsible challenging action requiring the application of these skills. This is coupled with critical analysis and reflection, which ultimately aims to develop meaning and direction for the learner's future. (p. 17)

Within this statement, it is easy to see the framework of Kolb's experiential learning model, but some have argued there is a difference between the three terms.

Defining and differentiating outdoor and adventure education, and even experiential and environmental education's connection, is not so cut and dry. Priest described outdoor education as having two branches, adventure and environmental education, in which experiential learning is important and primarily occurs in a natural setting. (Martin, 2001) Also, "Outdoor education has been identified as being part of the field of experiential education (Lynch, 1993) and uses an experiential approach to physical and mental development (Gair, 1997)." (Martin, 2001) A definition used by many (Ford, 1981; Donaldson and Donaldson, 1958; McRae, 1990; Lynch, 1993) is "education in, about, and for the outdoors, implying a place, a topic, and a reason." (Martin, 2001)

Adventure education has been defined by Martin (2001), quoting Hopkins and Putnam(1993), as independent terms. Adventure as "an experience that involves

uncertainty of outcome” that “liberates as it disciplines; because of the holistic nature of the experience there is personal growth” and education as a “process of intellectual, moral and social growth that involves the acquisition of knowledge, skills and growth”.(Martin, 2001) As with outdoor education, the underlying philosophy of experiential education, the experience followed by reflection and growth, exists. However in this context the experience is often defined as adventure. It may be possible to further focus adventure education by defining outdoor education as a branch of it in which the experience (adventure) occurs outside, rather than in an indoor pool or on an indoor rock climbing wall.

As Martin (2001) states, “throughout the literature the words outdoor, adventure, experiential and environmental are often used interchangeably... This suggests that the boundaries of each field of study are unclear.” (p. 19) James Neill, upon reviewing a variety of articles which attempt to define these fields, published a list on [wilderdom.com](http://wilderdom.com) of over 45 commonly used terms that are used interchangeably. However, despite the variety of names and definitions, one shared theme among them is the primary focus on personal and social development, through experience and reflection. For simplicity sake, the term outdoor education will be used to wholly encompass the different methodologies of applying experiential philosophy to a natural outdoors based classroom setting.

The value of outdoor experiences has been long believed. As Hattie, Marsh, Neill, &

Richards (1997, p. 43) state;

Plato extolled the virtues of outdoor experiences for developing healthy bodies, which would lead to healthy souls. Like many outdoor adventure programs, Plato considered that the aim of physical education was not primarily to enhance physical skills and that it had a higher educational value: "The moral value of exercises and sports far outweighed the physical value" (Plato, 1920, p. 6).

The impacts of outdoor education on students are well documented in certain environments. According to Austin, Martin, Mittelstaedt, Schanning, & Ogle (2009), "More than 200 schools (colleges) currently use some form of the Outward Bound-adapted model of outdoor orientation (OO) (freshman orientation)" (p. 435) and "scores of studies have been conducted... Hundreds of investigative and popular articles have been written about wilderness adventure programming... offered at many universities (Hendee & Brown, 1987). Historically, as Austin et al. (2009) states,

Documented gains associated with Outdoor Orientation (OO) programs include personal growth (Davis-Berman & Berman, 1996), an increase in self-efficacy (Hinton, Twilley, & Mittelstaedt, 2007), and improved retention (Gass, 1990). Outdoor orientation programs have also had a positive effect on participants' social skills, such as developing social networks (Gass, Garvey, & Sugerman, 2003) adjustment, small group skills, and reducing stereotyping (Galloway, 2000). (p. 435)

The Austin et al. (2009) study built upon the concept of developing social skills by seeing if such programs increased a sense of place in participants of college outdoor orientation programs. The study defined sense of place, quoting Sanger (1997), as; “an experientially based intimacy with the natural process, community, and history of one’s place” (p. 2) and which, quoting Vaske & Kobrin (2001); “...incorporates dependence, identity, awareness, and attachment.” Austin et al. (2009) found through a comparison of pretest and posttest responses a significant increase in the number of friendships and “in the number of people they would trust with an emotional secret.” (p. 436) These findings support the overall concept of outdoor education building social skills.

Ewert and McAvoy (2000, p. 5) summarize additional findings of influences of outdoor education programs on students;

- Luckner (1989) concluded that when combined with the interpersonal and supportive context of group interaction, outdoor adventure experiences, such as wilderness programs, can provide an effective platform for promoting self-concept change.
- Related to the construct of self-systems, Kellert (1999) found that participation in three wilderness-based programs (Outward Bound, National Outdoor Leadership School and the Student Conservation Association) produced a number of significant changes. A sampling of these changes included: a life-changing event, increased interest in school, physical and mental fitness, positive behavioral changes and a stronger commitment to

conservation and the environment. Kellert (1999) also found that many of these changes had some durability and persisted beyond the end of the course.

- Another construct in the category of self-system is self-efficacy, which was examined by Propst and Koesler (1998). As defined by Bandura (1977), self-efficacy refers to personal judgments of one's abilities and capability to act in situations that may be novel, unpredictable and potentially stressful (such as wilderness tripping). Using an "untreated control group pre/post test design," Propst and Koesler (1998) found that participation in an outdoor adventure trip increased levels of self-efficacy both immediately after and one-year after the course.

In 1997, Hattie et al. conducted a meta-analysis of "96 studies published between 1968 and 1994" (p. 51) encompassing over 12,000 participants, the majority of which (75%) were adults or university students. It was concluded "that some aspects of adventure programs are most successful..." (p. 70). Specifically, "the continued gains and longevity of the follow-up effects are the most impressive findings... It seems that adventure programs have a major impact on the lives of participants, and this impact is lasting" (p. 70). It was found that the greatest effect on participants was related to self-control, including "independence, confidence, self-efficacy, self-understanding, assertiveness, internal locus of control, and decision making." (p. 70). Therefore, adventure programs "appear to be most effective at providing participants with a sense of

self-regulation”, and “effects on most leadership, personality, and adventuresome dimensions are also substantial.”(p. 70). However, as Hattie et al. concludes, the details of this meta-analysis show that “Only some programs work, and these with only some participants and some instructors, and probably only parts of the program are influencing outcomes.” (p. 72)

While there is some question to the true impacts of outdoor education on students given the difficulty of assessing such subjective outcomes, currently the majority of studies support the idea of social skill development through outdoor education. What is interesting to note, is that the concept of outdoor education has not become a part of mainstream k-12 education, while private educational institutions such as Outward Bound and the National Outdoor Leadership School, along with hundreds of colleges and businesses have successfully adopted this model to produce change in students and employees.

As the above studies show, the affects of outdoor education in non-traditional settings have had plenty of research completed in regards to their successes, but studies concerning outdoor education in K-12 education are just now beginning to appear in sufficient numbers to provide an accurate picture of outdoor education in this role. One of the most well recognized studies is *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning*, conducted by Hoody and Lieberman with the State Education and Environment Round Table (SEER) in 1998. The

study gathered evidence from 40 schools in the United States, including “interviews with more than 400 students, and 250 teachers and administrators; four different surveys of the educators; and, comparative studies of standardized test scores, GPAs, and attitudinal measures.” (Lieberman & Hoody, 1998 p. 2) Each school involved adopted the Environment as the Integrating Context (EIC) framework, which provides “for interdisciplinary, collaborative, student-centered, hands-on, and engaged learning” (p. 1) that “employs natural and socio-cultural environments as the context for learning.” (p. 1) Each school’s program was unique as a result of different geographic environments, but it is easy to see how the principles of experiential education fit into the EIC framework.

The Hoody and Lieberman (1998) report the findings of the study in regards to specific measurements:

- Language Arts: “All 17 comparative studies of language arts achievement data found that standardized measures affirm the academic benefits of EIC-based learning for reading, writing, and general language skills. On the average, the EIC students outperformed their peers from traditional programs... As EIC students concentrate on subjects of interest and importance to them, they become more capable and confident readers, writers, and speakers. (p. 4)
- Math: “On the average, the EIC students outperformed their peers from traditional programs... Learning in the context of the environment helps students recognize the practical value of math for quantifying and understanding the world around them.” (p. 5)

- Science: “EIC students scored higher, on three of four comparative studies of standardized science achievement data, than their peers... In the fourth... EIC and traditional students scored equally... As they apply fresh approaches to solving problems, rather than passively listening and taking notes, they develop a clearer and deeper understanding of the importance of scientific knowledge and processes.” (p. 6)
- Social Studies: “Ninety-six percent of teachers and principals... reported that EIC-based learning helped their students develop and improve their knowledge of social studies... helps to produce active, involved citizens who develop a deeper understanding of their roles and responsibilities as members of a democratic society.” (p. 7)
- Thinking Skills: Ninety-six percent of teachers and principals “reported that students in EIC programs developed higher-level, critical-thinking skills than those of their traditional peers... The environment serves as a rich context within which students can gather, analyze, and begin to understand the many factors that affect individual, business, community, and governmental decisions.” (p. 8)
- Interpersonal Abilities: Educators were surveyed on the effects on interpersonal skills; 98% reported “better ability to work in group settings”; 94% reported “stronger communication skills”; and 93% reported “acting with greater civility toward others” (p. 9).
- Revitalized Teaching: “Educators at all 40 study schools described consistent and significant growth in their enthusiasm and commitment to teaching after their

school implemented an EIC program.” (p. 10) Specific effects included; “increased enthusiasm and commitment toward teaching (95%)”; “better working relationships with their students and colleagues (94%)”; “more opportunities to explore new subject matter” (95%); and “frequent occasions to use innovative instructional strategies (96%)”. (p. 10)

As Hoody and Lieberman conclude, “using the environment as an integrating context for learning, holds great promise” and “can provide a meaningful context around which teachers can create a curricular framework that intrigues learners and revitalizes teachers.” (p. 11)

With the multitude of evidence supporting the idea of applying the philosophy of experiential education to environmental education-based outdoor education (increased academic performance, cognitive and social development), it is surprising to not see such programs more prevalent in mainstream K-12 schools. Disinger (1984) discusses the role of field instruction in schools and summarizes the most common factors inhibiting the use of outdoor classrooms:

lack of planning time; lack of resource people for assistance; failure of the school to assume trip risk; lack of a satisfactory method for covering classes; restriction placed on field work by school regulations; lack of administration leadership, support, and encouragement; lack of appropriate funding; limited available transportation; too much ‘red tape’; excessive class sizes. (p. 1)

“Teachers find it easier to stay within the classroom walls, than to address these roadblocks. In many cases, the teacher finds no motivation from outside forces to move beyond those walls (Disinger, 1984).” More recently, Comishin, Dymont, Potter, & Russell’s (2004) study “focus(es) on the experiences of four programs (outdoor-focused secondary school integrated programs) that did become reality” (p. 48) and found similar results. The programs chosen in the study shared the following four criteria:

- (1) they were offered at the secondary level in the public system;
- (2) they were a minimum of one semester in length;
- (3) they offered courses which met students’ graduation requirements;
- and (4) they placed an emphasis on outdoor experiential education. (p. 48)

Comishin et al. found that

- The five most common challenges in developing and implementing an integrated program mentioned by the four teachers were: (1) funding constraints; (2) insufficient support from administrators and colleagues; (3) time constraints; (4) liability and risk management; and (5) inadequate skills and qualifications. (p. 48)

In order for outdoor education to become considered part of mainstream K-12, such as math, language arts, social studies, or science, these challenges must be met. In reality, it is not until outdoor education becomes mainstream that it will receive the necessary financial and administrative support.

However, an integration may be enticing enough to warrant these needed supports. Combining environmental-based education content and concepts with outdoor education practices would provide the benefits of both in an amplified manner. These two educational styles complement each other by uniting experience, knowledge, and motivation. This concept is not new, but it seems that evidence of such programs is lacking, especially in K-12 education.

### **Higher-Order and Critical Thinking**

Returning to Dewey, upon further investigation it is apparent his role in educational philosophy went far beyond experiential learning. As Fisher points out, Dewey “is widely regarded as the ‘father’ of the modern critical thinking tradition.” (Fisher, 2001)

Dewey defined critical thinking, or ‘reflective thinking’ as he called it, as:

Active, persistent, and careful consideration of a belief or supposed form of knowledge in the light of the grounds which support it and the further considerations to which it tends. (Dewey, 1909, p. 9) (Fisher, 2001)

Kolb’s model of experiential learning aligns well with Dewey’s definition. Most importantly, as Fisher states, “...critical thinking is *essentially* an ‘active’ process – one in which you think things through for yourself, raise questions yourself, find relevant information yourself, etc. rather than learning in a largely passive way from someone else.” (p. 2) The “active process” quality of critical thinking lends itself to the experiential learning philosophy of Kolb, Dewey, and Piaget.

