An Investigation of Students' and Graduates' Perspectives on Experiential Learning

in Undergraduate Environmental Programs

by

Lorna Roca

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Clayton H. Riddell Faculty of Environment, Earth and Resources

Department of Environment and Geography

University of Manitoba

Winnipeg, Manitoba R3T 2M6

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ABSTRACT

The central argument underlying this research is that experiential learning (EL) can strengthen environmental university programs. Its goal is to demonstrate the benefits of EL from students' and graduates' perspectives and to provide recommendations for its effective implementation into a program. The research utilized a qualitative case study (Environmental Sciences/Studies (ESS) programs at the University of Manitoba, Canada) through focus groups and individual interviews with students and graduates. The results indicate that EL helps develop an understanding of environmental complexities; motivates students to engage at all levels of their ability; is decisive in skill development; engages students in environmental issues with diverse stakeholders; is important in obtaining employment; and it is imperative to connect EL activities to concepts taught in class. The data however, did not show EL to be a significant factor in fostering pro-environmental behaviours in post-secondary environmental students. Overall, the research shows that provided effective implementation, EL can play a significant role in enhancing ESS curriculum and that ESS students place a great value on EL in their education.

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DEDICATION

To Marin. I would not have started nor finished this thesis without you. I love you.

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Chapter 1: Introduction

1.0 Research Rationale

Embarking on my undergraduate education in Environmental Studies as a mature student with years of diverse life and work experiences, I was fully aware of the merit of experience in both personal development and in acquiring knowledge and skills. I participated in a handful of field courses offered through my program, experiencing their benefits first hand. Concepts learned in class fell into place; academic papers I read had new meanings after I had a chance to engage with various stakeholders and environments and to reflect upon these experiences.

What I was not aware of was that so many other environmental students shared similar feelings, until one class exercise in the final semester of my undergraduate studies. In this exercise, students were asked to critically reflect on their education and to provide recommendations, and I was tasked with summarizing their answers. One common theme stood out straight away; a remarkably high number of students, 49 out of 55, talked about the importance and the need for more experiential learning courses with hands-on experience and/ or skill development components. To me, this indicated that the extent of students' interest in experiential learning might be disproportionate to the amount of attention it receives in our program, a discrepancy worth investigating.

1.1 Experiential Learning (EL) in Postsecondary Environmental Education: an Overview

"I hear and I forget. I see and I remember. I do and I understand." Confucius, 551-479 BC

This well-known proverb tells us that the value of experience in the creation of knowledge and furthering of personal development was noted as early as the 4th century B.C. In Indigenous communities worldwide, experience has been an integral part of traditional knowledge for millennia (Belton, 2013; Mazzocchi, 2006). However, it is mainly in the 20th century with the work of John Dewey and his 1938 book, Experience and Education, that experiential learning (EL) gained merit in the formal Western education (Lewis & Williams, 1994).

EL can take many forms and take place in travel courses, field trips, in the community, work-placements, international learning opportunities and others, provided that students can examine experiential concepts via cognitive reflection (Kolb, 1984; Penny et al., 2012). The importance of cognitive reflection lays in learners' examination of new knowledge gained from an experiential activity and how their understanding of the subject has changed because of this participation (Penny et al., 2012). EL promotes use of cognitive, affective, and psychomotor modes of learning (Kolb, 1984; Maskall & Stokes, 2008) as it engages learners in analyzing, evaluating, and problem-solving of real world issues relevant to their fields of study (Bass, 2012; Dewey, 1938).

Besides his many contributions to experiential education, Dewey was known for his work in promoting environmental education and was a strong believer that schools, as key democratic institutions, have the responsibility to shape attitudes in promoting common good and collective

action in protecting natural resources (Dennis and Knapp, 1997; Payne, 2006). He argued that if schools are to develop students who are committed to solving environmental problems, they first have to develop critical thinkers who see themselves connected to the real world, both that of nature and society (Payne, 2006; Quay & Seaman, 2013).

Most educators involved in EL within postsecondary environmental programs believe that it is a very effective means for students to understand the relationships between natural and anthropogenic processes, complexities of environmental issues (Basile 2000; Maskall & Stokes, 2008; Zandvliet, 2012) and to develop skills needed to deal with these issues and diverse stakeholders involved in them (Basile 2000; Gruenewald 2003; Zandvliet, 2012). However, extensive literature review shows a small number of publications in the area of EL in postsecondary environmental education, which limits the empirical substance needed to support these beliefs. Furthermore, none of the studies addressed students' and graduates' perspectives on the role of EL in their undergraduate environmental programs as a whole.

Research conducted thus far points to a number of important benefits of EL in postsecondary environmental programs. For example, after participating in environmental EL courses, students develop increased learning motivation (Basile 2000; Cummins and Snively 2000; Kenney et al. 2003; Smith and Williams 1999), increased pro-environmental behaviours and values (Bass, 2012; Cummins and Snively 2000; Gruenewald 2003; Kahn 1997; Penny et al., 2012; Zandvliet, 2012), acquisition of generic, or transferable skills (high-order skills that apply across all fields, including communication, problem-solving, critical thinking, collaboration, cooperation, teamwork, leadership, social skills, decision-making, and interpersonal skills)

(Basile 2000; Cummins and Snively 2000; Gruenewald 2003; Kahn 1997; Zandvliet, 2012) and technical skills, improved employability (Basile 2000; Maskall & Stokes, 2008; Penny et al., 2012), increased conceptual gain, deeper understanding of environmental complexities, (such as understanding of an ecosystem), increased systems thinking (cognitive skills, such as analyzing, synthesizing, and implementation) (Ben-Zvi Assaraf & Orion, 2005; Falk, 2005; Kern & Carpenter, 1986; Tal & Morag, 2009; Zint et al., 2014), increased self-confidence, and improved long-term knowledge retention (Bass, 2012; Kenney et al. 2003; Maskall & Stokes, 2008; Penny et al., 2012).

Moreover, unconventional students, or those struggling in school, have shown increased engagement and motivation when environmental EL is introduced in the curriculum (Cummins & Snively, 2000; Kenney et al. 2003; NEETF, 2000), which can potentially result in a higher academic achievement (NEETF, 2005). The National Center for Education Statistics in the United States (US) defines unconventional students as students: attend university part-time, are mature students; work full-time; are financially independent; have dependents; and are single parents (NCES, 2002). The Canadian Council on Learning's definition of the under-represented non-traditional university students identified three additional characteristics: students from low-income families; recent immigrants, students with disabilities and Aboriginal students (CCL, 2007).

1.2 Inclusion of Students' Insights into their Education

"Asking students to talk about their education is so simple that – whether we are teachers, parents, researchers, or policymakers – we inevitably forget to do it." (White, 2010, p. xi)

Given that university students have a vested interest in their education, they can be an important source of information, yet they are rarely consulted about their educational experiences (Bovill et al., 2011) beyond individual course evaluations, which are often restrictive and do not provide opportunities for students to reflect and provide input on the broader program experiences.

Drawing from the current literature on student engagement and on student voice, Bovill et al. (2011) argue that students have a distinctive perspective on their education and that they should be invited by educators to share their insights. By gathering student feedback and involving them in the decisions about their education, universities have a unique opportunity to enhance the quality of their curriculum (Bovill, 2014; Carey, 2013).

1.3 Purpose and Objectives

      The central argument underlying my research is that EL can strengthen environmental program curriculum in higher education. Its purpose is to increase the understanding of students' and graduates' perspectives on the merit of EL in undergraduate environmental programs. The following objectives serve this purpose:

1. Identify students' and graduates' perceptions of the role of EL within their programs, specifically:

   a) In understanding the complexities of environmental issues (e.g. understanding human and natural processes and interactions; understanding of an ecosystem etc.), and in increasing conceptual gain and systems thinking skills (analyzing, synthesizing, applying knowledge, and developing new ways of thinking when responding to new situations)

   b) In improving preparedness to deal with diverse stakeholders involved in environmental issues (e.g. indigenous communities, government departments, local residents, businesses, environmental groups, politicians, school systems etc.)

   c) In motivation to learn and engagement (the level of interest, optimism, and passion that students show when they are learning, which extends to the level of motivation to learn and progress in their education)

   d) In pro-environmental behaviours and values

e) In acquisition of generic, or transferable skills (high-order skills that apply across all fields, e.g. communication, problem-solving, critical thinking, collaboration, cooperation, teamwork, leadership, social skills, decision-making, interpersonal skills etc.)

f) In acquisition of technical skills (e.g. sampling, lab-work, health & safety) and long-term knowledge retention

g) In obtaining employment in their field of study

h) Other benefits not mentioned

2. Identify which EL components in the program helped the graduates in dealing with the variety of 'real-world' situations related to an environmental profession, and what is missing

3. Provide students' and graduates' recommendations for future implementation of EL within undergraduate Environmental Sciences and Studies programs

1.4 General Methods

Although I realise that my position as a student in support of increased use of EL might have influenced the way I interpreted the data of this study, I have attempted to maintain the pragmatic worldview that underpins all of my research endeavours. As explained by Creswell (2014), pragmatism focuses on problem-solving and actions or situations and their consequences, using whichever methods work best for that particular study.

I used a case-study approach, namely Environmental Sciences and Studies (ESS) programs in the Department of Environment and Geography at the University of Manitoba, in order to conduct an in-depth analysis of students' and graduates' perceptions of the EL within their programs. As a recent graduate from the same program, I trust that my experience served me well in multiple aspects of this research. I asked fourth year students as well as ESS program graduates to participate in semi-structured interviews, formulated in a way that addressed research purpose and objectives.

1.5 Contribution to Knowledge

My hope is that this research will contribute to the growing, but still limited, knowledge about the merit of EL in postsecondary environmental programs as it will provide useful input from the key stakeholders in higher education: students and graduates. I also hope that it will serve as an important resource in curricular enhancement, placing EL in a more prominent role.