However, examining further efforts at defining critical thinking points to a higher level of thinking possibly not addressed by Kolb's model. Edward Glaser, "co-author of what has become the world's most widely used test of critical thinking, the *Watson-Glaser Critical Thinking Appraisal*" (Fisher, 2001) defines critical thinking as:

- (1) an attitude of being disposed to consider in a thoughtful way the problems and subject that come within the range of one's experience;
- (2) knowledge of the methods of logical enquiry and reasoning; and
- (3) some skill in applying those methods. Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends. (Glaser, 1941, p. 5) (Fisher, 2001)

Glaser's definition views critical thinking not as a "level" of thinking, but as an awareness of and control of the thinking process. As stated by Rudd when quoting Paul (1995);

the 'master of critical thinking' uses a set of intellectual standards while thinking. These standards guide the thinking process as well as help the individuals heighten their ability to think critically. Thinking about thinking for the purpose of improving the thought process is at the heart of critical thinking." (2007, p. 46)

In addressing the statement ‘Kolb’s model of experiential learning is critical thinking,’ we must differentiate between the process of critical thinking and the skills of critical thinking. While Kolb’s model does invoke thinking, as Fisher points out when discussing Michael Scriven, “thinking does not count as critical merely because it is *intended* to be... To be critical, thinking has to meet certain standards – of clarity, relevance, reasonableness, etc. – and one may be *more* or *less* skilled at this.” (Fisher, 2001) Edward Glaser identifies some of the fundamental critical thinking skills as:

- identify the elements in a reasoned case, especially reasons and conclusions;
- identify and evaluate assumptions
- clarify and interpret expressions and ideas
- judge the acceptability, especially the credibility, of claims
- evaluate arguments of different kinds
- analyse, evaluate, and produce explanations
- analyse, evaluate and make decisions
- draw inferences
- produce arguments (Fisher, 2001)

If Kolb’s model of experiential learning promotes the use of these or other critical thinking skills, it would be safe to conclude this model promotes higher order critical thinking.

## **Student Journaling**

One of the challenges of establishing a non-traditional classroom environment built on the principles of experiential education in an outdoor setting is assessing the students. Dealing with large classes, inclement weather, variable activity preparation and execution- often leave little time for the traditional classroom worksheets, textbook reading and questioning, projects, quizzes, and tests. It could be argued however, that these assessment methods have no place in an outdoor experiential classroom. But, even more difficult with these situational challenges is establishing assessment practices that encourage students use higher order thinking skills. To truly establish a classroom environment where students can gain the most from the outdoor experiential model, assessment practices that encourage reflection, use of critical thinking skills, and consistent documentation of learning must exist. Student journals may be one viable method of such an assessment practice.

As stated by Hubbs and Brand (2005):

Reflective journaling can provide instructors with glimpses of the inner workings of the students' mind. Journal entries allow the instructor to view, through the student's words, the quality of comprehension and mastery of the material, as well as affective responses to the content. The reflective journal can be a vehicle for the student to define, question, and interact with content, concepts, ideas, values, beliefs, and feelings. In addition, reflective journaling invites students to articulate

their understandings of course content... (pg. 65)

As also noted by Hubbs and Brand, the concept of student journaling is rooted in Dewey and Kolb's theories. Dewey viewed an "effective learning condition as one that actively engages the student with the content in an intensely personal way, and advocated (for) experiential learning..." with Kolb "highlighting the reflective process as a necessary part of engaging the learner." (Hubbs & Brand, 2005) Structuring a student journal around Kolb's model of experiential learning would thereby capitalize on the proposed benefits of experiential learning while providing a means of assessment for the class.

Journaling has shown promise as a means of promoting the use of critical thinking skills. As Pavlovich states, "The observing, reflecting and learning from personal experience can be integrated into the classroom through students making regular entries in journals as they engage with course content, relationships and their own experiences." (2007, pg 283) This reflection of "content, relationships and their own experiences" could involve any number of critical thinking skills as outlined above. "The act of writing facilitates deeper analysis of the experience through assessing and articulating it." (Pavlovich, September 2007) If used consistently and in a structured manner, journals may serve as an effective assessment tool.

## **CHAPTER III**

### **METHODOLOGY**

This case study examines how student journaling facilitates Kolb's model of experiential education and provides opportunities for critical thinking and social skill development. The subject of this study was a semester long Outdoor Adventures class, consisting of 37 seniors. 34 students participated in the study, composed of 23 males and 11 females. The average GPA of the class was 3.41, which is relatively high compared to most classes at the school. The Outdoor Adventures class' philosophy is to use the outdoor classroom to teach skills, such as canoeing, snowshoeing, winter camping, rock climbing, etc., in an environmental science framework. Journaling has historically been a common practice utilized by the teachers of this class, often accounting for the largest portion of a student's grade. However, the expectations for and use of the journals has varied from teacher to teacher. The overall goal of this study is to use student journals to facilitate the process of experiential learning through Kolb's model and evaluate a variety of hypothesis'.

### **Typical Day in Outdoor Adventures**

This semester's Outdoor Adventures class was held during the first of four periods of the day, from 7:45 to 9:10 am on a block schedule. While there was a traditional, indoor classroom, more often than not students would meet at a pre-determined location outside on the school grounds, which covers approximately 200 acres and is bordered by the Rum River. Students were expected to come to class every day with appropriate clothing for the weather (no exceptions- even in February!), their journal and a writing utensil. During class students would participate in an activity as a whole, in small groups, or individually. Depending on the activity, discussion would often follow or be held the following day. Occasionally class was held in its indoor classroom or in the computer lab to conduct research or finalize projects. Due to the outdoor and experiential nature of the class and the resulting non-traditional independence students receive, the class is only available to seniors in order to maintain the highest expectations of personal and group safety.

### **Student Journals**

At the beginning of the semester students received a notebook that would serve as their journal. The student's journals served as the primary means of holding students accountable for their time and work in class. Journal prompts were either given at the start of the class period with the intent of students writing during class, or at the conclusion of the activity or period to be completed on their own time. During the first quarter of the semester, journals were collected and graded three times. This practice

yielded low student completion on a day-to-day basis. Through discussion with the class, it was suggested by and agreed upon by students that completion would increase if journal entries were checked in on a daily basis. Accordingly, this practice was instituted for the second quarter of the semester, with entries being checked for completion daily and collected for grading periodically. Journals were graded using a rubric that students taped into their journal (Appendix A).

### **Journaling Kolb's Model**

Periodically, journal prompts were given that specifically targeted the stages of Kolb's model with the aim of promoting students to show evidence of these stages. While students were aware that these prompts would be given throughout the semester, they were not informed which prompts these were. Each prompt was given during or after an activity/experience. When journals were collected for grading, I also transcribed these entries before returning them. An example of one prompt and the student's responses is included in Appendix B. Some activities/experiences have prompts that entail not one but two journal entries. For each experience and its entailing prompt(s) I have identified which stage of Kolb's model it targets; Reflection, Conclusion, Application. The specific prompts varied in how direct they targeted the individual stages of Kolb's Model, if at all.

## The Prompts

### Prompt 1: March 10<sup>th</sup> and 11<sup>th</sup>

Experience: Students built snow shelters (quinzhees) during class and could voluntarily camp out that night.

Reflection: “Campers: Tell me about your night! The good, the bad, the ugly, the beautiful!”

Conclusion: “What will you do differently next time? Would you winter camp again? Why yes or no? If yes, what did you learn last night, and how will this change your next winter camping experience? If no, what could you do to prepare yourself for a better winter camping experience? What would you do differently?”

### Prompt 2: March 12<sup>th</sup> and 13<sup>th</sup>

Experience: Students met me outside and were given a copy of Jack London’s “To Build a Fire”, then asked to find a place individually to read and complete the prompt. Note: It was cold out.

Reflection: “Read Jack London's “To Build a Fire.” Jot down 15 thoughts, ideas, observations, questions as you read. Read it 2 times.”

Conclusion: “Describe the main character in a few sentences. What do you think of him? Do you see any of yourself in this character? Could London's story be more than just about building a fire? Explain.”

### Prompt 3: March 18<sup>th</sup>

Experience: Following a warm spell in the weather and an ecological discussion on energy flow the day before, the class and I completed a walking tour of the campus to observe changes taking place.

Reflection: “Describe three changes you see in the natural world today while we walk.”

Conclusion: “What do these changes mean for the next few weeks in regards to feeding relationships/energy flow?”

**Prompt 4: March 21<sup>st</sup>**

Experience: To continue our examination of winter ecology and promote a discussion of adaptations to winter environments the class participated in the Hypothermia Lab. In this lab students worked in groups of 3 to 4. One student is the “victim” and puts their hand in a bucket of ice water for 12 to 15 minutes. Before starting, and every 3 minutes during, the other participants are gathering data by observing the victim, asking them questions, and measuring hand circulation, respirations, and dexterity. This prompt was specifically numbered.

Reflection: “1. Describe the progression of feelings/physiological changes that you experienced.”

Conclusion: “2. Why would your body respond this way? 3. What is the value of having such a response to cold?”

Application: “List 10 organisms whose habitat is in cold environments that we could not survive in.”

**Prompt 5: March 23<sup>rd</sup>**

Experience: In further discussing adaptations of animals in the natural world the class conducted an introductory tracking exercise. Students were blindfolded and required to follow a 600 foot rope through a variety of terrain using only their other senses.

Reflection: “Describe how your day went.”

Conclusion: “How did this experience alter your conception of the natural world? In regards to other ‘life’ is this view of the world common or rare?”

**Prompt 6: March 28<sup>th</sup>**

Experience: Following a discussion on humanity's impact on the natural world, students were given an article titled "Wild Forests and Landscape Amnesia" by George Wuerthner. The expectation was to read the article and complete the journal entry on their own time outside of class.

Reflection: "What is different about Vermont's forests today as compared to pre-settlement times?"

Conclusion: "What is landscape amnesia?"

Application: "Does it exist in Minnesota?"

**Prompt 7: April 7<sup>th</sup>**

Experience: Following a discussion on the changes we are seeing as Spring progresses and thinking about why we see the animals we do, the class applied their past lessons on energy flow to the predator/prey relationship. To stimulate this application of ideas, I hid myself and challenged the students to find me. This preceded a game called Predator/Prey which was conducted the next day. For this prompt, I identified the reflection stage in two areas, as identified below.

Reflection: "How easy was it to find Hunter?"

Conclusion: "Why was it hard/easy?"

Reflection: "What physical and behavioral adaptations do animals utilize to stay hidden?"

Application: How will you, the observer (or predator) adapt to counter your prey's adaptations?"

## **The Hypothesis'**

The overall purpose of the study was to examine how student journaling facilitates Kolb's model of experiential education and provides opportunities for critical thinking and social skill development. Specific hypothesis for the study include:

**Hypothesis 1:** Journaling is an effective way to facilitate Kolb's model of experiential learning.

**Hypothesis 2:** Journaling promotes higher order critical thinking.

**Hypothesis 3:** The experiential learning method encouraged students to reflect upon social skills.

**Hypothesis 4:** Journaling is an effective assessment tool in an outdoor experiential education classroom.

## **Data Analysis**

Once journals were collected, graded, and entries transcribed, they were returned to students. Working through the transcribed entries, I broke each entry down into the corresponding stage of Kolb's Model. A sample of student journal responses to one prompt with stage breakdowns identified is located in the Appendix B. For each entry I then conducted a word count of the total entry and of the entry sections showing evidence of each of Kolb's stages. Evaluating these counts allows for a variety of comparisons to be made and relationships observed among individual student's writing patterns and the class as a whole in regards to showing evidence of Kolb's model. The patterns that

emerge may offer clues in how journaling promotes learning through Kolb's model, and how to more effectively use the journaling process.

### **Post-Course Student Survey**

On the last day of the semester students were asked to complete the Post-Course Student Survey (Appendix C). Given the experiential nature of the class, the learning style, and journaling, student attitude is an important indicator of the success of such a class. The survey contained 12 questions aimed at measuring the student's attitudes in regards to the study's hypothesis'. Students were also asked to respond to two short, written answer prompts. The results of questions 1 through 12 can be found in Appendix D.

### **Summary**

Being the first time I have taught this class, it was a learning process throughout. The class did complete much more over the course of the semester than is described here, so it is possible that factors outside of the data mentioned specifically could have changed the data collected and results. However, I feel that the prompts utilized in the study are a solid representation of the class as a whole. Between analyzing the student's journals, surveying their attitudes, and my personal observations, I believe that an accurate picture of the class can and has been created, such that the four hypothesis can be sufficiently evaluated.