Chapter 2: Literature Review

2.0 Experiential Education

Experiential education is an educational philosophy grounded on the primacy of experience in the learning process (Katula & Threnhauser, 1999). It is based on the cycle of experience and reflection, or making meaning out of experiences, distinguishing intellectual or moral meanings and integrating them into abstract concepts, which can serve as a direction for future problem-solving (Katula & Threnhauser, 1999; NSEE, 1998). Philosopher and educator John Dewey, considered by most scholars a father of experiential education, worked toward changing the way knowledge was conveyed to students after observing that most of them were not able to grasp the abstractions taught in class because they could not associate them with the 'real world' (Katula & Threnhauser, 1999; Lewis & Williams, 1994).

Dewey called for a pragmatic education that linked learning and experience, one where teachers structured experiences that actively engaged students in developing usable knowledge (Katula & Threnhauser, 1999; Lewis & Williams, 1994). As much as experience gave meaning to concepts presented in class, Dewey (1938) explained, the concepts gave structure and meaning to experiences, noting that there is an important educational relationship between the classroom and the outside world. Thus, sound education involves continuity and interaction between the learner and what is learned, between observations and actions, and between experience and concepts (Dewey, 1938; Katula & Threnhauser, 1999; Kolb, 1984).

Dewey's work was followed by a significant number of publications in educational psychology that connected experience and intellectual development, such as those of notable

scholars including Jean Piaget, Paulo Friere, William Perry, Lawrence Kohlberg, and Carol

Gilligan (Katula & Threnhauser, 1999). Most of the early research on the effects of fieldwork on

learning focused on retention and recollection of information (Frisk & Larson, 2011). For

example, when Mackenzie & White looked into the impact of fieldwork on the ability of school

children to memorize information, they found that active participation in fieldwork helped them

form 'easily recalled episodes' which increased their ability to remember what they had learned

(Frisk & Larson, 2011; Maskall & Stokes, 2008).

Their findings are supported by those of Killerman in 1996, who concluded that plant

identification skills were significantly increased in children taken into the field compared to

those thought exclusively in the classroom (Maskall & Stokes, 2008). Today, there is sufficient

empirical evidence indicating that the retention of students' knowledge is highest in situations

where they had the most immersion in the learning process. Specifically, students retain about 80

percent of knowledge from active participation, compared to 10 to 20 percent from passive

learning such as lectures or readings (Cain, 2006; Cortese, 2003; Frisk & Larson, 2011).

2.1 Experiential Learning Theory

The most influential work on EL since Dewey is that of the cognitive psychologist David Kolb. According to Kolb, learning is the process through which knowledge is acquired by the transformation of experience, increasing in complexity throughout the process (Katula & Threnhauser, 1999; Kolb, 1984; Lewis & Williams, 1994). In his Experiential Learning Theory (ELT), learning occurs via four adaptive learning modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Katula & Threnhauser, 1999; Kolb & Kolb, 2005; Lewis and Williams, 1994; Maskall & Stokes, 2008).

Additionally, in the ELT model, Kolb postulates two dialectically related modes of grasping information-concrete experience versus abstract conceptualization, and two dialectically related modes of processing that information (transforming experience)-reflective observation versus active experimentation (Katula & Threnhauser, 1999; Kolb & Kolb, 2005; Lewis & Williams, 1994). The idea is that learners have their preferred ways of learning. For example, they may be inclined either towards abstract concepts, or towards practical activities (Maskall & Stokes, 2008; Watton & Truscott, 2006).The combination of preferred ways of grasping and processing information represents a learning style (Watton & Truscott, 2006).

However, Kolb considers any one learning style to be incomplete, and for true learning to occur, all four stages of the cycle have to be accommodated by the learner (Katula & Threnhauser, 1999; Lewis & Williams, 1994). Therefore, in EL process, where the learner 'touches all the bases' - experiencing, reflecting, thinking, and acting, a creative tension between

the four learning modes is not only present, but necessary (Katula & Threnhauser, 1999; Kolb &

Kolb, 2005).

This view of the learning process is fundamentally different from the behavioral or

rationalist and other cognitive theories of learning which are the base of traditional educational

approaches, and which prioritize acquisition, manipulation, and recall of abstract information

(Kolb, 1984). From the EL perspective, the significance is in adaptation and learning, in contrast

to content or outcomes. Knowledge is an adaptive process that is constantly created and

recreated, in which learning transforms experience both objectively and subjectively (Kolb,

1984). However, Kolb emphasizes that his intention is not to pose Experiential Learning Theory

as an alternative to behavioral and cognitive learning theories, but rather to offer a holistic

integrative perspective on learning, which includes experience, perception, cognition, and

behavior (Kolb, 1984).

2.2 EL in Higher Education

Kolb (1984) observed that there is a growing group of educators in the field of higher education who see EL as a way to revitalize the university curriculum and to deal effectively with many of the changes facing higher education. Aiming to expand Dewey's thinking on shaping the curriculum in higher education, Kolb's idea was to bring changes to the US curriculum to meet the needs of non-traditional students, minorities, and the poor, whose life experiences did not prepare them for traditional textbook learning (Katula & Threnhauser, 1999).

Additionally, in response to increasing graduates' and employers' complaints, concerned with the mismatch between necessary career skills and institutional learning, Kolb emphasized the need to link education to employment (Cantor, 1997; Katula & Threnhauser, 1999). All these concerns, he claims, are addressed with a curriculum based on EL, as it is the only model of learning that allows the knowledge to be construed from the array of experiences brought into the classroom and to adapt to the learner while bridging the gap between an institution and the student (Kolb, 1984; Kolb & Kolb, 2005; Zandvliet, 2014).

Many educators advocate the use of Kolb's model to serve as a guide for EL in the formal curriculum. Some are describing teaching techniques that will engage each of the four learning modes to ensure a complete cycle of learning. For example, concrete experiences can be accomplished via real world case studies; reflective observation via reflective papers, journals, or group discussion; abstract conceptualization can be stimulated by lectures or films; and active experimentation can be effectively encouraged by problem solving exercises (Lewis & Williams, 1994).

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A widely held belief among these educators is that effective EL must have a clear purpose in the curriculum in terms of adding or enhancing on existing portion of the curriculum, or have a significant objective in the curriculum as a whole (Kolb, 1984; Maskall & Stokes, 2008). Therefore, a meaningful integration of EL with lectures is important; otherwise it may result in diminished learning and meaning (Kolb & Kolb, 2005; Maskall & Stokes, 2008). For example, at the University of Plymouth, fieldwork in the Environmental Science program is designed so that throughout their program, students progressively experience autonomy and responsibility; research competence and specialization; global perspective; complexity of subject matter; contact with external organizations; and personal and professional confidence (Maskall & Stokes, 2008).

In Canada, Ryerson University in Toronto considers EL an effective pedagogical tool for engaging students as they construct conceptual and practical knowledge in real life situations (Penny et al., 2012). The university developed an EL model (based on Kolb's model), representing a wide range of disciplines (Penny et al., 2012). From an initial enrollment of 520 students in 1948, the university has expanded to over 28,000 full-time undergraduate students in 2012 (Penny et al., 2012). Students are attracted to Ryerson due to its extensive EL opportunities, such as service learning, laboratories, fieldwork, clinical placements and the recently developed Digital Media Zone (Penny et al., 2012). 91% of all undergraduate programs offer EL, almost 40% of the courses offered at the university have an EL component, and with over half of these courses being required (Penny et al., 2012).

In the US, an institutional development program promoting EL was initiated by the Case Western Reserve University (Case), and in 2000, Case adopted a philosophy of EL (Kolb & Kolb, 2005). The university developed an experimental undergraduate curriculum called Seminar Approach to General Education Studies (SAGES), designed to foster in students breadth and specialized knowledge by exposing them to a wide range of disciplines within three major divisions of the college (Kolb & Kolb, 2005). The new SAGES curriculum begun in 2005 along with a five-year faculty development program, where 80 faculty members underwent an intense development on how to develop a particular course or other educational experiences based on EL (Kolb & Kolb, 2005). In 2011, 60 First Seminars enrolled 920 students, with student evaluations of the experience continually improving, resulting in First Seminars being rated higher than the average 100- and 200-level courses (SAGES, 2012).

In its 2007 report called "College Learning for a New Global Century", The Association of American Colleges and Universities (AACU) listed ten high-impact activities, all of which included EL; such as first-year seminars, learning communities, service/ community based learning, study abroad, internships, collaborative assignments, undergraduate research and other experiential activities (Kuh, 2008). Additionally, since it was first established in the 2000, the National Survey of Student Engagement (NSSE) publishes a list (used by many Canadian postsecondary institutions) of high-impact practices that are a very close match to the AACU's list of EL activities (Bass, 2012; Kuh, 2008).

High-impact practices are students' experiences in higher education which highly correlate to the most significant learning outcomes such as success, retention, graduation,

continuing to graduate studies, and which lead to meaningful learning gains (Cantor, 1997; AUCC, 2011; Bass, 2012; Kuh, 2008). These experiences give students opportunities to integrate, synthesize, apply knowledge, and develop new ways of thinking when responding to new situations, which are all crucial for deep learning experiences (Kuh, 2008). Events and actions are put in perspective, resulting in students who better understand themselves in relation to others and to the big picture (Kuh, 2008).

Clearly, traditional lecture format is no longer adequate as the predominant or single pedagogical approach in higher education. EL needs to be viewed as a necessary component of the learning process, as opposed to being optional, an accompaniment, or extracurricular experience (Bass, 2012; Penny et al., 2012).

2.3 Significance of EL in Education for Sustainable Development

With the increased urgency to address environmental, social, and economic issues globally, education is regarded to have a central role in the path towards sustainable development. And, its primary task, as defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1997, is not a small one: "Achieving sustainability will depend ultimately on changes in behavior and lifestyles, changes which will need to be motivated by a shift in values and rooted in the cultural and moral precepts upon which behavior is predicated" (Frisk & Larson, 2011, pp 2).

The 2005-2014 UN Decade of Education for Sustainable Development (ESD) spoke to the gap between academia and community, and the need to inaugurate pragmatic ESD in environmental education, the one that will foster attitudes and commitments that students need in

order to take transformative action (Cortese and McDonough, 2003; McPherson & Mayer, 2014; NAAEE, 2011; Sipos et al., 2008).