## CHAPTER IV

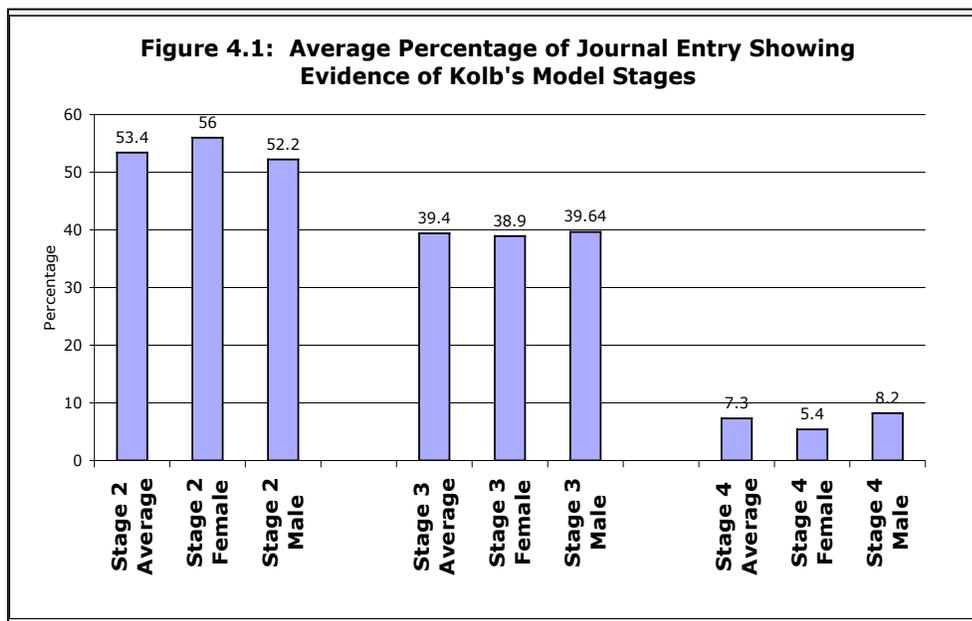
### RESULTS

#### **Hypothesis 1: Journaling is an effective way to facilitate Kolb's model of experiential learning.**

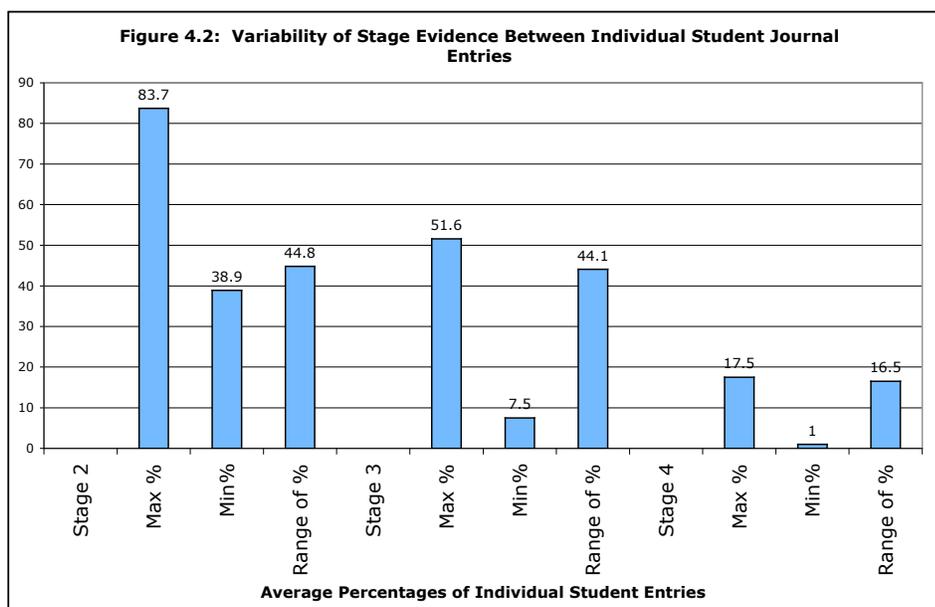
In evaluating this hypothesis, I addressed a number of questions. First, did students complete the journal entries? Of the students who were included in the study, the average journal completion rate was 81.1%. Female students had a higher completion rate at 88.3% than male students at 77.6%. Of these completed entries, the average word count was 169, with males having a higher average count of 180 words compared to females at 150 words.

Second, do students show evidence of Kolb's model in their writing?

As can be seen in Figure 4.1, students invested the majority of their journaling efforts to showing evidence of Stage 2: Reflection, consisting of 53.4% of the average journal entry. Stage 3: Conclusion consisted of 39.4% of the average entry, and Stage 4: Application at 7.3%. Also, as can be seen in Figure 4.1, this distribution was fairly consistent between male and female students, with little difference between the two.

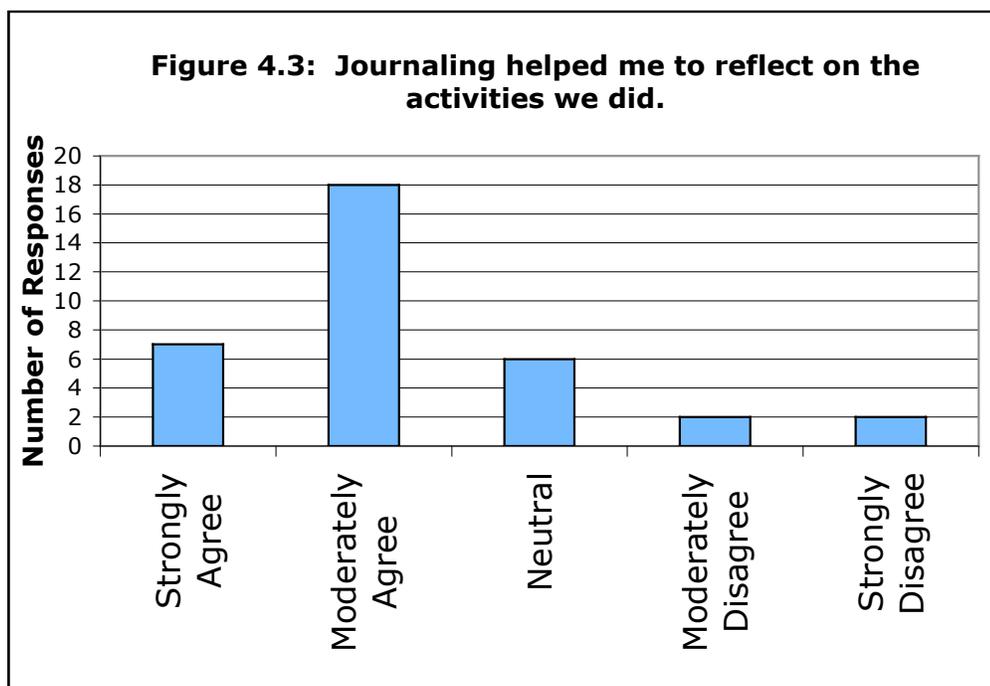


However, it is important to note the tremendous variability that was present throughout the journal entries. When looking at individual students the variability from one student's journal entries to another was quite large.

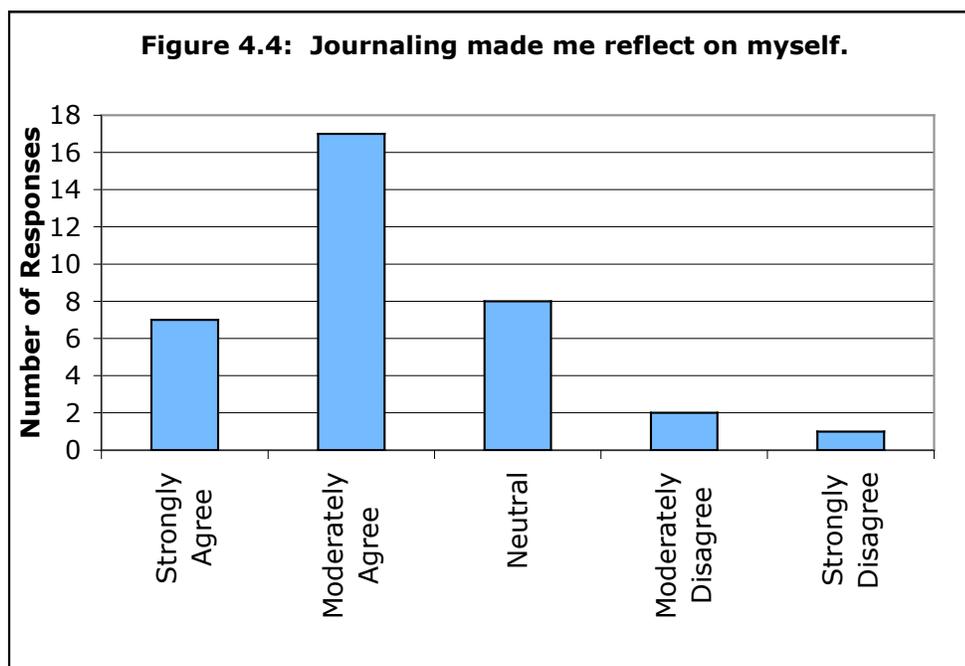


As Figure 4.2 shows, the evidence present for each stage in the student's journal entries varied. Stage 2 evidence ranged from a minimum average percentage of 38.9% to a maximum of 83.7%. Stage 3 evidence ranged from an average of 7.5% to 51.6%, and Stage 4 ranged from an average of 1% to 17.5%. This shows that individual students varied greatly in which of Kolb's stages they wrote evidence of. Despite this variability, statistical analysis shows that evidence of Stage 2 was more prevalent than Stage 3, with a t-test of .0314.

A necessary component of any Experiential Learning model, including Kolb's, is the element of reflection. Students were asked to evaluate the element of reflection through journaling twice on the Post-Class survey. One statement, as shown in Figure 4.3, was "Journaling helped me to reflect on the activities we did."



As Figure 4.3 shows, the majority of students agreed with this statement, with 18 stating they Moderately Agree and seven stating they Strongly Agree, out a sample of 35 students. Students were also asked to evaluate the statement “Journaling made me reflect on myself,” as shown in Figure 4.4. Of the 35 students surveyed, 17 stated Moderately Agree and 7 stated Strongly Agree.



**Hypothesis 2: Journaling promotes higher order critical thinking.**

If journaling encourages higher order critical thinking, evidence of this thinking should be present in the students’ writing. While we cannot totally assume that a student’s writing which shows evidence of one of Kolb’s stages is the equivalent of observing

evidence of a student’s critical thinking, by definition Kolb’s Stage 3: Conclusion and Stage 4: Application do align with the fundamental critical thinking skills as outlined by Edward Glaser. (Fisher, 2001) Following this line of thought, then yes, student journaling does promote the use of critical thinking. As stated in Figure 4.1, an average 39.4% of entries showed evidence of Stage 3 and 7.3% showed evidence of Stage 4.

Students were also asked to evaluate statements on the Post-Class Survey regarding how journals promoted higher order critical thinking. As can be seen in Figure 4.5, 5 and 15 students stated the Strongly Agree and Moderately agree, respectively, with the statement “Journaling Made Me Think Harder Than Normal Homework.”

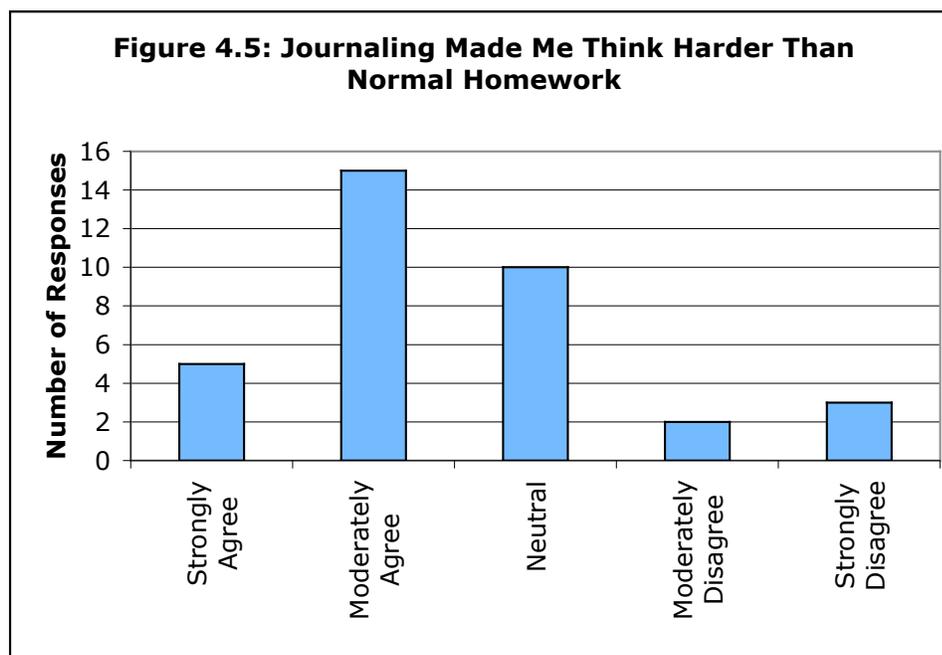
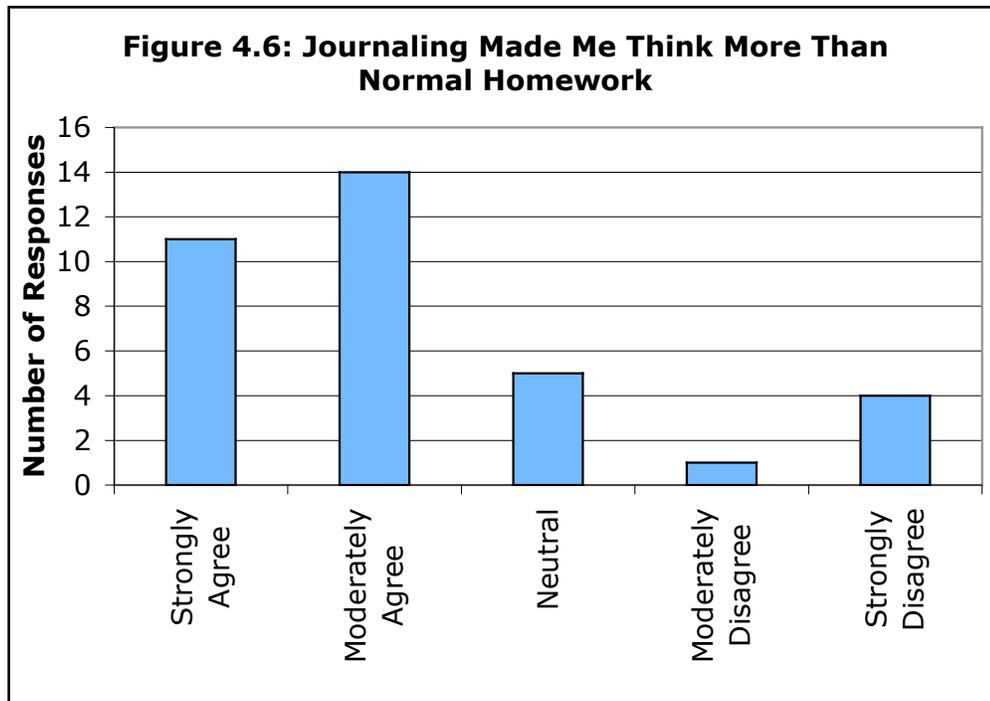


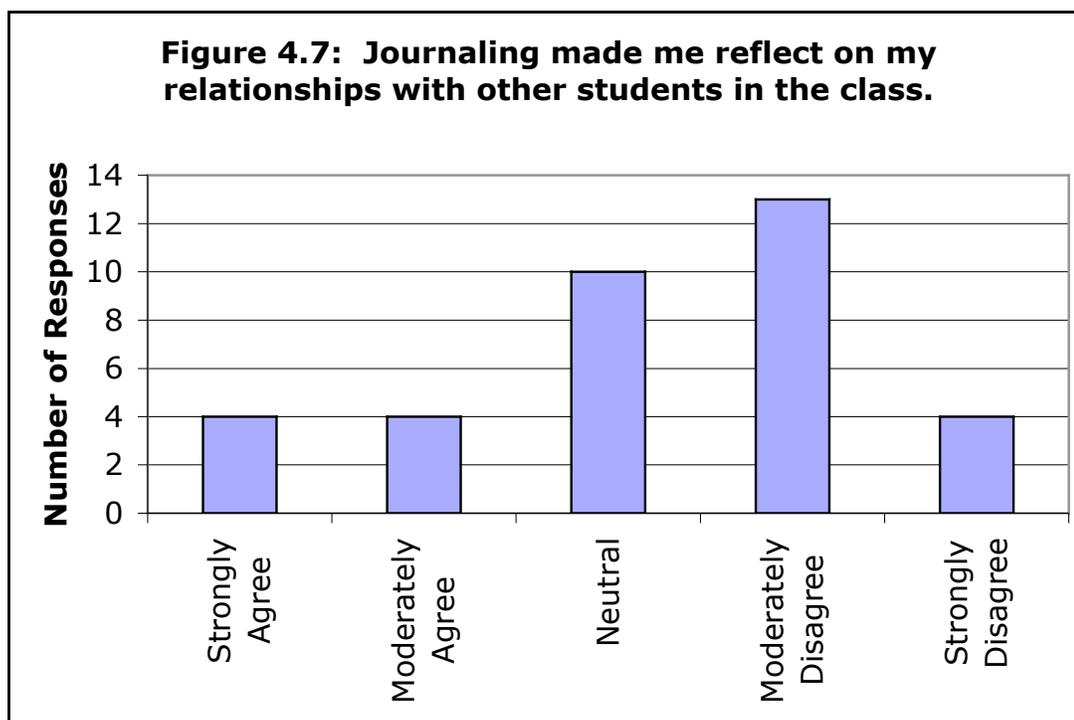
Figure 4.6 shows the results for the statement “Journaling Made Me Think More Than Normal Homework.” 11 students reported Strongly Agree and 14 students reported Moderately Agree. According to the survey’s findings, the majority of students feel that

journaling required them to think above and beyond what is normally asked of them in class work.



**Hypothesis 3: The experiential learning method encouraged students to reflect upon social skills.**

On the Post-Class Survey students were asked to evaluate the statement “Journaling made me reflect on my relationships with other students in the class.” The results are shown in Figure 4.7. 13 students responded with “Moderately Disagree” and 4 with “Strongly Agree.”

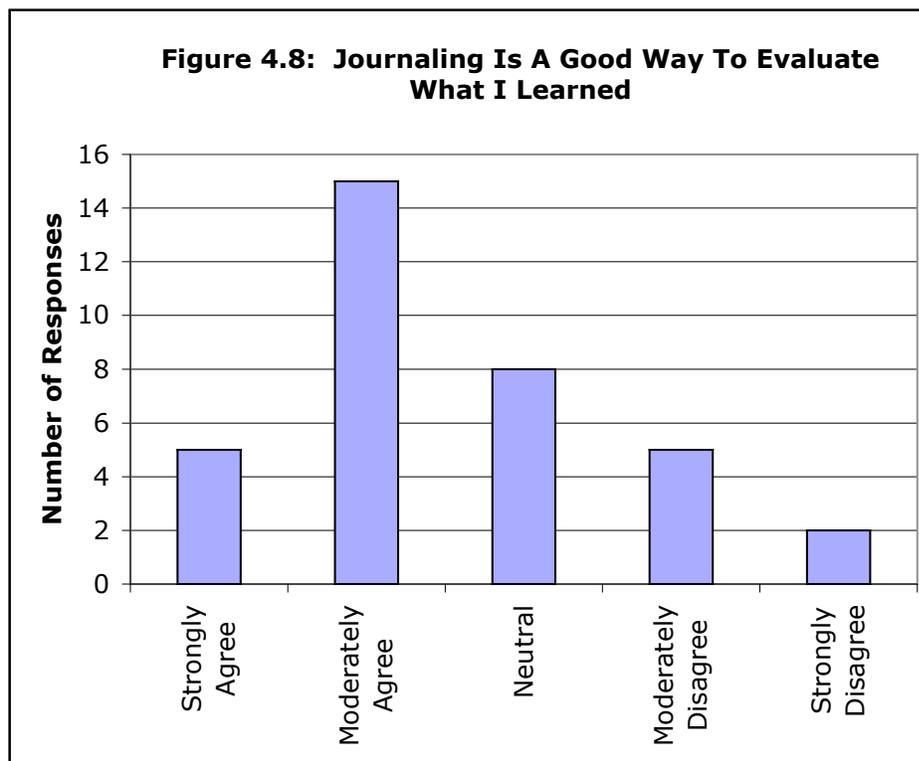


Only 4 students responded with “Moderately Agree” and another 4 with “Strongly Agree,” with the balance of the remaining students reporting “Neutral.”

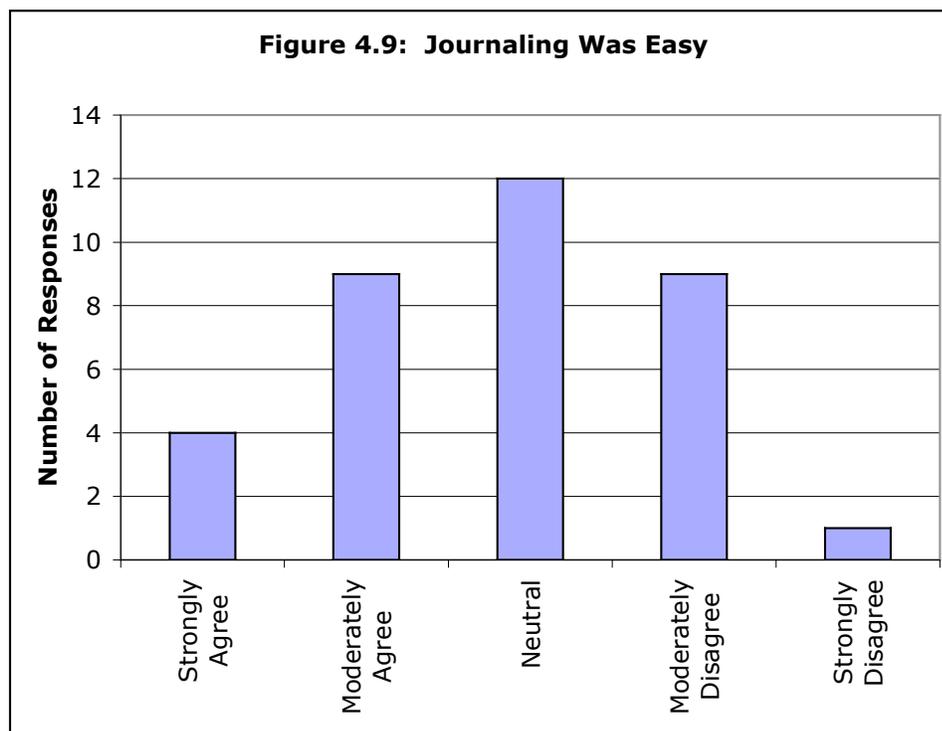
**Hypothesis 4: Journaling is an effective assessment tool in an outdoor experiential education classroom.**

An important part of assessing a student’s performance is the students themselves feel the assessment tool is valid. Students were asked to evaluate the statement “Journaling Is A Good Way To Evaluate What I Learned” on the Post-Class Survey. As Figure 4.8 shows, 5 students “Strongly Agree” and 15 students “Moderately Agree.” Eight students reported a “Neutral” response, with the remain 7 reporting “Moderately” or “Strongly

Disagree.” Interestingly, students who reported an “Agree” response have an average GPA of 3.46, while students who reported a “Disagree” statement have an average GPA of 3.22.



Students were also asked to evaluate the statement “Journaling was easy,” as shown in Figure 4.9. Students were fairly evenly distributed in their responses, with 13 students responding with an “Agree” statement, 12 “Neutral,” and 10 with “Disagree.” Also interesting to note, students who



reported an “Agree” response have an average GPA of 3.73, while students reporting a “Disagree” response have an average GPA of 3.11. It appears that students with higher GPAs may be more disposed to journaling as a means of assessment. Also interesting is that of the 13 students who responded with an “Agree” response for “Journaling Was Easy,” 8 responded with an “Agree” response regarding the statement “Journaling Is A Good Way to Evaluate What I Learned,” while only 2 responded with a “Disagree” response. It appears that students who think journaling is easy also tend to think journaling is an effective means of assessment.

Students were also asked how much time they spent on average for a journal entry. Figure 4.10 shows that 12 students spent 5 – 10 minutes on each entry, 10 students spent 10 – 15 minutes, and 9 students spent 15 - 20 minutes.

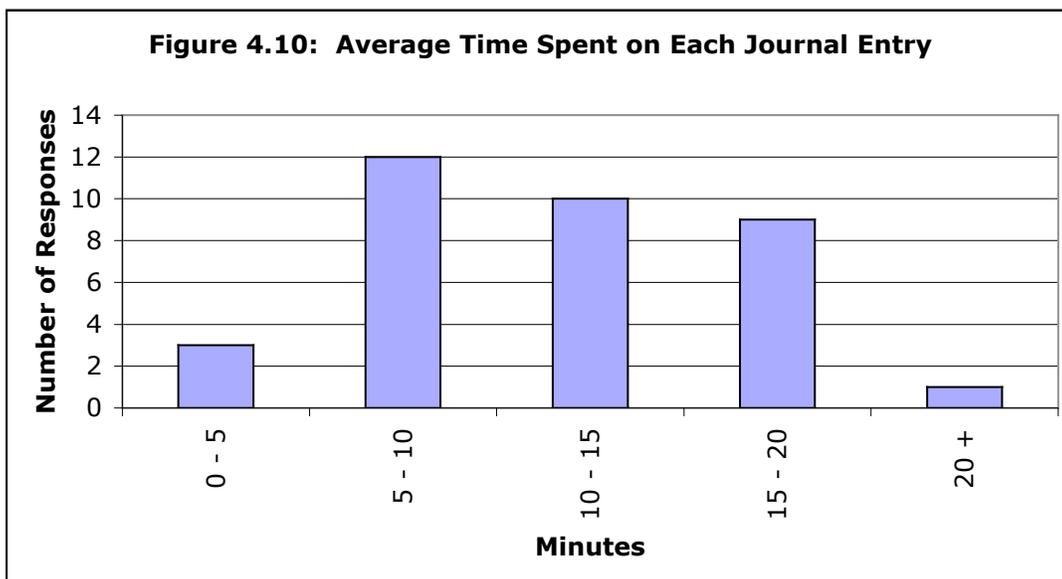
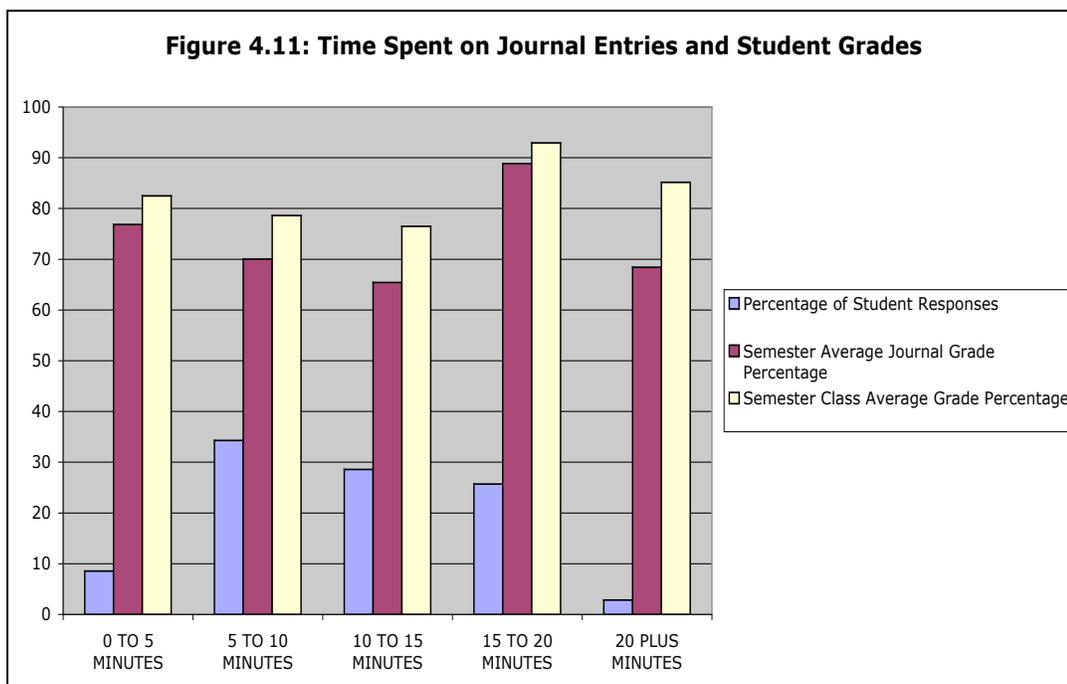


Figure 4.11 shows the Time Spent data in conjunction with the student's Semester Average Journal Grade and Semester Average Class Grade. While students who reported spending 15 to 20 minutes per journal entry had both the highest average journal and class grades, the relationship of more time spent on journals results in a higher journal and/or class grade does not exist. Students who reported 10 to 15 minutes per journal entry had the lowest average journal and class grades, while students reporting 0 to 5 minutes had the second highest average journal grade and third highest average class grade.