There is a shared notion among a great deal of scholars that the current educational efforts are not effective in achieving transformative action, including many programs whose main goal is to produce pro-environmental behaviors (Frisk & Larson, 2011; Kraljevic, 2011; Tan, 2009). The main problem, they argue, is the faulty assumption about linear progression of environmental knowledge to positive attitudes to action, resulting in educational institutions using classroom-confined and information-intensive methods that largely focus on declarative knowledge about environmental systems (Bonnett, 2004; Frisk & Larson, 2011; Kraljevic, 2011; Lake et al., 2010). As American psychologists Eiss and Harbeck proposed in 1969, learning is a process of interaction between cognitive, affective, and psychomotor learning domains, therefore an individual cannot deal with knowledge alone because it is inseparable from feelings and emotions (Maskall & Stokes, 2008).

Zint et al. (2014) conducted four syntheses of environmental education research and program evaluations published between 1971 and 2008. While they found only seventeen studies that investigated the effects of environmental education on behavioural outcomes of elementary and high school students, all of them concluded that programs which engage students in EL (including field trips, community learning, and investigations of local environmental issues) are more effective in fostering environmentally responsible behaviours than classroom-delivered programs (Bonnett, 2004; Ballantyne & Packer, 2005; Zint et al., 2014). These findings are supported by the research of behavioural scientists, who explain that direct experiences have

stronger influence on people's behavior than indirect ones (Ballantyne & Packer, 2005; Frisk & Larson, 2011; Maskall & Stokes, 2008).

According to the 2008 Sustainable Design Project initiated by Wheeler et al., effective learning occurs when it is relevant to students' lives, through local initiatives where students are given an opportunity to make a difference and acquire decision-making skills (Bonnett, 2004; Frisk & Larson, 2011; Woodhouse & Knapp, 2000). Similarly, Ballantyne et al. found that fieldwork in the local environment was effective in facilitating students' role as change agents in their communities (Endreny, 2010; Frisk & Larson, 2011; Gruenewald 2003; Kahn 1997). Moreover, the educators facilitating EL courses in the local community are reporting increased professional satisfaction, while communities experience greater connection with their neighbourhood school and students (Zandvliet, 2014).

More recently, Kimble (2014) investigated the informal grade 3 biodiversity education in EL activities including environment explorations, animal shows and museum visits. When students participated in environment exploration, the most frequent learning code was motivation; encountering animals resulted in highest evidence of species description; and visiting specimens resulted in highest species identification (Kimble, 2014). Consequently, the researchers developed codes in the skills, place, emotion, attitudes and knowledge (SPEAK) domains and proposed them as a tool in environmental education (Kimble, 2014).

In a study conducted by Manoli et al. (2014) in Cyprus, the researchers investigated the effects of an environmental EL program entitled Earthkeepers (over two consecutive years with 491 grade 4 through 7 students) on children's environmental attitudes and values, behaviour, and

ecological understandings. The results clearly indicated that participants manifested significantly increased pro-environmental attitudes and values; increased understanding of ecological concepts; longitudinal behavioural changes through the reduction of their impact on the natural environment; deeper feelings towards the Earth; and sharing their knowledge with others (Manoli et al., 2014). Similar to Kimble's experience, these researchers too strongly suggest that EL is a successful pedagogical practice which could be implemented as an innovative approach in education for sustainability (Kimble, 2014; Manoli et al., 2014).

As Leopold (1949, p. 204) noticed years ago, seeing ourselves as a "plain and simple member" of the natural world is a prerequisite for environmentally responsible behaviour. This notion of connectedness to nature has recently sparked renewed interest and produced a significant number of empirical studies. For example, there are at least ten publications which measure connectedness to nature, and they consistently show a valid relationship between connectedness to nature and pro-environmental behaviour (Kibbe et al., 2014; McPherson & Mayer, 2014; Nisbet et al., 2009; Quay & Seaman, 2013; Zint et al., 2014).

Drawing from the research on interpersonal relationships by social psychologists which supports the assertion that a sense of 'we-ness' will make the protective behaviour more likely (even if this behaviour is inconvenient), McPherson & Mayer (2014) argue that connectedness to nature should also lead to environmentally responsible behaviours. In the study of environmental attitudes of 308 Irish students, Kibbe et al. (2014) demonstrate that swarming students with negative examples of environmental degradation and 'lost battles' as a method used to foster environmental concern does not work. They too, suggest that positive approaches such as nature

connectedness might be more effective in influencing adolescents' environmentally responsible behaviours, as the potential loss of something they care for becomes tangible (Keynan et al., 2014; Kibbe et al., 2014; Tan, 2009).

In 2003, aiming to transition towards sustainability-oriented higher education; University of British Columbia sponsored experimental learning partnerships, which resulted in a series of learning objectives named transformative sustainability learning (TSL). Bloom's Taxonomy, an alternative to learning outcomes that uses cognitive, psychomotor and affective learning domains, served as a foundation for the TSL (Sipos et al., 2008). The idea behind this initiative was to facilitate personal and interdisciplinary experiences for students based on EL, which would result in competencies in knowledge, skills and attitudes that contribute to development of change agents towards environmental, social and economic justice (Sipos et al., 2008).

2.4 Significance of EL in the Development of Core Competencies in Postsecondary Environmental Programs

Postsecondary environmental program leaders, faculty, and students are in an increasing agreement that sustainability should be adopted as an overall guide in environmental education, and that environmental programs need to develop graduates who are competent leaders, decision makers and problem solvers (Maskall & Stokes, 2008; Vincent & Focht, 2010). UNESCO urges for a curriculum that will develop inter-disciplinary understandings of social, economic and environmental issues and a review of teaching, learning and assessment approaches in higher education in order to develop lasting and relevant skills (Sipos et al., 2008; UNESCO, 2006). The skills such as critical thinking, oral and written communication, collaboration and

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cooperation, leadership, conflict management, decision-making, problem-solving (Brand &
Karvonen, 2007; Maskall & Stokes, 2008; Vincent & Focht, 2010) and practical citizenship
(UNESCO, 2006) are all seen as essential to effectively deal with the complexity of
environmental issues.

In an effort to explore the possibility of reaching consensus on the core competencies to
guide the design of environmental university programs, the Council of Environmental Deans and
Directors of the US National Council for Science and the Environment conducted a curriculum
study involving environmental educators and environmental program leaders (Vincent & Focht,
2010).The study singled out three main viewpoints on program curriculum design (none of them
bipolar, confirming that agreement is indeed possible): the Environmental Citizen; the
Environmental Problem-Solver, and the Environmental Scientist (Vincent & Focht, 2010).

What is interesting, though it was not explicitly said, is that the EL was a common
element in all three viewpoints. For example, the Environmental Citizen viewpoint, which
favours liberal arts education over preparation for employment, and is cautious of the
involvement of outside stakeholders in curriculum design, supports uninhibited, interdisciplinary
sustainability change agent development (Vincent & Focht, 2010). As previously discussed, EL
plays a significant role in the development of sustainability change agent (Frisk & Larson, 2011;
Gruenewald 2003; Kahn 1997; Sipos et al., 2008).

The EL connection in Environmental Problem-Solver, the second viewpoint, is quite
apparent. This perspective, which likely underpins my thesis work, sees the role of
environmental programs as "educating environmental professionals who can use systems-

thinking and interdisciplinary approaches to solve complex environmental problems" (Vincent &

Focht, 2010, p. 10). An important aspect of this viewpoint is the belief that employers and other

stakeholders should be actively involved in the curriculum development to keep up with a

"rapidly changing research environment and job market" (Vincent & Focht, 2010, pp.). The

supporters explicitly emphasize that students need to be provided with EL opportunities such as

service-learning, internships, and interdisciplinary EL opportunities with external organizations

in order to develop 'real-world' problem solving skills (Vincent & Focht, 2010).

The third viewpoint, Environmental Scientist, underlines the importance of scientific

expertise and educating scientific and technological professionals, trained to use "disciplinary

tools" in order to create efficient solutions for environmental problems, as well as to meet

employer expectations (Vincent & Focht, 2010). As in previous two viewpoints, they too support

interdisciplinary approach in terms of graduates' ability to effectively communicate with policy

makers, the public, and members of an interdisciplinary team of professionals (Vincent & Focht,

2010). Again, the significance of EL is apparent in developing the skills they consider essential,

including technical, or hands-on (Falk, 2005; Maskall & Stokes, 2008; Tal & Morag, 2009),

interpersonal, collaborative, and communication skills (Falk, 2005; Frisk & Larson, 2011;

Gruenewald, 2003; Kahn 1997; Kuh, 2008; Tal & Morag, 2009; Zandvliet, 2012).

In the United Kingdom (UK), the predominant view is that EL is a critical aspect of

learning in environmental studies and sciences university programs (Maskall & Stokes, 2008).

This is demonstrated in the benchmark statement for earth sciences, environmental sciences, and

environmental studies (ES3) of the Quality Assurance Agency, responsible for ensuring

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academic standards: "It is impossible for students to develop a satisfactory understanding of ES3 without a significant exposure to field-based learning and teaching, and the related assessment" (Maskall & Stokes, 2008, p. 4).

Comprehensive understanding of environmental issues, such as the effects of anthropogenic activities on ecosystems, or action required at the individual or larger level, requires understanding of complex systems. For example, due to the complexity of connections, invisible dynamic processes with indirect causality and multi-level organization, ecosystems are an area that students normally have great difficulties understanding (Booth-Sweeney & Sterman, 2007; Duncan & Reiser, 2007; Eilam, 2002; Hmelo-Silver & Azevedo, 2006; Jacobson, 2001; Keynan et al., 2014; Wilensky & Resnick, 1999). Research has shown that EL is an effective approach in helping students develop a deeper understanding of environmental complexities, including understanding of an ecosystem (Ben-Zvi Assaraf & Orion, 2005; Keynan et al., 2014; Magntorn & Hellde´ n, 2007; Shepardson et al., 2007).