## **CHAPTER V**

### **CONCLUSION**

The ultimate goal of all teachers is to get students to learn. Despite this universal goal, there is no universal method to guarantee this. A seemingly infinite number of variables dictate how each student learns, and there are often 30 or more students in each class. Luckily, multiplying 30 by infinity does not change how difficult it is for a teacher to find a best approach for that class!

However, we are all human, and we all do learn, so there must be at some level a most basic, common “variable” that results in learning. It could be said that Dewey, Piaget, Hahn, Kolb, etc., would agree that this most basic variable is an experience. A child touches the side of a pot of boiling water. A student reads “Desert Solitaire.” A driver rear-ends the car in front of them at an unseen stop sign. These experiences all result in learning, a change in the way a person’s thoughts exist and are organized and flow.

It is the aim of this study to take a number of previously identified common variables, implement them in a classroom, and see if they produce genuine learning for students. As discussed in Chapter II, much research has been done into what students, adults, business leaders, and politicians want and are motivated by when it comes to learning.

However, the simple existence of these desirable variables in a classroom does not guarantee learning. Teaching environmental science, which has shown great promise as a developer of critical thinking and motivator of students, does not mean learning absolutely will occur. Having a class that utilizes outdoor or adventure education practices, which have been shown to be very effective in certain measures, does not mean learning will absolutely occur. In short, the perfect class could exist, with all the right variables for great learning to occur, but learning would still not be a guaranteed outcome for all students.

If the driver who rear-ended the car in front of them never came to the conclusion of “That was bad, I don’t want it to happen again. Maybe I shouldn’t drive as close to other cars?” but instead just kept driving in such a way that they repeated the accident in the future, has learning occurred? If learning is a change, and if there is no change in the driver’s thinking or behavior, then there has been no learning. So, why would one person learn from this experience and another person not?

The difference lies in an examination of how people learn, as many have done, such as Dewey, Hahn, Kolb, etc. These educational philosophies not only stress the importance of experience in learning, but also, even more importantly, is the role of reflection. This is the difference between the driver who learns and that who doesn’t. The experience is only the raw material, while the reflection is the construction of this material into meaning, resulting in changes in thought, or learning. The role of an effective teacher is

not only to create the right class environment or set of variables, but to also facilitate the process of learning, in this case reflection.

Kolb's model of experiential learning is one of the most common ways to conceptualize how people learn. If a class has the right set of initial variables, using Kolb's model should result in learning. The question then lies in how to go about facilitating this model, and for this study student journals have been selected as the tool of choice. This leads to Hypothesis 1.

**Hypothesis 1: Journaling is an effective way to facilitate Kolb's model of experiential learning.**

Defining "effective" is key to answering this hypothesis. An inherent quality of "effective" is that it was completed. With an average journal entry completion rate of 81.1% and a sample size of only 35 students, it is safe to conclude that most students completed the journal entries throughout the semester. Further defining "completed", the average journal entry was 169 words (about the size of this paragraph), showing that students did invest some time into writing. However, the time invested by students was not consistent, as shown in Figure 4.10. This will be discussed in more detail with regards to Hypothesis 4. Overall, I believe that the act of journaling was adopted by the students, which is necessary for it to be successful. If students didn't do the journals, there would be no way to facilitate Kolb's model.

Since most students did the journals, does the content reflect Kolb's model? Do the entries themselves should show evidence of the stages of Kolb's model? Yes, but the stages are not equally evident. As shown in Figure 4.1, on average over half, or 53.4% of each journal entry was written pertaining to Stage 2 of Kolb's model, while only 39.4% showed evidence of Stage 3 and 7.3% for Stage 4. Also important to note, as shown in Figure 4.2, is the tremendous variability from one student to the next. For example, one student averaged 83.7% of their entry showing Stage 2 evidence, while another student only averaged 38.9%. This variability exists for each stage. It should also be noted that the criteria for directing the evaluator on what part of an entry pertained to each stage was not clear.

Why would students favor Stage 2 over the others? First, the journal entry prompts, displayed in Chapter III, are heavily weighted towards Stage 2, and it is the nature of students to do only which is asked of them, no more. Second, I believe that Stage 2: Reflective Observation is something that most students are very comfortable with doing, and feel like they know how to do. Stage 3: Concluding and Stage 4: Planning or Application, which could be viewed as higher-order thinking than Stage 2, may be harder for students or be something they are not comfortable with, have little experience doing, or don't know how to do. Third, students wrote for length, not content. Most students came to the conclusion that 1 full page in their journal was likely to get them a good enough grade. And, given the structure of the prompts, and looking at the cyclical nature

of Kolb's model, students would start writing in regards to Stage 2 but get to the 1 page mark and stop before writing evidence of stages 3 and 4. It is possible that if this conception of "1 page is enough" didn't exist, that more evidence of the latter stages would have been present.

To answer the question of "why would students think 1 page is enough?" we have to think about two ideas. One, what is the student's disposition towards schoolwork and what are their personal expectations in regards to the amount of work they are willing to invest for a certain grade. This varies greatly among all students of course. Second, what feedback cycle existed in class that would reinforce the idea of one page being enough? It is my belief that the structure of the rubric that was used for journal grading (Appendix A), along with the practices surrounding the utilization of the journal in class, did not provide feedback that would promote students writing for content. A number of recommendations to improve this feedback cycle are discussed at a later time.

But, what if students had written for content? There were some students who had average entry word counts of over 200. Yet, even these students still favored writing evidence of Stage 2. If all other factors, as described above, were negated, would the student's writing still show mostly evidence of Stage 2? This thought arose as I began transcribing student entries and identifying evidence of the stages. To do this, I was forced to identify the characteristics of each stage so I knew what to look for in each entry. This was a very abstract identification, and another researcher might identify the

evidence in a much different manner. The abstract defining characteristics of each stage and the lack of defining characteristics for written evidence made identification of evidence difficult.

But why was this so difficult? First, let us ask why there is so little evidence of Stage 4, only an average of 7.3% of each journal entry, meaning most entries contained no evidence. Is it possible that the practice of journaling is only effective at documenting Stages 2 and 3, but not 4? How does a student write evidence of Application? Why would they? According to Kolb's Model, Stage 4: Application is followed by starting the cycle over with a new experience. The difference between this new cycle and the last is that the new experience, or Stage 1, will be different because of the learning that has taken place. The question becomes then, how is Stage 4: Application different from Stage 1: Experience of the following cycle? Wouldn't the act of applying new knowledge be the experience? With this thought of Stage 4 being an experience, it would be difficult for a student to show evidence of this action in their journal writing.

It could be argued that Stage 4: Application, or Planning as Neil phrases it in **Figure 2.1**, could be the hypothetical application of what has been learned. For example, the reflective driver who rear-ended the car in front of them would think to themselves "I shouldn't drive so close to other cars." But they would think this before driving again, before the next, new experience. If Stage 4 is a hypothetical application of new knowledge, or call it the transfer of new knowledge, journal prompts could be written to

promote students writing evidence of this stage. For this study, some of the prompts that students wrote about do have a purposeful section aimed at Stage 4. But, with a better understanding of what Stage 4's defining properties are, it would be easy to argue how effectively they actually promote evidence being shown of Stage 4. If Stage 4 is a hypothetical application of new knowledge, then an appropriately constructed prompt should promote students writing evidence of it.

The last piece in evaluating Hypothesis 1 is the student's perception of journaling. On the Post-Course Survey, the majority of students expressed that journaling helped them to reflect upon the activities conducted in class (Figure 4.3) and upon themselves (Figure 4.4). Given that reflection is such an integral part of Kolb's Model of Experiential Learning, a favorable response to journaling is an indicator of its effectiveness. If students did not view journaling as a means of reflection, it is unlikely journaling would be effective at promoting reflection.

In regards to a summative evaluation of Hypothesis 1 (Journaling is an effective way to facilitate Kolb's model of experiential learning), I would conclude that journaling is an effective means of facilitating Kolb's model. How effective it is will be dictated by how well the following factors are implemented in a class:

1. A class format that promotes consistent journal entry completion by all students.

2. Journal prompts that actively and equally promote the discussion of all stages of Kolb's model.
3. A grading procedure that promotes writing for content, not length.
4. A clear picture of the defining characteristics of evidence for each stage.

**Hypothesis 2: Journaling promotes higher order critical thinking.**

Building upon the concept that reflection, in general, is the process of constructing meaning out of experiences, as Kolb's model implies, it could be construed that the processes and skills of reflection (Stage 2 of Kolb's model), along with Concluding (Stage 3) and Application (Stage 4) might encompass some of the same skills and processes that characterize critical thinking. Edward Glaser has outlined some of these critical thinking skills:

- identify the elements in a reasoned case, especially reasons and conclusions;
- identify and evaluate assumptions;
- clarify and interpret expressions and ideas;
- judge the acceptability, especially the credibility, of claims;
- evaluate arguments of different kinds;
- analyse, evaluate, and produce explanations;
- analyse, evaluate and make decisions;
- draw inferences;
- produce arguments.

(Fisher, p. 9)

Examining these skills, it would be safe to say that these skills encompass more than just reflection, with reflection being defined in practice by students as the recounting of and connecting of past experiences. Looking at the student's entries, I would argue that these

critical thinking skills reflect the thinking that occurs during specifically Stage 3 and possibly Stage 4 of Kolb's model. With this thinking, it was found that on average 39.4% of each journal entry showed evidence of Stage 3, which could be translated as showing evidence of critical thinking. However, this specific conclusion would be easy to argue against given the lack of direct connection between critical thinking and Kolb's Stage 3. If Stage 3 evidence was better defined, as suggested earlier, a connection could be more clearly drawn and this conclusion might be better supported.

However, students themselves are indicators of what sort of thinking has occurred. It is a well-established belief among educators that the majority of class work students perform does not promote higher-level critical thinking. This is what students are used to; it is their baseline and often their expectation. Therefore, if students are exposed to a different level of thinking, they should be conscious of it. According to the Post-Course Survey, the majority of students felt that journaling made them think both harder (Figure 4.5) and more (Figure 4.6) than normal class work. Assuming that higher level critical thinking is more difficult and takes more time than the lower level thinking required of normal homework, we could draw the conclusion that journaling promotes critical thinking.

Also indicative of journaling's ability to promote critical thinking was student's comments on the Post-Course Survey. Responses to the following prompt were mostly positive in regards to journaling as a means of learning.

How does journaling compare to normal class work, such as worksheets, textbook reading and questions, and tests – when it comes to helping you learn?

Some examples of student responses include:

- ◆ “Journaling helps me learn a lot more because I have to think of my own ideas.”
- ◆ “...it made me think instead of just read and look for answers in a book. They made me think a lot more!”
- ◆ “The journals are more interesting than the normal worksheets and homework because it makes you think in a new way but are easier to do than a test/quiz.”
- ◆ “Journaling is better because it’s not as pointless as other homework, most homework is boring and stupid but journaling makes you really think.”
- ◆ “I love journals because you reflect (on) what you’ve learned and the teacher can see how much you’ve improved by your thoughts.”

As can be seen by these responses and other survey data, many students viewed journals as an educational tool that requires them to think, and to do so at a level above that which is usually required of them.

Of course, not all students shared this point of view. One student’s response to this prompt was:

“I think H.W. teaches me better. Journals were just a reflection.”

It seems as if this student did not see a connection between learning content and reflection. This could be indicative of the student’s lack of comfort with journal writing and specifically reflection, or, as many teachers of upperclassmen have experienced, a function of the mindset many students take of “give me the information, and lets move on.” But, it could also be a result of prompts that were not clear in their content goals, or a reflection on how journals were or were not used in class, making it seem to this student that the journals did not apply to what was being learned. This student’s lack of connection with the process of journaling is reflected in their semester journal grade, one of the lowest of the class at 48.6%, and their extremely low average entry word count of only 28. If this student had seen the connection of journaling to the class’s content, I believe the motivation to complete the journals would increase, thereby increasing the amount of critical thinking that would occur. Given that this student was not alone in this point of view, changes do need to be made in this regard. These changes align well with Hypothesis 1 and 4, and will be discussed respectively.

In regards to a summative response to Hypothesis 2 (Journaling promotes higher order critical thinking), I would conclude that journaling has the potential to promote higher order critical thinking. The success of journaling at promoting this is dependent upon primarily how well the prompts promote Stage 3 and 4, where critical thinking skills are

most likely to be used. It is important to note, that Hypothesis 2 can only be implemented successfully if Hypothesis 1 is also.

**Hypothesis 3: The experiential learning method encouraged students to reflect upon social skills.**

This hypothesis was investigated as a result of outdoor experiential education's documented role in social development. However, while social development is an acknowledged goal of this class's teachers, it was not the purposeful aim of this study, and the journal prompts do not promote it. Despite this, it was wondered if social development would occur simply as a function of the experiential, outdoor structure of the class. It should be also noted that this hypothesis, not being a purposeful aim, was poorly examined.

According to the Post-Course Survey, the majority of students reported that journaling did not make them reflect upon their relationships with other students in class. As shown in Figure 4.7, 17 students stated this, while only 8 believed it did, and the remaining 10 students reporting a neutral response. However, given that none of the prompts were specifically aimed at getting students to reflect on their relationships or social workings, the fact that about 25% of the class reported a yes indicates the potential of experiential education and journaling to promote such reflection. I also state this as a result of my

own observations of the class in how it's social structure and behaviors changed throughout the semester, and from reading the students journal entries. Had social reflection been the primary goal of this study, I believe the results would be positive, supporting previously completed research and common experiential practices.

**Hypothesis 4: Journaling is an effective assessment tool in an outdoor experiential education classroom.**

Hypothesis 4 builds upon the concepts discussed in Hypothesis 1. If the goal of the journal is to provide a place for students to show evidence of learning, specifically in relation to Kolb's model, then journaling was successful, as outlined in Hypothesis 1. If journaling is a successful tool, Hypothesis 4 then asks if journaling can be further used as an assessment tool. If an assessment tool is to be successful at assessing students, it must provide a structure that promotes and evaluates learning. Hypothesis 4 could be restated as "Journaling promotes learning and provides a means to evaluate learning in an outdoor experiential education classroom."

As discussed in Chapter II, one of the greatest challenges teachers face when attempting to implement outdoor experiential education classes in conjunction with a traditional school setting is finding a method of assessment that connects with the nature of the class. Worksheets, textbooks, and bubble-answer tests are difficult to utilize outdoors

and really don't fit with the experiential, outdoor philosophy of such a class. But, society, administrations, educational systems expect and demand assessment. Most importantly, assessment is necessary as a means of feedback to the teacher. With no assessment, how can the teacher know that they are doing what is best for the students? The concept of using journals in such a class environment is not new. Their use as an assessment tool in such an environment is the question at hand.

First, do journals as an assessment tool promote learning? According to Hypothesis 1, journaling is effective at facilitating Kolb's model of experiential learning, which simply translated means that journaling does promote learning. It is important to remember however that, as discussed with Hypothesis 1, how effective journaling is at promoting learning is dependent on a number of factors.

Even when journaling is approached generically, not specifically tied to Kolb's model, I believe it is effective at promoting learning. The open answer structure of journaling allowed students to focus their energy and attention on the experience/activity at hand. This compares to a student's approach to a worksheet or textbook questions, where students identify what content they must know, skim the material looking for this content, copy, and are done. There is no active thought, just treasure hunting; and the experience, the motivation to learn, is non-existent. The treasure to be found in a journal entry is only limited by the student's thoughts and the prompt provided, providing an opportunity for genuine thought and learning.

A negative of the openness of journal writing is exactly that quality. The possible responses to a prompt are infinite! When reading student's journals, I realized that the majority of students had responded to the prompts in a manner that I never predicted. The content to be learned was not being hit upon as I had hoped for. However, this could be both viewed as a negative or a positive.

If the teacher approaches this wide variety of responses with the mindset of certain responses being correct and all others incorrect, this openness would be a negative. In fact, this approach would result in a feedback cycle that reinforces students either not being comfortable with writing responses because of fear of their thoughts being labeled as wrong, or of students writing responses that they knew would appease the teacher. This approach would defeat the whole purpose of student journals promoting learning.

However, the opposite approach, of accepting all writing as correct would also defeat the purpose of student journals promoting learning. If students could just write whatever they like, however slightly pertaining to the prompt, and receive full credit for such efforts, a feedback cycle of promoting writing for length, not content, would be established. There is no arguing that the majority of students will do the least amount of work they can.

If student journaling is to be used in a manner that promotes learning, its utilization must be approached by the teacher thoughtfully and purposefully so that a feedback cycle of evaluation promotes writing for content. But, this content cannot be deemed right or wrong, as this would negate the learning potential of the journal.

Second, do journals as an assessment tool provide a structure to evaluate learning? As shown in Figure 4.8, the majority of students responded positively to the statement of “Journaling is a good way to evaluate what I learned.” Students were also asked to evaluate the statement “Journaling was Easy” (Figure 4.9). Interestingly, the distribution of responses was about equal, with approximately one third of students reporting positively, another third negatively, and the final third neutral. Given that students have different dispositions towards writing, reflection, schoolwork, etc, in line with Gardner’s thoughts on Multiple Intelligences, it would make sense that some students think journaling is easier while others think it is not. The relatively equal distribution of responses indicates that journaling is an appropriate tool for evaluating learning; not too easy, not too hard. Confirming this, the two prompts being discussed are very similar, as can be seen by the positive correlation between responses as discussed in Chapter IV.

Also interesting to note is that students who reported that journaling was easy had a much higher average GPA of 3.73 compared to students who reported that journaling was difficult, with an average GPA of 3.11. This positive disposition towards reflection and writing may be an indicator of academic success, at least in traditional education.

Overall, it appears that most students feel journaling is an acceptable way to evaluate their learning. While it is important for students to agree with how they are evaluated and graded, from a teacher's point of view, the validity of journals as a means of evaluating learning is not so cut and dry.

As mentioned earlier, the feedback cycle that an evaluation structure establishes largely dictates how successful journaling is at promoting learning. Therefore, an effective evaluation structure will result in learning! Working backwards, we have already concluded that journaling, in regards to this study, did result in learning, which leads to the conclusion that the evaluation structure in place was effective, and therefore, overall, journaling is an effective means of evaluation. But, as with all structures and practices, improvements could be made.

One of the biggest difficulties with using journals was getting students to do them in a timely fashion. First off, the time aspect is important because of the nature of experiential education. It would seem logical that the highest quality reflection would occur shortly after the experience was had, not two weeks later. Second, if a discussion was to be had concerning the prompt, and students did not have their entry completed, the discussion was not beneficial as it simply turned into the teacher talking at the students rather than a true discussion amongst the class.

Half way through the semester, students were presented with the opportunity to establish a new set of practices that would increase the timely completion of journals. Up to then, journals were randomly, with no warning, collect by the teacher to be graded. This practice was historically established as a practical time management practice for the teacher, along with the thinking that students (all seniors) need to have ownership of their thoughts and actions, and be given an increased level of responsibility. Interestingly, following discussion, the students themselves elected to have each journal entry be checked for completion on a certain day following it's assignment, generally one or two days after. This check-in accounted for half of a student's journal grade. Journals would also be collected periodically on established dates to be graded according to the rubric, and this would account for the other half of a student's journal grade. This change did increase the overall completion rate of the class, but quantitative data showing this was not collected.

By examining this change in procedure, it can be seen how this structure of evaluating journals would only amplify the practice of students writing for length, not content. Prior to this change, students were writing this way already, as I believe the rubric is too generic in it's criteria for content. With this change, half of a student's grade comes simply from a quick glance for completion, it would be logical that students would write just enough to get that full 50%. Now, even if a student gets only half of the points when their journal is graded via the rubric, which is quite easy, the student has received a total grade of 75%. To a senior during the last few months of their high school career, this is

generally a very acceptable grade for such a little amount of work. While this practice on the surface seems to work, it does not work in regards to promoting learning through journaling.

Another indicator of the effectiveness of this structure of evaluation was the amount of time spent on journal entries that students reported on the Post-Course Survey (Figure 4.11). As discussed in Hypothesis 3, higher-order critical thinking is most likely to occur in Stages 3 and 4 of Kolb's model. Yet, as stated in Hypothesis 1, most of the students' writing pertained to Stage 2. A structure of evaluation would be more effective if it promoted more writing pertaining to Stages 3 and 4. This level of thinking takes time. The majority of students reported (Figure 4.10) spending between 5 and 20 minutes on each journal entry. Overall, this is not much time that is being invested.

Also, it would seem logical to assume that the more time spent on an entry, the more evidence of higher-level thinking would exist because students would be able to get to Stages 3 and 4, and therefore the higher the journal grade. But, as Figure 4.11 shows, this relationship between more time invested and higher journal grades does not exist.

Evidently, the structures being used to evaluate journals do not promote an investment of time or the writing of higher-level content.

As a summative conclusion to Hypothesis 4, yes, journaling can be an effective assessment tool in an outdoor experiential education classroom. The success of

journaling as an assessment tool is dependent upon the how effectively the structures of evaluation promote learning. As this study shows, while learning did occur, the more effective the evaluation structures, the higher the quality of learning.

### **Recommendations**

Upon examination of the four hypotheses, journaling shows great potential as a means of promoting and assessing student learning. As with all educational practices, the purposeful and conscientious implementation of journals is what will dictate their success. Because, as with all educational practices, none are foolproof, all have the potential to fail at getting students to learn.

Given the hope that journals will be utilized more in the future as educational practice turns its focus away from standardized everything towards individualized thinking development, I find it pertinent to provide a summary of recommendations in regards to using journals which have come to fruition as a result of this study.

#### **◆ Journal Prompts**

1. **Construct well thought out prompts.** Kolb's model provides a conceptual way to structure a prompt. Given the ultimate goal of promoting learning, students need to proceed through Kolb's 4 stages. A

prompts should be written in such a way that promotes students writing evidence of each stage. This will increase the learning potential of the initial experience, and provide the student with an opportunity to develop critical thinking skills.

2. **Train students to recognize characteristics of a good prompt response.**

When introducing the journals, give an example prompt and look at a well-written response versus a poorly written one. Use the rubric as a class to evaluate each response. This practice will establish expectations for writing, increase students' comfort with the concept of journaling, and result in higher rates of entry completion.

3. **Have students identify Kolb's Stages in their writing.** Building on the above recommendation, teach students how to identify Kolb's stages. The practice of doing this for each entry could be implemented. This would make students be more conscious of not only their writing, but of their thinking, which by the nature of doing would develop critical thinking skills. Students could even self-grade their entries according to the rubric prior to the teacher collecting their journal.

4. **Make prompts applicable to content.** If students feel that what they are writing about matters in regards to what is being learned, they are more

likely to complete the entry. If students feel that the journal is disconnected from the class, it will be viewed negatively as busy work.

◆ **Evaluation Structure**

1. **Establish a journal check-in procedure that reinforces writing for**

**content.** Quick, daily checks do not succeed at this. Random, yet often, rubric based check-ins, may be the best practice overall. If the other recommendations are implemented and the entry completion rate is high, this should work.

2. **Assign points using a rubric that promotes writing for content.**

Content should account for the majority of points a student can earn on the rubric. Kolb's model could serve as a conceptual framework for the content criteria of the rubric. Each Stage could be one level of the rubric. If a student writes evidence of only reflection, being Stage 2, that student's entry would receive a 2 for content. In order for this to work, the following recommendation must also be implemented.

3. **Clearly define rubric criteria for evaluating content.** In other words,

define what evidence of each stage of Kolb's model looks like. This would be necessary to make grading effective, but also at promoting

writing at a high level. This would also be hugely beneficial when implementing the “Prompt” recommendations.

◆ **Class Format**

1. **Discuss responses.** This ties the act of journaling, a very personal act, back to the rest of the class, thereby increasing its connection to the content and the social aspect of the class, and its authenticity to students as a learning tool. Also, given the open-endedness of experiential learning and journaling, discussion as a class helps the students become aware of other’s perceptions, which ties strongly into the development of critical thinking skills. This also allows the teacher to gauge the level of learning that has occurred and provide further opportunities for learning. Lastly, the act of discussing, or sharing, what they have written gives students ownership in the class, which, along with the other points discussed, should increase completion rates of entries.
2. **Assign journaling consistently.** Students are creatures of structure, as evident by the students of this study choosing to be checked daily rather than purely randomly. Establish an expectation and standards of journaling for the class- how often will prompts be given, when will they usually be discussed afterwards, how often will they be randomly

collected, etc. Journals can be a very personal thing for the students, and a change in procedure could be taken as a personal insult.

This study has served as an amazing introduction and examination of the practice of implementing student journals. Most noteworthy has been the eye opening of how the subtleties of using the journals are more important than the act of journaling itself. How the journals are utilized really dictates how successful they are at promoting learning. Given the experiential practices of the Outdoor Adventures class that participated in the study, I feel that journaling is a great match. It gets students to learn, and it has the potential to develop the critical thinking skills that these students of today will need to succeed tomorrow.

An endless number of studies could be completed examining the findings and thoughts in this study. A follow up study built upon implementing the provided recommendations would help examine the validity of the conclusions to the four hypotheses. The social development aspect of experiential learning was not represented in this study at all, but the role of journaling in such development would be a fascinating examination. Most importantly, this study will hopefully serve as a launching platform for new ideas on how to use and implement journals, and help to build the presence of experiential education in traditional educational settings. Whether in an Environmental Science or Calculus or Economics class, experiential education, facilitated through journaling, has tremendous potential for our students.