2.5 Research on EL in Environmental Programs

The findings of Keynan et al. (2014) point to the significance of EL in the development of systematic understanding of an ecosystem. The study investigated the effects of an EL program (labs and field trips in the local ecosystem, interspersed with learning activities) on the development of secondary school student's systems thinking skills in ecology (Keynan et al., 2014). They used the System Thinking Hierarchy (STH) model, developed by Ben-Zvi Assaraf & Orion (2005), which suggests that understanding a system can be categorized in order of advancement into levels: analyzing the components; synthesizing components; and implementation. The results, based on the distribution of the constructs in the STH levels prior and post-participation in the EL course, showed students' transition to higher levels of systems thinking skills (Keynan et al., 2014). The vast majority of students advanced to a higher level of the STH hierarchy, as well as acquired the ability to discern ecological occurrences (Keynan et al., 2014).

Despite the recognition that EL is one of the most effective modes of developing the competencies deemed essential in environmental programs by UNESCO as well as in the US, Australia, and the UK, it still does not have the prominent role in Canadian universities. This may be because extensive literature review shows a low number of publications investigating the significance of EL in postsecondary environmental programs, with majority coming from the US, UK and Australian universities, and none from Canada.

Moreover, none of these studies conveyed students' or graduates' perspectives on the role of EL in their environmental programs as a whole. Nevertheless, the research conducted so far

demonstrates consistent support for EL in environmental programs from the academic practitioners who teach experiential courses, participating students, external examiners, and employers (Mascall & Stokes, 2008). While these studies suggests that there are many significant benefits of EL in postsecondary environmental programs, further research is needed to identify the specific practices of EL which can be effectively incorporated into the program curriculum.

In addition to the previously discussed significance of EL in developing environmental stewardship, EL programs have been shown to motivate students in engaging at all levels of their ability (provided the opportunity to reflect) because they view direct experiences as personally meaningful (Basile 2000; Cummins and Snively 2000; Kenney et al. 2003; Smith and Williams 1999). Further, unconventional students, such as mature students, or those struggling in school, have shown increased engagement and motivation, as well as increased leadership skills when environmental EL is introduced in the curriculum (Cummins & Snively, 2000; Kenney et al., 2003; NEETF, 2000), which can potentially result in higher academic achievement (NEETF, 2005).

Collaborative and social skills, regarded as one of the most essential skills for environmental practitioners (Brand & Karvonen, 2007; Maskall & Stokes, 2008; Vincent & Focht, 2010) are developed more effectively in EL programs than in traditional classroom environment (Falk, 2005; Maskall & Stokes, 2008; Tal & Morag, 2009; Zandvliet, 2012). Participating in EL activities such as international and local travel courses, service learning courses, internships, and other field placements, increases chances of experiencing diversity

through contacts with different people and bringing one's values and beliefs into awareness. They engage students in their communities while investigating real-world environmental issues with various stakeholders (of differing values and beliefs), and expose them to the realities of conflicting goals, trade-offs, and uncertainties (Frisk & Larson, 2011; Tan, 2009). Consequently, the students have the opportunity to gain skills necessary to engage in democratic and collaborative decision-making that reflects multiple stakeholder interests (Frisk & Larson, 2011; Maskall & Stokes, 2008; Zandvliet, 2012).

A pioneering experiment in University of South Carolina by Kern and Carpenter (1984), which assessed the value of fieldwork in environmental science teaching, exemplifies the early research on the benefits of EL in postsecondary environmental education. Kern was teaching an introductory course in environmental science, when he observed low motivation on the course and stipulated that it may be related to classroom-only delivery, prompted by a question from one of the students: "Since this is Earth science, how come we aren't out there?" (Maskall & Stokes, 2008, p. 13). As a result, an alternative field-approach was designed so that approximately 70% of the course was conducted in the field (Kern & Carpenter, 1984). The results showed that students who learned in the field were more motivated, had more positive attitudes, and placed more value in their work than those that learned in the classroom (Kern & Carpenter, 1984; Maskall & Stokes, 2008). Kern and Carpenter (1986) followed up with a second study, which found that the students learning through fieldwork did better in tests that required them to apply more sophisticated cognitive skills including analysis and evaluation.

In the UK study, which spanned across five universities, Fuller, Gaskin, and Scott (2003) demonstrated that student perception of fieldwork in geography and environmental sciences was overwhelmingly positive. The most important benefits perceived by students were the experience of geographical reality, development of subject knowledge, development of technical as well as transferable (most notably working with others) skills (Fuller et al., 2003). Instructors claimed that fieldwork offered many direct benefits to student learning in the subjects studied, and they used it as a means to help students understand theory, to present reality into their teaching, and to teach subject-specific skills (Fuller et al., 2003; Maskall & Stokes, 2008). The researchers concluded that there was a broad agreement among instructors and students on the effectiveness of EL in geography and environmental sciences (Fuller et al., 2003; Maskall & Stokes, 2008).

In another UK study, which included 365 students from Geography, Earth and Environmental Science departments across seven universities, Boyle et al. (2007) showed that students' affective responses, such as feelings, attitudes, and motivation, improve as a result of participating in fieldwork. Elkins and Elkins demonstrated increased conceptual gain in students learning in the field compared to students learning in the classroom alone (Maskall & Stokes, 2008).

These studies back the belief that EL is an effective mode of learning in terms of developing cognitive skills (Ben-Zvi Assaraf & Orion, 2005; Falk, 2005; Kern & Carpenter, 1986; Tal & Morag, 2009; Zint et al., 2014) and that learning in the affective domain (experience relating to motivation and enjoyment) is an important part of the learning process (Boyle et al., 2007; Kern & Carpenter, 1986; Kimble, 2014; Kuh, 2008; Maskall & Stokes, 2008). Therefore,

upon engaging in EL activities, students are frequently found to develop a greater motivation to learn, deeper learning experiences, and increased pro-environmental behaviours (Ballantyne and Packer 1996; Cummins and Snively 2000; Kenney et al. 2003).

In the light of the inherent global nature of environmental issues, another reality for the graduates of environmental programs is that they are expected to have a global perspective on environmental sustainability. This calls for learning experiences that will help the graduates to develop competencies needed to professionally participate across national and cultural borders. International EL courses offer the potential for students to develop the capacity to gain real-world, deep, intuitive understandings of cross-cultural aspects related to environmental issues.

Australian researchers and environmental educators Thomas & Meehan (2010) exemplified this in the multidisciplinary research project in Vietnam (a semester long course), intended to expose undergraduate environment students to work in an international context. To explore whether the course was valuable in their professional lives, the researchers surveyed the 2002-2005 participants who had graduated from their environmental programs (Thomas & Meehan, 2010). The respondents clearly indicated that the course increased their confidence in working internationally, provided them with valuable skills relevant to their environmental careers, and directly helped them in obtaining employment (Thomas & Meehan, 2010). The specific skills stated were "teamwork; multidisciplinary understanding; project management skills; report writing; oral communication; research skills; analytical skills; self-reflection; and professional confidence (Thomas & Meehan, 2010, p. 99).

2.6 Employment in Environmental Profession: the Role of EL

Universities need to respond in new ways to ensure that environmental program graduates have the best chance of finding employment in their chosen profession, and hence be involved in environmental issues where they are able to impact environmental management or policy. It is important that graduates are employed in organizations in which they can apply their knowledge and skills to work on effective solutions to environmental issues. Thus, they must have the knowledge and skill set that is appealing to employers. Environmental graduates need an education which will allow them to participate in a leadership capacity in environmental management, and an education which will make them employable (AUCC, 2011; Orrell, 2004; Thomas, 2003).

Launched in 2005, Liberal Education and America's Promise (LEAP), a national initiative of the Association of American Colleges and Universities (AACU) commissioned an employer survey. The results showed that 63 percent of employers believe that "too many college graduates lack the skills they need to succeed in the global economy" (Schneider, 2008, p. 15) and that university degree needs to be more than a "forty courses and a major" in this time of rapid technological and organizational change with unpredictable career paths (Schneider, 2008, p. 13). Again, in a 2007 LEAP follow-up survey, employers gave graduates downright low marks (on a scale of one to ten) on the achievement of learning outcomes they considered necessary, most notably flexibility and ability to adapt, with global learning being the most noticeable area of underachievement (Schneider, 2008).

Environmental job searches on Canadian and the US career web sites show a remarkable variety of jobs that range from environmental enforcement specialists to sustainability coordinators to renewable energy managers. This ambiguity presents a challenge to environmental university programs, particularly environmental studies and environmental sciences programs, which are characterised by a very broad, interdisciplinary curriculum (Vincent & Focht, 2010).

Despite the fact that there is a steady growth in both environmental jobs and the number of environmental graduates from these interdisciplinary programs, only few studies (most from outside of Canada and the US) investigated programs' effectiveness in environmental career preparation (Vincent & Focht, 2010). The research suggests that environmental employers look for graduates with teamwork, decision-making, problem-solving, efficiency, analytical, critical thinking, interpersonal, communication, project management and leadership skills, in addition to the job-specific environmental knowledge (Maskall & Stokes, 2008; Thomas, 2003; Vincent & Focht, 2010; Watton & Truscott, 2006).

For example, Thomas (2003) investigated employers' expectations as they pertain to the skills and attributes of the environmental graduates in Melbourne, Australia. The results of the study were grouped in three categories and summarised as follows: a) Environmental skills: job-specific skills and knowledge; environmental awareness, policy skills; b) Personal traits: communication skills, leadership, enthusiasm, motivation, creativity; c) Transferable skills: teamwork, problem solving skills, interpersonal skills, efficiency, academic ability, independent and critical thinking, research and analysis ability, literacy, numeracy, computer skills,

project/time management (Thomas, 2003). Similarly, another Australian study of 600 environmental professionals found that communication, critical thinking, leadership, project management, teamwork, facilitation, and practical work experience are quoted most frequently as essential for an environmental career (Vincent & Focht, 2010).

Besides being a financial necessity for most people, employment is a social norm that presents an additional pressure on graduates. They are expected to find employment upon graduation. Developmental psychologists explain this within a framework of "readiness to learn" towards a "developmental task" (Knowles, 1980). People learn best those things that are essential for them to know in order to move to the next developmental phase. 'Each of these developmental tasks produces a "readiness to learn" which at its peak presents a "teachable moment"' (Knowles, 1980, p. 51). Adults tend to engage in learning in a performance-centered frame of mind, primarily in response to current life pressures, such as obtaining employment upon graduation (Knowles, 1980). They further suggest that if the teachable moment is to be seized, the curriculum must be arranged to accompany their developmental task (Knowles, 1980).

In addition to the growing financial burden of attending a university, students are becoming more aware of the increasingly competitive graduate labour market and the need to be employable (Kuh, 2008; Watton & Truscott, 2006). Consequently, they are more critical about their course selection in terms of weighing costs and benefits, and perceiving courses that will increase their employability as more beneficial (Atkins, 1999; Kuh, 2008; Watton & Truscott, 2006). Research undertaken in the US, Australia, and the UK shows that students who

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participated in EL in the form of either work-integrated learning or skill development experience during their studies reflected more positively on their university experience than those that did not participate (Orrell, 2004).

In the study by Crebert et al. (2004), graduates from the three Griffith University departments were surveyed to investigate their perspectives on the role of university learning, work-placement learning and post-graduate employment learning in the development of their transferable skills. The study also included focus group discussions with employers. The results indicated that although graduates acknowledged university's contribution in their transferable skill development, they considerably appreciated EL in the work-placement, and later in employment (Crebert et al., 2004). Collaboration, teamwork and sense of responsibility were perceived as the most important elements for effective learning (Crebert et al., 2004).

Additionally, stronger connection between the curriculum and the 'real world' was repeatedly cited by graduates as a way of developing transferable skills in the context of university learning (Crebert et al., 2004). Both employers and graduates felt strongly that industry involvement in the curriculum is valuable, as it exposes students to the 'real world' issues, and in terms of integrating transferable skill development into the curriculum, the input from both employers and graduates should be considered (Crebert et al., 2004).

Graduates' perceptions of EL in the work-placement in Crebert's study confirmed Orrell's (2001) conclusion, which contends that work-placement EL empowers students to "identify the relevance of theoretical concepts and ways of proceeding that have been learnt in their course of study, and thus encourage more intentional classroom learning; develop an awareness of

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workplace culture and appreciate the rapidly changing nature of work environment; evaluate and develop work-related personal attributes (diplomacy, cooperation, workplace etiquette, decision-making, people-skills and leadership); and establish career plans and strategies" (Orrell, 2001, p. 3).

Likewise, the UK study for the Higher Education Funding Council for England on the effect of employability skills teaching on the graduate employment outlook (it included 34 departments in eight UK universities and surveys of recent graduates and their supervisors) reports that workplace EL and/or employer involvement in the curriculum were found to positively impact graduates' immediate employment likelihood (Cranmer, 2006). Further, the researchers argue that, notwithstanding the best intentions of academics to help, these skills cannot be effectively developed in the classroom, and that resources would be better invested on employment-based EL and employer participation in courses (Cranmer, 2006).

The case for supporting graduate employability is an overwhelming one in terms of being backed by employers, students, and governments (Watton & Truscott, 2006). The link between EL and employability is apparent through previously described research. Students' and graduates' perceptions of EL in the existing research are very positive, and EL has shown to be effective in acquiring knowledge, skills, and subject understanding, in addition to being important in the development of personal attributes such as motivation, attitudes, and self-confidence (Boyle et al. 2007; Cantor, 1997; Kern & Carpenter, 1984; Maskall & Stokes, 2008; Watton & Truscott, 2006).

Chapter 3: Methods

3.0 Research Design

The purpose of this research was to explore students' and graduates' perspectives on the merits EL in undergraduate environmental programs through a series of questions (objectives). In order to address these research questions, the study utilized a qualitative research design, through a case study method and conducted an in-depth analysis of students' and graduates' perceptions of EL within ESS programs at the Department of Environment and Geography at the University of Manitoba. My selection of the ESS programs at the University of Manitoba stemmed from the personal experience. As a recent graduate from the Environmental Studies program, I trust that my familiarity with the program, with EL courses, and existing contacts served me well in multiple aspects of this research.

Although research points to a number of important benefits of EL in undergraduate environmental programs, extensive literature review shows a limited number of publications in this area. Furthermore, none of the studies addressed students' and graduates' perspectives on the role of EL in their undergraduate environmental programs as a whole. Therefore, I chose the qualitative research design due to the exploratory nature of the research and its focus on individual perceptions and experiences. Understanding of both the process (e.g. specific strategies or components of an EL course) and the outcome (e.g. effect on student's ability to deal with multiple stakeholders involved in environmental issues) is at the core of qualitative research (Merriam, 1998).

According to Creswell (2014), qualitative research takes place in the natural setting of the activity or event being studied, which aims to incorporate its multiple social aspects. Case study presents a valuable method in situations where phenomena being studied are dynamic and not easy to analyze or understand, as it can provide a closer look at an individual, a group of people, event, or an activity (Hird, 2003).

The researcher therefore strives to understand multiple perspectives (Lincoln & Guba, 1985) while paying attention to details, and interprets data in respect to the particulars of a case instead of generalizations (Creswell, 2014). Although case studies have been criticized for their lack of statistical generalisation and the possibility of selection bias, in exploratory studies such as this, they do provide more complete information on a particular case, and can provide an analytical (as opposed to statistical) generalisation (Hird, 2003).

3.1 Methods of Data Collection

I collected data for this research by conducting two focus groups (which took place in a private classroom on campus and were audio-recorded); a one-on-one interview; and e-mail surveys, using a semi-structured interview format with six students and eight graduates from the ESS programs in the Department of Environment and Geography at the University of Manitoba. One focus group included four ESS students, and the other four ESS graduates. As for participants who were unable to participate in the two focus groups, I conducted a one-on-one interview with one student and five e-mail surveys with four graduates and one student. The interview instruments consisted of two sets of semi-structured interviews with questions designed for ESS students and ESS graduates respectively (please see Appendix 1: Interview Schedule for ESS Students, and Appendix 2: Interview Schedule for ESS Graduates).

Student participants were recruited by my contacting of the ESS instructors, visits to senior-level ESS classes at the University of Manitoba's Department of Environment and Geography (with prior permission from the course instructors), followed by a snowball sampling approach. I contacted the initial alumni participants directly. Being a recent ESS graduate, I was able to use my existing contacts from the pool of former classmates and acquaintances. Following this initial contact, the snowball sampling approach was used to recruit further participants until saturation was reached. The fourth-year students were intentionally chosen because of my assumption that they would have an opportunity to reflect on the EL spanning over the entire program. ESS program graduates who are currently working in the variety of

environmental professions similarly brought valuable information because they had an opportunity to reflect on the merits of EL in the variety of 'real world' professional applications.

According to Dunn (2010) research interview is the most effective method to investigate diverse and complex opinions, motivations, and experiences. While interviews provide understanding of varying perspectives within a group of people, they can also reveal agreements on certain matters (Dunn, 2010). The semi-structured interviews were particularly useful for this study, as they allowed for an open response (in contrast to closed yes/no response options), where respondents shared the parts of their experience they deemed relevant, while the structure in the questions directed the conversation toward my study objectives. I found the focus groups to be quite productive, as participants engaged in deep discussions and bounced ideas off of each other, resulting in the emergence of many new themes that contributed to this research. The face-to-face nature of the focus group interviews was also of notable value to me, a novice researcher, as respondents were able to comment on the interview schedule, let me know if a question is unclear, or is on the wrong track, as well as reveal issues that I have not previously identified.

I prepared the interview schedules in an effort to overcome the main limitations of face-to-face interviews commonly found in the literature, while addressing my research question. For example, Foddy (1993) points to several sources of error in this type of data collection: respondents misunderstanding the intended meaning of the question; reluctance to acknowledge some behaviours or attitudes; inability to remember or understand due to uncomfortable interview environment; inconsistent questions from the part of the interviewer; and the order of questions.

Krueger & Casey (2009) suggest an interview that is ordered in a way which allows the conversation to naturally flow from general questions to more specific and important ones: opening; introductory; transition; key; and ending questions. The purpose of the opening question is to start the conversation. It is best if this question is easy to answer, is factual as opposed to attitudinal, and it does not start with sensitive questions that could make the person uncomfortable (Krueger & Casey, 2009). Introductory questions are designed to get participants to start thinking about their link with the topic and to communicate how they understand the issue that is being investigated (Krueger & Casey, 2009). Transition questions direct the conversation towards key questions that drive the study (and require the most attention in the analysis), while ending questions conclude the interview and allow participant to reflect on previous comments, which is critical to analysis (Krueger & Casey, 2009).

Based on this literature, I developed a consistent question design, with as clear and non-judgemental questions as I could, beginning with general and introductory questions, and gradually moved to transition, key and ending questions. The questions were formulated to address the study objectives:

1. Identify students' and graduates' perceptions of the role of EL within their programs, specifically:

   a) In understanding the complexities of environmental issues and in increasing conceptual gain and systems thinking skills

   b) In improving preparedness to deal with multiple and diverse stakeholders involved in environmental issues

c) In motivation to learn and engagement

d) In pro-environmental behaviours and values

e) In acquisition of generic, or transferable skills

f) In acquisition of technical skills and long-term knowledge retention

g) In obtaining employment in their field of study

h) Other benefits not mentioned

2. Identify which EL components in the program helped the graduates in dealing with the variety of 'real-world' situations related to an environmental profession, and what is missing

3. Provide students' and graduates' recommendations for future implementation of EL within undergraduate ESS programs

3.2 Ethical Considerations and Thesis Timeline

The research had a minimal risk of harming interview participants, university staff, and employers or dealing with sensitive issues, and I obtained the Research Ethics Board's (REB) approval prior to data collection. Nevertheless, participants (as well as employers and any university staff) remained anonymous throughout the research, and were notified that they could withdraw without ramification at any research stage (please see Appendix 3: Interview Informed Consent). Immediately upon the REB approval, which occurred in the late summer of 2015, I started recruiting ESS students and program graduates. The focus groups, the one-on-one interview, and on-line surveys took place during October and November of 2015.

3.3 Data Analysis

The verbatim data of focus group interviews was recorded via the audio-recorder, supported by researcher notes. Dunn (2010) suggests that these notes should include comments related to the interview practice, significant issues, unanticipated themes, participant gestures, and any other pertinent information. I transcribed interviews and read through the raw data to develop a sense of themes and patterns as the research was conducted. In addition to the spoken words, the transcripts include relevant comments from my notes, such as gesture descriptions or tone that may reveal underlying content.