## APPENDIX A

### OA: JOURNAL RUBRIC

- Your journal will be collected and reviewed a minimum of two times per quarter.
- A random sampling of entries will be read by the teacher and an overall score will be determined using the criteria below.
- The maximum number of points that can be earned per review is 12.
- The total number of points earned for all reviews will account for the Journal portion of your OA quarter grade (40%).

	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>Content</b>  <b>Points = X2</b>	Entries show consistent investment of time and thought. Original, personal, reflective.	Majority of entries show investment of time and thought. Most are original and show reflection.	Some entries show investment of time and thought. Few are original and show reflection.	Entries show little effort and reflection. Author simply going through the motions.
<b>Completion</b>	All entries are completed in the manner they were assigned.	Most entries are completed as assigned.	Some entries are completed as assigned.	Few to no entries are completed.
<b>Physical Quality</b>	Writing is legible, organization is consistent and makes identification of entries easy, journal has been cared for and physically maintained.	Most writing is legible, organization is somewhat consistent, and journal is in decent shape.	Some entries are legible, some aren't. Organization is inconsistent and journal has not been well cared for.	Chicken-scratch. 

## APPENDIX B

### Example of Student Journal Entry With Kolb's Stages Identified

#### Prompt 3: March 18<sup>th</sup>

**Experience:** Following a warm spell in the weather and an ecological discussion on energy flow the day before, the class and I completed a walking tour of the campus to observe changes taking place.

**Reflection:** "Describe three changes you see in the natural world today while we walk."

**Conclusion:** "What do these changes mean for the next few weeks in regards to feeding relationships/energy flow?"

# Student	Student Entry	Total Word Count	Reflection Word Count	Conclusion Word Count	Application Word Count
1.	<p>The dirt and grass is beginning to show. This means the ground's warming and plants are beginning to grow. From this change, we hear the birds and squirrels moving and chirping more because they finally have more choices of food and have a much easier meal to find than in winter. Another change is the sun. The sun is out much more and producing more heat. This helps melt the ground and snow and makes the air a little more humid. With the humidity plants know its time to grow and trees begin to make leaves again.</p>	98	36	62	0
2.	<ul style="list-style-type: none"> <li>• <b>Birds</b> <ul style="list-style-type: none"> <li>○ Eat insects/get eaten (Their eggs too)</li> <li>○ Fertilize trees (maybe?)</li> </ul> </li> <li>• <b>Damp air</b> <ul style="list-style-type: none"> <li>○ More moisture</li> </ul> </li> <li>• <b>Open water</b> <ul style="list-style-type: none"> <li>○ Drinkable for animals</li> </ul> </li> </ul> <p>There will now be more animals coming to this area because there is water to drink and plants to eat. Animals will then come to eat those animals. Dead animals fertilize soil for more plant growth. The cold leaving means the energy flow goes into overdrive.</p>	145	5	140	0
3.	<ul style="list-style-type: none"> <li>• <b>Less snow:</b> There is less snow and dirt is starting to show. The temperature of the ground is increasing. Plants are absorbing water and becoming producers for animals.</li> <li>• <b>Birds:</b> Since the ground is thawing, birds can dig worms and other things to eat. When spring comes, they can also eat seeds from trees.</li> <li>• <b>Melting Ice:</b> The ice on the river is melting which would bring more animals to drink water. The water is flowing and there is no snow on the ice. The snow is melted and made weird piles and textures.</li> </ul>	95	53	42	0

4.	<p>1. The first change hat noticed while I was walking was that the ice was off the river and it was slightly higher than normal. This was happening because of the warmer weather we are having and also because the river is being replenished with water from the melting snow. Because the water is warming up, fish that live in the river will soon begin to spawn.</p> <p>2. The second change that I noticed was that the snow was melting. Since this is happening, more food will be available to wild animals and the wont have to work as hard to get it. Because of this, animals such as woodchucks and skunks will soon becoming out of hibernation.</p> <p>3. The last change that I noticed in the natural world were that the ducks and geese are returning from their wintering sites. Soon, food will be more plentiful and they will start building nests to lay their eggs in.</p> <p>Since all these changes are happening so fast, many of us are starting to get the itch to be outside and enjoy this great time of year. For me, spring is my most favorite season because I'm looking forward to warm weather and hunting wild turkeys all over the Midwest.</p>	208	61	147	0
5.	<p>1. Rivers- the rivers have changed greatly. They have risen and shrunk and caused many banks to erode.</p> <p>2. Human made/natural land- Humans have created and destroyed more land than ever before.</p> <p>3. The mountains have changed. They have eroded and gotten smaller/larger.</p>	43	33	10	0
6.	<ul style="list-style-type: none"> <li>See the snow melting, this will cause a lot of extra water, could cause flooding.</li> <li>More animals, birds etc.</li> <li>The ice on the river is melting.</li> </ul>	29	18	11	0
7.	<p>Dirt/water/oxygen/carbon dioxide</p> <p>The air/atmosphere was lighter. It is easier to breath. There is more moisture in the air to breath. The reason there is more moisture us because the snow is melting. The days are getting warmer so the melting is evaporating. The air has not heated up enough to be super saturated so it has not rained. While we were walking along the path I was hearing birds all over the place until we got within 50 meters from the bridge. The birds being out and about in such abundance means that there is enough food in the area that they are not traveling as far, another indication that the snow is melting and things are starting to grow green and fresh. Seeing the dirt also says the snow is leaving and the dirt now has a chance to harbinger life. This means that the more snow melts the more green will come into life from the soil that is now frozen. This life will grant the next level of life to feed and grow. This process will continue until the carnivores on top of the food chain will have enough to live on.</p>	195	53	142	0

8.	<p>The air is foggy- the temp is getting warm so it caused the snow to melt and evaporate into the air. The snow is melting because of the warm weather. There are cracks in the ice because of the warm weather. The soil is muddy because of all the snow melting. The changes are going to continue changing making some of it completely disappear, others just lessen.</p>	67	23	44	0
9.	<p><u>Dirt</u>- The dirt was starting to rise above the snow as we walked, and it looked as if it was being transferred which meant more animals and people were walking outside. Seeing dirt means that the snow is melting faster, and things like plants will have enough soil for photosynthesis in spring.</p> <p><u>Moisture</u>- The moisture in the air, like fog and dampness. All of the snow was starting to melt, which went into the air and is causing it to feel more moist. These changes mean that the grass will be starting to show, and it gives trees, plants, and animals what they need for water.</p> <p><u>Civilization</u>- The last thing that we had to think of, and which I thought of is civilization. Because the weather is getting nicer, and its not so cold out, more people are walking outside, and throwing garbage around. When the snow melts, more animals will be around civilization because it is their instinct to figure out that people means food.</p>	166	57	109	0
10.	<p>The first change that I noticed was that the snow was starting to melt (FINALLY!). That allows us to see the grass and the dirt that has been hidden for the past four months. Since the sun is getting higher all of the snow will melt meaning grass will turn green and leaves will start to bud. Another change that I noticed, as mentioned before, is that the sun is getting stronger and higher. Since the sun is higher the air temperature will be much warmer. Many hibernating/migrating animals will slowly begin to return. We will hear birds, see bears, and also mosquitoes ☹️. One last change that I noticed was the small leaf buds starting to form on some trees. The leaves are important in our ecosystem for the survival of animals. They provide shelter for birds and squirrels. They provide much needed for deer and other animals. They also serve as a home for many insects, which are food for other animals higher on the food chain.</p>	169	50	119	0
11.	<p>Three changes that I saw in the world today during the walk was that the snow was melting, birds were starting to get louder, and more of them, and the air was very moist. While we were walking there were many puddles and less snow on the ground than a week ago. I also heard many birds chirping and talking to each other. Also the air was very damp and had lots of melted snow in the air. These changes mean that spring is coming soon and that winter is almost over. Once all of the snow melts and the plants start getting green and growing, then all of the animals that migrated south will come back.</p>	117	78	39	0
12.	<p>One change that is noticeable is that there is a lot more bare ground showing because of the warming temperatures. The bare ground allows for the plant to begin to finally thaw out and begin to grow. This step allows all the small animals to come out of hiding and begin to hopefully get food to eat. Another change that is occurring is there is water opening up on the rivers and maybe lakes too. Having the water not frozen means that the animals can go to more than one place to rely on water for them to drink allowing them not as long of a a walk. The other major change is the warm temperatures and the days getting longer. These changes can allow the animals who are south to come north and eat the small critters and let them get bigger. It also lets the animals who have been hibernating come out and get food to eat because they are most likely hungry.</p>	165	46	119	0

13.	<p>I see a lot of grass and dirt... the snow is melting.. next few weeks its going to be muddy... but that melted snow feeds the soil and trees with water. It also helps sustain the water levels. However we don't want it to melt too fast.. which could cause flooding.</p> <p>I also saw some budding on the trees, which brings back green and warmth... and flowers... and less crabby people because they are all out sniffing flowers.</p> <p>Last change. Bird! I saw them ☺ and I say welcome home. Granted I hope they are not singing when I'm trying to sleep but I think they are back because the ground is soft and their dinner worms comes to earth surface they come back to deal with insects and that part of the food chain.</p>	135	44	91	0
14.	<p>The three changes I saw outside during the walk was a lot of dirt, open water and humid air. Dirt is important because if there is dirt then plants can grow, and them consumers like birds, and other animals will then use them as a food source, which is important. There was a lot of open water. This is very important because where there is water, theres animals because they need water to survive and live. During the winter there is very little open water because everything is frozen over. When it hits spring it opens up, and so all the things that need water come out. The last thing that I notice during the walk was the humid, damp air. This is important with regards to nature because trees and vegetation need food warm air in order to have the ability to bud and grow during the spring time. If trees don't this type of air they tend to bud and grow slowly during the spring time. All of these changes are good changes in order to keep the ecosystem moving good and safely. Without them the ecosystem would not work as smoothly and there would not be a perfect equilibrium.</p>	202	40	162	0
15.	<p>A. Melting snow = starting to reveal grass and dirt, therefore anything that feeds on grass, or lives underground can emerge</p> <p>B. Rivers/lakes unfreezing= ice is melting and allowing water to flow. Animals that drink from rivers and such can now reach water.</p> <p>C. Buds on trees= there were buds on the ends of some branches. This means leaves will be on the trees in not too long.</p>	68	34	34	0

16.	<p>A. Birds Chirping Birds that migrated south for the winter are starting to return. You can tell this because when waking up in the morning you often awake to the sounds of song birds and chickadees.</p> <p>B. Tree Budding The tips of trees are beginning to show signs of life again. Buds that will soon sprout into leaves are prevalent in many trees in my yard; this, producing signs of seasonal change.</p> <p>C. Snow Melting The snow is just about GONE! Another change in the natural world. Due to an increase in temps. And no more snowfall. Lakes will open soon; as well as rivers. Fish will spawn and produce off-spring.</p>	111	82	29	0
17.	<p>Three changes I see is the snow beginning to melt thus creating high moisture levels. Also animals are slowly beginning to come out of hibernation. Also life is coming back to the natural world grass will soon be green, trees will be in bloom and flowers everywhere. The next couple of weeks will change for feeding relationships/energy flow, because in the winter you almost never see animals or green plants so food is very scarce. Now that it is changing animals will be back to eating plants and eating and killing prey.</p>	92	34	58	0
18.	Not Completed	0	0	0	0
19.	<p>The air feels so much warmer and moisture, smells clean. You can see the brown coming out of everything. It feels dirty but a clean dirty If that makes sense... everything seems way more alive, like the start of something new. I feel more energized to do things except when it rains its kind of tiring, yet I love thunder storms, but mucky rain always brings moral down.</p>	68	58	10	0
20.	<p>A lot of our "nature" is man made. People plant the trees and plants and stuff so it is not really natural so I think the energy flow would be off balance, there's more pollution and things because of humans and because of that I'm sure that messes up feeding relationships and energy flow by killing certain nutrients, plants, and stuff. Third thing is how many people that are actually living now. So many people so many resources being used and nature being disturbed were like smothering the nature energy flow maybe?</p>	93	32	61	0
21.	Not Completed	0	0	0	0