As recommended by Creswell (2014) I analyzed the data for codes to develop themes grounded in my research objectives (which are for the most part based on existing literature and my student experiences), any unexpected themes, new themes that had conceptual value, and themes that pertained to a broader theoretical aspect. To determine validity, I sent detailed results

(which included participant quotes, themes, and summaries of these themes) back to all participants and encouraged them to provide feedback and let me know if they feel that the results are an accurate representation of what was said. The participant comments and feedback were quite positive in general, with few minor corrections that included misspelling of an acronym and a technical phrase related to a participant's work experience.

The data and participants were represented in the results and discussion of these themes, and interpreted to show how they corroborate or diverge from the current knowledge. I have previously identified my personal bias of being a student in support of EL in hope that this recognition will assist me in minimizing the bias in the way I perceived and interpreted research data, as well as to allow the reader to cast a critical eye over the results of this research. Additionally, in an effort to minimize this bias, I informed the participants throughout discussions that the purpose of the research is not to merely list all the merits of EL, or to say that EL should supersede the classroom learning. Rather, I told them, the focus is on the meaningful integration of the two, and on critical reflection of the EL within ESS.

Chapter 4: Results

The themes in this chapter closely follow those from the interview questions, which were structured to address the study objectives (stated in chapter 3):

- Participant profile and graduates' job description

- Types of EL undertaken

- The role of EL in understanding of environmental complexities

- The role of EL in preparedness to deal with diverse stakeholders

- EL in motivation to learn and pro-environmental behaviours

- EL and skill (transferable and technical) development

- EL and conceptual gain, systems-thinking, and long-term knowledge retention

- The role of EL in dealing with 'real-world' situations in environmental careers

- EL in helping ESS graduates obtain employment in environmental profession

- Graduates' and employers' input in the development of EL activities

- Additional recommendations for future implementation of EL within ESS programs

Moreover, the results include two new themes that emerged during discussions: 1) Relevance of EL to concepts taught in class and 2) EL activities participants perceived as meaningful. Based on the increased level of participant engagement, these new themes were significant to both students and graduates, and equally brought valuable insights to my study.

4.0 Participants

As outlined in the methods chapter, in addition to the individual on-line surveys of University of Manitoba's 4th-year ESS program students and ESS program graduates, two focus group interviews for each of the two participant groups were carried out. The following table summarizes participant profiles:

Table 4.1: Participant Profile

PARTICIPANTS	NUMBER OF PARTICIPANTS	IN CO-OP PROGRAM	ENVR. SCIENCES	ENVR. STUDIES
STUDENTS	6	4	4	2
GRADUATES	8	7 (3 quit Co-op)	5	3
TOTAL	14	11	9	5

As there was no notable difference observed in the answers between environmental sciences and environmental studies participants, there was no need to separate these two categories in the results section below. They are, however, shown separately in both tables with the purpose of demonstrating that both programs are represented in this research.

Table 4.2 shows ESS graduate participants' graduation year, program, and employment particulars:

Table 4.2: Graduate Participants' Job Description

PARTICIPANT	EMPLOYER'S PRIMARY BUSINESS	PARTICIPANT'S ROLE AND TASKS
ENVIRONMENTAL STUDIES (2014)	Agricultural private sector, livestock production and wholesale fresh meat exportation	Environmental Programs Coordinator: Reporting for daily operations, work with Envr. Compliance Specialist on water quality standards
ENVIRONMENTAL SCIENCES (2014)	Wildlife conservation and protection, International organization	Public Outreach Coordinator: Outreach activities for the Boreal and Caribou protection
ENVIRONMENTAL STUDIES (2011)	Oil and gas clean up: Decommissioning, Remediation, Reclamation	Decommissioning Project Manager: Oversee field work re. pipeline abandonments and facility decommissioning, liaison between field and clients

ENVIRONMENTAL SCIENCES (2009)	Licensing and Environmental Assessment – Transmission Division	Environmental Specialist: Lead, design and execute public engagement processes for environmental assessment and project processes
ENVIRONMENTAL STUDIES (2015)	Works in a non-environmental profession	Continuing studies: pursuing a degree in Education
ENVIRONMENTAL SCIENCES (2015)	Environmental education	Environmental Educator: Sustainability education to public and students. Pursuing master's (environment) degree
ENVIRONMENTAL SCIENCES (2005)	Environmental consulting and engineering company	Environmental Consultant: Site assessments, soil quality, remediation, water quality
ENVIRONMENTAL SCIENCES (2006)	Environmental consulting and engineering company	Environmental Consultant: Environmental site assessments, project management, stakeholder engagement. Pursuing master's (MNR) degree

4.1 Types of EL Undertaken by Participants

At the beginning of the interviews, the participants were told that EL, sometimes called hands-on learning, can take many forms and take place in travel courses, field trips, in the community, work-placements, in the lab, international learning opportunities and others, and then were asked about the types of EL they undertook in their ESS studies.

<u>Students</u>

All of the Co-op students mentioned their Co-op work placements. Most of them started with naming the Co-op experiences first, and some continued to elaborate on the personal benefits of these experiences:

"It (EL) all started with Co-op when they require you to get a mentor, and I got in touch with one of our professors who introduced me to Operation Wallacea through which I was able to go to Honduras to do my thesis there. It was a humongous help, it was a really good experience, field work". (Student 2)

"I am currently enrolled in the 3rd Co-op work placement. In these placements I have been able to develop and fine tune my soft skills and gain experience in key skills such as data entry and management, field work and project management". (Student 6)

"I am also a member of MEIA (Manitoba Environmental Industries Association), so that's been really helpful, going to all their conferences, getting a mentor, and finding out what they want. Through the Co-op program it's pretty much free of charge to become a MEIA member and network". (Student 4)

One of the two students who are not in the Co-op program started with his semester-long international student exchange EL experience to the university in Africa and talked about his memorable involvement in starting the first student-led newspaper that was passed off to local resident students and continued after he left. The first EL experience that the second student talked about and expanded upon was her summer research under a PhD student that allowed her to do bird studies in Manitoba.

Other student experiences that were listed but not elaborated on included personal volunteering (e.g. Wildlife Society meetings); volunteering as part of the departmental course (e.g. at FortWhyte Alive); MEIA student membership; being involved with different student groups; survival workshop; presentations from guest lecturers; 10-day summer travel course through the department; field trips; field courses; lab-work as part of the classes; tours inside and outside of the city; seminars; and one-on-one language and cultural exchange meetings with an international student as part of a departmental course (international topic).

Graduates

Although seven out of eight graduates were in the Co-op program, when asked the same question about the EL experiences during their ESS studies, the Co-op program was not the prevalent theme among graduates. Four graduates did mention their Co-op work placements, while two Co-op graduates did not mention the Co-op when naming their EL experiences. Furthermore, three graduates discontinued the Co-op program: one graduate discontinued after two terms because he was unable to obtain work placement through Co-op. The second discontinued due to liking the first work placement and wanted to continue working there long-

term. The third graduate, also unable to obtain work placement through the Co-op program, underscored the lack of employers represented in the program:

"I dropped out after the first year because I found that there was not such a lack of diversity, but a lack of companies and employers represented. They seemed to have their standard companies that they partnered with and if you didn't fit with any of them, you were pretty much out of luck. I also interviewed for a summer student position after my first year in the ESS program with the company I'm currently with. They weren't affiliated with the environmental program, so my work experience was not as easily transferable to the Co-op program. The terrible bottom line for me was that I thought the program was a waste of time for my situation. The amount of effort students had to put in to the Co-op program didn't guarantee you work in the end". (Graduate 8)

One graduate however, talked about her experience in the Co-op program as important in her ESS studies because it provided her with the opportunity to meet environmental employers early on and to develop the Co-op program with them:

"So the program was new, and they were trying to figure out the required courses and so on. I worked with practitioners who were already in the field, professionals who have been working for 20-30 years, and developed the program with them. I would get to shadow them as part of their projects as well, so that was really, really awesome. Because I got to see what they do and how they do it". (Graduate 2)

The EL experiences most frequently mentioned and elaborated on in the graduate group were specific departmental travel courses: Riding Mountain National Park; Banff National Park; Churchill (Conservation) and Clearwater (Sustainable Agriculture). Other types of EL

experiences mentioned were self-directed Environmental Assessment course for Environmental Assessment credit; field trips; Environmental Field Investigation courses; lab work as part of the course; volunteering; community work; and project courses including those with the Canadian International Development Agency (CIDA).

One of the graduates discussed her awareness of the merits of EL, which motivated her to pursue this type of learning during her studies:

"I took advantage of all courses and workshops that I could. I become a member of the MEIA Student Chapter and took part in the soil sampling workshop. I went to Wapusk as part of the Churchill field study. I completed some individual courses were I worked with communities for lung health (MB Lung Association); a company starting their health and safety program; Delta Marsh hunting weekend; wildlife workshop on campus; local conferences where I volunteered; I traveled to Japan as part of the Japan-Canada forum; I took part in the Global Citizen and Student Leadership on campus looking at international issues and the Millennium Goals. I also completed a student internship in Malawi. I had three different work terms: a Project Assistant (federal government) for 16 months, Junior Planner at an environmental consulting and engineering company, and a Project Assistant at CIDA". (Graduate 1)

4.2 The role of EL in Understanding of Environmental Complexities

All student and graduate participants agreed that EL activities during their ESS studies increased their understanding of the complexities of environmental issues, as well as offered specific examples:

"I feel that being immersed in one topic is a better way to fully understand all aspects of an issue than getting a brief overview of multiple topics. For example, my job right now (Co-op placement) requires me to test building materials for asbestos. I had learned briefly about asbestos in school but didn't get to fully understand where it is located in buildings, how to identify and deal with it and when it is hazardous until I was working with it". (Student 6)

"I worked in the Fisheries Assessment unit (Co-op placement). I really got to learn how my own enjoyment of fishing affected the lake, and then, take that to the effects of commercial fishing. Prior to that, I didn't realize how much that was (the effects of fishing)" (Student 4).

"You can learn all you want from a textbook about forest fires, but it's completely different being there (Co-op placement. It's so much more valuable as opposed to just looking at the pictures. The pictures don't tell you how it moves, how it spreads, and having to work there was very beneficial". (Student 3)

"So for me, it was a realization that every project, every situation is different. Every environmental issue is different, depending on the social setting that you are in. I did a Co-op term with an environmental engineering and consulting firm for which I ended up working after I graduated. But working there, that's when I realized that environmental issues are not as much

about the environment as they are about people. Trying to balance complex stakeholder interests

is one of the most complicated things that you have to do". (Graduate 2)

Two new themes emerged while discussing this topic: EL activities have to be relevant to concepts taught in class, and EL activities participants perceived as meaningful in understanding environmental complexities and issues. Although these two themes were intentionally discussed among students, they were evident among some graduates as well.

4.2.1 Relevance of EL to Concepts Taught in Class

Although all participants agreed that EL increased their understanding of environmental complexities and issues, most emphasized that it is not sufficient to have either EL or textbook learning alone, and that it is imperative to connect EL activities to concepts taught in the classroom. Furthermore, in the focus group discussion with students, all participants expressed that the meaningful balance between the two types of learning is achieved if classroom learning takes place prior to EL activities.

"I learned tons while I was working at the ELA (Experimental Lakes Area), and it was great, and it was one of the best work things I could have asked for. However, I'm doing the 'knowledging' now, which is the study of lakes, and it would have been really nice to have taken that course before going to ELA". (Student 2)

"The professor talks about all different concepts of conservation and restoration in class, but then has these field trips that support the concepts. Two weeks ago we went to Assiniboine Park, and we were out there, physically pulling out some invasive species. That was really cool,

because if you read about it, or hear about it, you don't have that type of learning experience. It's something that I'll remember now". (Student 1)

"The tours throughout the city, being able to see when you are focusing on sustainable building, it was cool to see these systems, to see what the end-product would look like, see all the pipes and things that would run through the building should you implement a certain system. But at the same time, you definitely need the knowledge in order to understand the importance of the subject and which system is which". (Student 3)

"What I'm saying is that just like you shouldn't have textbook learning, you shouldn't just have EL. You definitely need to put them together, find that meaningful balance". (Student 2)

When one of the students in the focus group exemplified this meaningful balance with the college learning, all other students agreed:

"Like College. Two years of college. I should have done that, and gotten my university degree after that. I could have been making money right now". (Student 4)

"If there was a science program in college for this, I'm pretty sure most of us would be there". (Student 2)

Some participants further explained that lack of this connection between EL activities and concepts taught in class will result in diminished learning:

"So, really, it does depend which type of EL you take, and what you take out of it. Because you can go through an EL class and get nothing out of it". (Graduate 3)

"I feel as though most of the available EL activities through required course work did a superficial job of increasing our understanding of complexities associated with environmental issues. There was little to no exposure to the issues discussed in class as well as little to no opportunity for to be involved with meaningful change. Any required volunteering and field trips seemed to be filler that would look good on a syllabus. Had there been some sort of contact information to organizations that dealt with local or international issues I think myself and other students would have acted on getting involved with these people or events". (Student 5)

*"*I *think it was imperative. With the Ethiopia project, CIDA had funded microdams to help with the irrigation. And unfortunately, there was a lack of geo-technical investigation, and when CIDA proceeded with the project; it ended up draining a lot of the area and escalating the problem. We (students) were brought in to identify early. So, how do you identify issues in a setting like that? My classroom learning was based on environmental legislation in Canada and how you do environmental assessment in Canada, and identify environmental issues in Canada". (Graduate 2)*

4.2.2 EL Activities Participants Perceived Meaningful

In addition to underscoring the importance of connecting EL activities to the concepts taught in class, participants perceived certain EL experiences as more meaningful than others, some even as having a life-long positive impact. Generally, international work or study experiences, EL experiences that immersed students with the locals, experiences where they had an active role (as opposed to that of a passive observer), and lasted longer were looked at more favourably:

"The meaningful activities included the summer course to the rural community where we got to discuss local food security issues with experienced farmers. This was valuable because we spent an extended period of time there and developed trusting relationships with the farmers we were learning from. The other meaningful EL experience for me was my exchange to West Africa, where I learnt a tremendous amount about West African culture, trade, history and political structure. This was by far the greatest learning experience of my undergraduate study and my life in general". (Student 5)

"I think that most important hands-on EL is really working, and doing something for more than a day, more than an hour. You need to continue to learn it for couple of weeks. It's just going to get engrained in your brain all the better than an hour, two hours at Fort Garry. The Co-op program should almost be, not mandatory, but I definitely think that's one of the best ways to learn". (Student 2)

"The time required to learn something is definitely shortened when you are out in the field, but at the same time you cannot just go out in the field and look at something, you actually have to pull

plants and do stuff. The EL, the quality of it definitely depends on the type of EL. So whether you

are seeing it, or whether you are being involved, actually working in the field". (Student 3)

4.3 The Role of EL in Preparedness to Deal with Diverse Stakeholders

When asked whether they believe that EL activities in their ESS studies improved their

preparedness to deal with the diverse stakeholders involved in environmental issues, both student

and graduate participants unequivocally conveyed their agreement that EL does play an

important role in this regard. However, the response to whether or not the EL activities in the

ESS program as a whole improved their preparedness to deal with diverse stakeholders depended

on the type of EL experiences they undertook.

Students

All students who had work placements through either the Co-op program or on their own,

expressed that these experiences have indeed improved their ability to deal with different

stakeholders. As put by one student:

"I completely agree. I deal with very diverse people every day in my Co-op job and have to

inform them about a complex environmental issue. I have strong confidence that this experience

will help me in my future careers when dealing with stakeholders". Student 6

Another student highlighted how having the opportunity to work at different

environmental positions exposed her to not only various stakeholders but also to various

perspectives:

"I have been working in government as well for the past 6 months. So, first seeing things from a science perspective, being a field scientist, knowing the concerns within that, such as funding issues, compared to being in government. There, I get to deal with different issues. It all exposed me to a range of different stakeholders. So I think that without that experience, you would only have theoretical idea of what it's like". Student 1

One of the unconventional students (Indigenous background) shared with the group how she benefited from the Co-op placements and attending environmental conferences:

"From going to all the conferences, they made me more comfortable. I'm a very shy, timid person who will sit back and watch. But going to all the conferences, my mentor has made me introduce myself to all these people, talk to people. That networking really helped because I talked to everyone, you know, the people of the environmental industry. And than with my Co-op jobs, I had to deal with some (laughs) very diverse stakeholders. I'm of Indigenous background, I'm Metis, and have no experience with that, so having to deal with people in a more professional setting and doing hands-on learning, it just helped, because you wouldn't get that in the classroom, other than talking to your prof and your peers." Student 4

On the other hand, a student who did not participate in the Co-op program, nor was able to secure environmental work experience otherwise, and whose EL experiences involved only those offered by the ESS program (such as field trips, travel courses and labs) did not believe that the EL activities improved his preparedness to deal with environmental stakeholders:

"No I don't believe there was. Aside from the odd guest presentation from a member of a local indigenous group or politician there was no involvement with these stakeholders. This is

troubling looking back on my studies because it would have been an excellent way for students to network with potential employment or internship opportunities". Student 5

Graduates

Likewise, graduates who did not obtain environmental work placements during their studies did not feel that EL activities in their ESS program helped prepare them to deal with diverse stakeholders in their environmental careers:

"I cannot say that I was (prepared). Interacting with stakeholders on a much closer basis would have been extremely beneficial to our environmental foundation. There should be much more of it. I could really see this working in the more theory based courses such as Quantitative Research Methods or even Technical Communications." Graduate 8

"Engagement with stakeholders, First Nations, members of the public was something we did not talk much about in university, whereas this is now my career. It is still considered a hindrance, or extra step or even a hassle by many to ask anyone what they would like to see or what they could contribute to the overall outcome of a project. It is slowly changing whereas in university this type of discussion was minimal at most". Graduate 6

Nevertheless, one graduate who did participate in several environmental Co-op work placements still did not feel that the ESS program has prepared her to deal with environmental stakeholders in her career:

Trying to balance complex stakeholder interests is one of the most complicated things that you have to do. It's not about algae; it's about all the users around that area that have conflicting

interests. How do you bring those interests together? And I think that was something that I did

not learn. Or I don't remember the format, maybe it was said, but I don't remember the emphasis

in the class on the human side in environmental issues. For me, that was a big realization when I

started working". Graduate 2

Four graduates who worked during their ESS studies in an environmental position

through the Co-op program in addition to being involved in other EL activities (i.e. project

courses) all felt confident that the EL activities improved their preparedness to deal with diverse

stakeholders:

"Yes. As a Co-op student I was immersed in government and learned the process of bidding

work, how to contact regulators and how the government system appeared. I also gained a

wide range of people in my network and felt comfortable approaching different parts when I

had questions related to specific projects. I took on individual projects that allowed me to start

working with residents and having conversations specific to the task at hand". Graduate 1

Environmental Assessment was discussed in more depth as an example of an EL

project course and due to the fact that several participants' careers extensively involved

environmental assessment and/or stakeholder engagement. It became evident that while some

graduates found EL activities in this course beneficial, these activities varied from year to

year and their effectiveness was inconsistent:

For example, we did a course called Environmental Assessment, and the whole course was

based around this big project. Each group would do a different project. Mine was a Brady

Resource Management Facility, so by either going there on my own, or looking up these

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different things on my own, we were able to pick out which stakeholders were affected. And it was not what you would typically think. You wouldn't think of people down the river, or the community that's however far away. You don't think of where and how it actually affects until you start doing it and working on it. It gives you that opportunity to see things without being told what to see. Like, you can be told a list of affected stakeholders, but some people might make more sense then others, and some people might be more affected than others. So EL gives you that opportunity to see it in a way that you wouldn't normally see it in a classroom". Graduate 3

"I took that course, Environmental Assessment course. It sounds a lot different than when I've taken it. I don't remember discussing stakeholders a whole lot. Maybe it did happen but just didn't hit home". Graduate 4