22.	<p>The three changes I see is dirt, water, and the lengthening of days. When spring comes around the sun is out longer, so the snow melts. As the snow and ice melts the grass and dirt starts to show, and the water becomes open. Once grass and water start to show birds and little eaters start to come out. Once more little animals come out and the food supply increases the bigger animals come out. The part of the relationships of energy flow is little animals, like birds, mice, and rabbits come out first because very little amounts of food is available. As it starts to get hotter and hotter, bigger and bigger animals start to come out and the ecosystem starts back up again.</p>	125	75	50	0
23.	Not Completed	0	0	0	0
24.	<ol style="list-style-type: none"> <li>1. We can hear lots of birds in the trees. When it was cooler out you could hear a few birds but now there are a whole variety of sounds. Because of these sounds, we can infer that there is more food for the birds to eat, therefore it is getting warmer.</li> <li>2. The days are getting longer and there is/was more sunlight. This means more hours of sunlight which means more time for the plants to harvest the energy and the snow to melt.</li> <li>3. We can start to actually see the dirt and grass obviously this means the snow is melting and spring is coming which means there will be lots of plants in bloom and lots of animals.</li> </ol>	121	52	69	0
25.	<ol style="list-style-type: none"> <li>A. With the river starting to thaw out, fish will start to jump and stretch out their... gills? Yeah, we'll go with gills. But what are they supposed to eat? Don't they usually eat bugs and stuff like that?</li> <li>B. The air is starting to feel more lively and fun. This will bring out a sense of happiness and excitement. Well to humans at least. I like spring.</li> <li>C. As the snow melts, the soil will thaw and things will start to grow. The grass will turn green and flowers will bloom and all that winter put to sleep will be awake and raring to go ☺</li> </ol>	107	23	84	0
26.	<p>There are 3 most prominent changes in the outdoors during this time of year. The biggest change I see is that the snow is beginning to melt. The melting snow will allow the moisture to be released which will evaporate and then rain down, encouraging plant growth. The ice on the river is also beginning to thaw which will provide fresh water to animals. The third change I notice is the longer days. More sunlight means more energy to plants which means more food for animals.</p>	86	47	39	0
27.	<p>The first change I saw was the melting snow. The snow melting means we will be able to see dirt. The dirt is very essential, because with dirt we will be able to see plants soon.</p> <p>The melting snow also means the temperature is rising. With warmer temperature the snow will melt and plants and animals will reappear into the open. There'll be more food resources and land and in water.</p> <p>The third change I witnessed was that the animals are already starting to return. I hear birds chirping and singing and there is a sign of spring. The birds and animals presenting their presence means there is more food</p>	122	18	104	0

	resources. Soon we'll be able to wear shorts and shirts only soon.				
28.	I see grass, which means the snow is melting. I also hear the sounds of birds, which means that its getting warmer and the birds are beginning to migrate back up to the north. I also see the river ice is melting, so that means its getting warmer outside and eventually will be all melted. These changes mean that for the next few weeks that the smaller animals like birds will come back first because they need the least amount of food then the larger animals come back like foxes or other large animals because they need more food, so once the small animals come the larger come. The larger animals also feed on smaller ones, so that is why the smaller ones come back first.	126	24	102	0
29.	3 changes are: <ul style="list-style-type: none"> <li>- Water amounts</li> <li>- Dirt</li> <li>- Food supply</li> </ul> <p>Water amounts have changed cause the air is getting warmer and melting snow and as it does that there is more water for animals and plants.  Dirt matters cause the dirt (ground) serves as so many different insects, animals, plants' homes and growth partners that they wouldn't be able to live without it obviously.  The food supply, meaning grass, buds on trees, insects, smaller animals, and other things needs the water to grow, be more nutritious, and plentiful for the animals and other beings that exist.</p>	97	11	86	0
30.	1. Soil thawing. 2. Moist air 3. Ice melting <p>When the soil thaws plants can start to grow and turn green again. Since plants are often the lower part of the food chain, their growth leads to more small animals such as birds. The moist air will form precipitation which will fall to earth and replenish the plants and bodies of water. When the ice melts there is more water for the larger animals to drink. As spring comes upon us we will first see small animals followed by the large consumers.</p>	92	9	83	0
31.	As we walked down the trail in the back, I noticed three distinct changes in nature, dirt, moisture, and wildlife. Walking out there in the woods, there was something different than the week before. Instead of walking n snow, it was hard thawing dirt. We could start to smell the natural smells of the partially frozen soil. Another change was the air. Instead of having thin very dry air that we had all summer, it was cloudy, moist air filling the skies. Also, as we walked down the path, it felt like was starting to wake up. Instead that cold nothing sound in the middle of winter, the sounds of a few birds and the flowing river were the first sounds of spring to our ears.	126	117	9	0
32.	1. I could hear and see a lot more birds, and it give me a lot more positive "energy" now that I can hear birds and not just cars going over the bridge. 2. Now that a lot of the snow is melting I can not just see the grass but smell and touch it as well. 3. The river is also thawing out more and more each day, which in turn the	79	69	10	0

	flowing water will attract more wildlife.				
33.	Dirt, warmer temperatures, melting snow Dirt makes it so plants and nutrients can grow. The warming temperatures make it easier for the plants to grow and melting snow makes for more dirt and plants that are covered become uncovered.	39	5	34	0
34.	Birds chirping snow melting open water. It means that the animals are going to be out and about more now that there is open water. The birds that went south for winter are going to start coming back. And good news for the ground hog. It doesn't matter if he saw his shadow or not spring is here!	58	26	32	0
35.	Air is getting wetter, this means that plants can begin to grow. Snow is melting along with ice, ground begins to thaw which means that animals that went away for winter will appear.	33	10	23	0
36.	Change #1: Everything more damp and wet. Change #2: Less snow on trees. Change #3: Ground – less snow and path more mucky These changes mean the end of winter and the starting transitions into spring. The air is becoming less dry and more moisture which is melting the snow.	49	31	18	0
37.	Dirt: Dirt becomes soft allowing seeds to grow/bury thus allowing food to grow for animals to eat/grow/multiply! Open water: Pretty much same as dirt except can't grow anything, but animals need open water to drink and hydrate so they can grow... Grass:	42	16	26	0

## APPENDIX C

Post-Course Survey

Student Name: \_\_\_\_\_ Age: \_\_\_\_\_ GPA: \_\_\_\_\_

*For each of the following, circle the number that best describes your response.*

**1. Journaling helped me learn.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**2. Getting a good grade on the journals was difficult.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**3. I agree with the grades I have received on the journal.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**4. Journaling was easy.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**5. Journaling made me think more than normal homework.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**6. Journaling made me think harder than normal homework.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**7. Journaling is a good way to evaluate what I learned.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**8. Journaling helped me to reflect on the activities we did.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**9. Journals shouldn't be used in Outdoor Adventures.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**10. Journaling made me reflect on myself.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**11. Journaling made me reflect on my relationships with other students in the class.**

1:Strongly Agree    2:Moderately Agree    3:Neutral    4:Moderately Disagree    5:Strongly Disagree

**12. On average, how much time did you spend on each journal entry?**

0-5 minutes    5-10 minutes    10-15 minutes    15-20 minutes    20 or more minutes

**13. On the back of this sheet, please share your thoughts on the following 2 questions:**

**A. How could journals be used differently to make them work better?**

**B. How does journaling compare to normal class work- such as worksheets, textbook reading and questions, and tests- when it comes to helping you learn? Do you have a preference?**

## APPENDIX D

## Post-Course Student Survey Results

		Strongly Agree (1)	Moderately Agree (2)	Neutral (3)	Moderately Disagree (4)	Strongly Disagree (5)
1	Journaling helped me learn.	2	16	11	4	2
2	Getting a good grade on the journals was difficult.	5	11	9	7	3
3	I agree with the grades I have received on the journal.	6	13	8	7	1
4	Journaling was easy.	4	9	12	9	1
5	Journaling made me think more than normal homework.	11	14	5	1	4
6	Journaling made me think harder than normal homework.	5	15	10	2	3
7	Journaling is a good way to evaluate what I learned.	5	15	8	5	2
8	Journaling helped me to reflect on the activities we did.	7	18	6	2	2
9	Journals shouldn't be used in Outdoor Adventures.	2	3	13	10	7
10	Journaling made me reflect on myself.	7	17	8	2	1
11	Journaling made me reflect on my relationships with others students in the class.	4	4	10	13	4
12	On average, how much time did you spend on each journal entry? (minutes)	3 (0 to 5)	12 (5 to 10)	10 (10 to 15)	9 (15 to 20)	1 (20 or more)

## REFERENCES

Almon, J., & Miller, E. (March 2009). *Summary and recommendations of crisis in the kindergraten: Why children need to play in school*. College Park, MD: Alliance for Childhood.

*Association for Experiential Education: What is Experiential Education?* (2010).

Retrieved January 6th, 2010, from <http://www.aee.org/about/whatIsEE>.

Athman, J., & Monroe, M. C. (2004). The effects of environment-based education on students' achievement motivation. *Journal of Interpretation Research*, 9(1), 9.

Austin, M. L., Martin, B., Mittelstaedt, R., Schanning, K., & Ogle, D. (2009). *Outdoor orientation program effects: Sense of place and social benefits*. Association for Experiential Education. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=36836373&site=ehost-live>.

Brown, S., & Vaughan, C. (2009). *Play: How it shapes the brain, opens the imagination, and invigorates the soul*. New York: Penguin Group.

Bush, Laura. (October 15, 2003). *First lady bush emphasizes importance of education.*

Transcript: First Ladies' Summit -- Dominican Republic:

Comishin, K., Dymment, J. E., Potter, T. G., & Russell, C. L. (2004). The development and implementation of outdoor-based secondary school integrated programs. *Applied Environmental Education and Communication*, 3.

Coyle, K. (2005). *Environmental literacy in america: What ten years of NEETF/Roper research and related studies say about environmental literacy in the U.S.*

Washington, D.C.: The National Environmental Education and Training Foundation.

Cronin, J., Dahlin, M., Xiang, Y., & McCahon, D. (February 2009). *The accountability illusion.* Thomas B. Fordham Institute. Retrieved from ERIC database.

Disinger, J. (1984). *Field instruction in school settings.* ERIC/SMEAC Environmental Education Digest.

Dodge, A. (2009). Heuristics and NCLB standardized tests: A convenient lie.

*International Journal of Progressive Education*, 5(2).

Ewert, A., & McAvoy, L. (2000). *The effects of wilderness settings on organized groups:*

*A state-of-knowledge paper* USDA Forest Service Proceedings RMRS-P-15-VOL-3.

Editorial Projects in Education. (2004). *Research center: Character education*. Retrieved December 31, 2009, from <http://www.edweek.org/rc/issues/character-education/>.

Fisher, A. (2001). *Critical thinking: An introduction*. Cambridge, United Kingdom: Cambridge University Press.

Gardner, L., Ives, B., & Obenchain, K. (2007). Taxing praxis: One social studies' teacher's journey with experiential education. *Social Studies Research and Practice*, 2(1), 22.

Glenn, J. L. (September 2000). *Environment-based education: Creating high performance schools and students*. Washington, D.C.: The National Environmental Education and Training Foundation.

Hattie, J., Marsh, H. W., Neill, J., & Richards, G. E. (Spring 1997). Adventure education and outward bound: Out-of-class experiences that make a lasting difference. *Review of Educational Research*, 67(1), 43.

Hendee, J. C., & Brown, M. H. (1987). *How wilderness experience programs facilitate personal growth: The Hendee/Brown model*. Annual Meeting of the World Wilderness Congress.

*How environmental education is used in schools* (May, 2004). (Number 120)

Environmental Education and Training Partnership.

Hubbs, D. L., & Brand, C. F. (2005). The paper mirror: Understanding reflective journaling. *Journal of Experiential Education*, 28(1), 60.

Ives, B., & Obenchain, K. (2006). Experiential education in the classroom and academic outcomes: For those who want it all. *Journal of Experiential Education*, 29(1), 61.

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning and Education*, 4(2), 193.

Lieberman, G. A., & Hoody, L. L. (1998). *Closing the achievement gap: Using the environment as an integrated context for learning. executive summary*. State Environmental Education Roundtable (SEER).

Linn, R. L. (March 2000). Assessments and accountability. *Educational Researcher*, 29(2), 4.

- Louv, R. (2008). *Last child in the woods: Saving our children from nature deficit disorder*. Chapel Hill, N.C.: Algonquin.
- Madaus, G. F., & Kellaghan, T. (April 1993). Testing as a mechanism of public policy: A brief history... *Measurement & Evaluation in Counseling & Development (American Counseling Association)*, 26(1), 6.
- Martin, A. J. (2001). *Towards the next generation of experiential education programmes: A case study of outward bound*. Unpublished Doctor of Philosophy in Management, Massey University, Palmerston North, New Zealand.
- McCrea, E. J. *The roots of environmental education: How the past supports the future*. Environmental Education and Training Partnership. Retrieved from [eetap.org/pages/fetch.php?fid=History.Final.20060315.pdf](http://eetap.org/pages/fetch.php?fid=History.Final.20060315.pdf)
- Neill, J. (2004). *Experiential learning cycles - overview of 9 experiential learning cycle models*. Retrieved January 6th, 2010, from <http://wilderdom.com/experiential/elc/ExperientialLearningCycle.htm#underlyingphilosophy>
- Organisation for Economic Co-Operation and Development. (2009). *Green at fifteen? how 15-year-olds perform in environmental science and geoscience in PISA 2006*. Retrieved from <http://www.oecd.org>.

*Outward Bound Educational Framework and Mission*. (2010). Retrieved January 7th,

2010, from [http://www.outwardbound.org/index.cfm/do/ind.about\\_philosophy](http://www.outwardbound.org/index.cfm/do/ind.about_philosophy)

Pavlovich, K. (September 2007). The development of reflective practice through student journals. *Higher Education Research and Development*, 26(3), 281.

Rudd, R. D. (October 2007). *Research report: Defining critical thinking*. Association for Career & Technical Education.

Ryan, K. (1997). The missing link's missing link. *Journal of Education*, 179(2), 81.

Tulchin, B., & Muehlenkamp, K. (March 12, 2007). *Survey results on education among california business leaders*. Washington, D.C.: Greenberg Quinlan Rosner Research.

UNESCO & UNEP. (October 1997). *Intergovernmental conference on environmental education : Tbilisi*. Retrieved from

<http://www.unesdoc.unesco.org/images/0003/000327/032763eo.pdf>

Wuerthner, George. (August 2008) Wild Forests and Landscape Amnesia. *International Journal of Wilderness*. 14(2).