"I think I can relate to that, because when I took the EA course, we didn't talk about the stakeholders at all. And thinking back and reflecting on that course, I wish we have. I've talked to several people over the years in the program in the hope to implement this. I think that course would definitely benefit by having a workshop on how to design a stakeholder engagement program and do mock open houses. For your project, as a part of the lab, develop engagement tools, and how to develop a comment sheet, and a survey, and what to do with the data, how do you categorize your stakeholders. It's a huge discipline. Engagement itself is a discipline. So I think that course would benefit a lot more on stakeholder engagement". Graduate 2

4.4 EL: Motivation to Learn and Pro-Environmental Behaviours

While both students and graduates had many positive comments about the role of EL in their motivation to learn, there were fewer comments and concrete examples on the subject of EL and pro-environmental behaviours. Most specific behavioural changes were reported by student participants. For example:

"For pro-environmental behaviors, it's like, people are going to hear from me, you know, I'm going to nag people about things that I learned out in the field, outside of the classroom, because now I have more of a background to say if they ask "why should I do that?". I don't have to rely on the textbook knowledge that I half-know, half-forgot". Student 2

"I worked at Recycle Everywhere last summer, now if I am somewhere and there is no recycling bin I get a little annoyed and will bring the bottle/can I drank from home with me, or carry it around until I find a recycling bin. I won't just throw it in the garbage, which is closer and easier". Student 6

"In my earlier year classes, we had to do something that will benefit the environment, and I went out and picked up garbage on an ice-road. I thought after picking up 3 garbage bags of litter in only about a 1 km length, why would you want to do that? We are going to go fishing in that! That definitely made me think about it, and now my friends don't just toss anything out of a truck when I'm in it. Because I will make you pull over and pick it up". Student 4

One student pointed out that it was the classroom learning, not the EL that influenced his environmental behaviours and values:

"It (EL) hasn't really changed my environmental behaviors and values as much. I would say if anything, the courses have provided knowledge for me to back up why I want to do what I do. For example, unplugging things from the sockets when you are done with them. By doing one course, I found data on it, as well as dollar values on how much it's costing you to leave it in. So, it was the classroom course in this sense that has provided me that". Student 3

All but one participant offered insights on the significance of EL in increasing their level of interest, self-confidence, optimism, and passion when learning (examples illustrated in the table below). Moreover, many participants stated that EL has helped them realize what type of work they liked doing, and shaped the direction of their studies.

Table 4.3: Significance of EL in Motivation to Learn

Participant	What role, if any, did EL during your studies have in your motivation to learn (the level of interest, optimism, and passion when learning)?
Student 6	*"It has given me more confidence in myself that I can do it. I know that when I graduate I will be able to do the job that I get because I already have proven that to myself. This confidence has made me want to try harder and I enjoy school more now knowing that I am in fact in the right faculty and field."*
Student 1	*"I found that having EL and doing the research in the field helped me shape the courses that I decided to take after doing that. I actually sought-out courses that helped me develop particular skills where I would have something more to take out of it, rather than just picking out an easy course for an easy A. So, now I'm thinking more about learning as something to benefit me into the future, rather than just getting a degree and a piece of paper. And getting to be outside every single day, it almost felt worth it, felt like a work day. Reminding you that the work that we do is actually impacting something more than just ourselves".* *"Getting that experience while you are still a student is only going to help you. I think it also gives you a bit of a better idea in terms of what you want, by trying these different jobs and trying these different skills. Because you might try something and then just completely hate it. Then at least you are not totally shattered when you come to realize that that's not your dream job after all. I think it gives you a better idea of what you want as an individual, not necessarily what employers are looking for. If you start that kind of learning early enough, then you are not in too deep. You are not graduating and then realizing that you want to do something completely different".*
Student 2	*"EL has definitely reworked my course-load a couple of times. My first two years of undergrad study, I thought that I would do the wildlife management. And then I was able to go to Honduras and do my thesis there, and then I thought, my goodness! Now I want to do marine biology, because it was incredible there! And than I did EL at the ELA, and after I thought, damn it! Now do I want to do freshwater biology? You just fall in love with it, and it's hard to pick just one. So, you know, maybe this means I love everything, who knows".*

Student 4	*"Well, I definitely learn better hands on, so I found that having labs as a supplement to classes were beneficial to me. I did a lot better grade-wise and interest-wise in those classes where I was doing hands-on learning. Being able to get up and move around, feel things and do things, really created my passion for getting a job in the field. I took soil courses where I was working with the soil, and yeah, I want to go out and do that. I took a course doing remediation, doing site-assessments where I could actually do a site assessment; pick a business, which was really helpful. I felt I can do that, I excelled at it, so now I want to go do it. The classroom things, I am taking a course on environmental health, and thinking, this is really cool but, having the instructor just talk about the issues, I don't know, it was really fast, and I lost my passion for it".*
Graduate 8	*"I feel that EL greatly increased my awareness of the variety of topics and areas of study I was not aware of previously. EL allowed me to believe I can actually make a difference with my actions and choose options that will help me become a positive environmental steward. I also loved the research were we were told to go interact with people in the community and hear their story to better understand a situation".*
Graduate 7	*"EL opportunities played a significant role in enhancing my student experience. EL opportunities opened my eyes to a whole new world and made me understand the complexities associated with solving a problem".*
Graduate 1	*"EL allowed me to expand that knowledge and make informed decisions. I had an increased level of interest and was motivated to keep expanding my knowledge".*
Graduate 5	*"I would say that it (EL) shaped the direction my degree went actually. I took an environmental science course on a whim I guess, and ended up taking field investigations EL course. It interested me, and I got into all kinds of networking opportunities, such as the Wildlife Society, Nature Manitoba, and others. I got involved with different organizations that I volunteered with for a long time, and I'm still involved with that. Because of those courses and how exciting, and you know, just the networking itself was a huge draw for me. That encouraged me to continue taking more courses that had EL. It all kind of stemmed around the first field investigations course I took. And that is the reason why I ended up with this degree I think".*

Graduate 3	*"Projects motivate me. When I'm able to go out and do a project on my own, gather the information and present it that usually is a motivation for me to learn more. It generates my own interest in it and I can shape it on my own. There is a course that's thought in the summer, it's called Building a Community Commons, and you build a garden. So first year, they built this garden, and every year they do it, they add to it. Through this EL you are able to see the impact that this 3-week course has made on a community and it makes you understand that one small change can actually impact the community for the better. But that course isn't in Environment. This was a Sociology class".*
Graduate 4	*"Yes, I think that EL increased my interest and passion when learning because you can see how it is applied in real life rather than just ideas in the class. You can see how you can have a job and work, which increases your motivation and interest. But I wonder now if you were in a job placement that you didn't like and how that would totally de-motivate you and make you change direction".*
Graduate 5	*" I found to a certain degree that was true for me, because I really didn't like the lab work I was doing at DFO, and that for me, it's not that I didn't like the work I was doing, I liked the research part of it and the results."..." But it made me realize that I didn't want to do lab work for the rest of my life".*
Graduate 3	*"It always depends on the type of EL you are doing. You weren't motivated by lab work, right? But some people might be motivated by that type of EL. It just depends on the type of EL you are doing and what that means to you".*

4.5 EL and Skill Development

Next, students and graduates were asked to reflect on the significance of EL in the development of transferable (e.g. communication, collaboration, cooperation, teamwork, leadership, social skills, decision-making, problem-solving, critical thinking) and technical skills. The difference between student and graduate participant responses was notable when they were discussing the role of EL in the development of their transferable skills. As for the technical skills however, both groups were unanimous in the agreement that EL played a significant role in the development of their technical skills:

"And technical skills, I only got those from hands-on learning. My sampling work, my lab-work, my GIS, field safety. A lot of personal awareness when I'm in the field. I have to make sure that when I'm out there and working by myself I'm safe and aware of my surroundings. We even had bear attacks on the island when I was working with the fish, so I had to learn how to make sure that my colleagues are ok, learn my surroundings and know where everyone is" Student 4

"Taking the Churchill course prepared me for the field work I am working on now. The MEIA sampling workshop prepared me for soil sampling in a coop term". Graduate 1

Though they recognized the importance of EL in the development of their technical skills, several student and graduate participants commented and provided recommendations on the efficacy of courses with labs:

"For courses like GIS, remote sensing, ecology, I found that those you just have to learn in the lab. You cannot learn that by reading. Having said that, I also found that a lot of the labs were

just following the recipe, rather than teaching you how to explore and figure things out for yourself". Student 1

"You can't learn that stuff in a classroom in a sense; be told about it. You have to actually do it. I think you have to be absorbed in your work. Just passing through your labs doesn't really give you time to understand it and do it. I guess that pertains to any learning, weather it's a lab, fieldwork, or a lecture, if you don't have the time to understand it, it's pointless". Student 3

"It would be so much more helpful to put all labs in a real world context, filled with student interaction with their environment. I feel that an EL style would make a huge difference in understanding foundational concepts while completing course work. I gained so many practical skills going out and collecting the information and genuine answers from people by listening to them instead of reading the example in a textbook without context". Graduate 8

Students: EL and Transferable Skill Development

While almost all graduates' reflections included a strong agreement that EL was important in the development of transferable skills (and provided specific examples), students were divided in their views on which types of learning experiences attributed to the development of these skills. For example, three students described how EL helped them develop following skills: communication, collaboration, cooperation, teamwork, leadership, social skills, decision-making, problem-solving, and critical thinking:

" From my experience, being outside ones comfort zone and forced, so to speak, with other students to accomplish a common goal was the most significant factor in the development of

communication, collaboration, cooperation, teamwork, leadership, social skills, decision-making, problem-solving, and critical thinking. For example, during discussion periods in my 10-day travel course we were provided a platform to ask questions and talk about issues that we had just discussed with local farmers. I felt that people actually cared and were interested in talking about such issues, and it was a far more passionate discussion than anything inside a university classroom because we were in the subject environment". Student 5

"Well, hands-on learning is basically how I developed all those skills, especially communication. I don't talk much in class because it is intimidating, I would just sit there and listen. If I didn't have hands-on learning through Co-op, work placements and lab work, I would probably be a hermit somewhere, and not very sociable." Student 4

"And then, emailing people (Co-op work placement) was really good for communication and collaboration. You have to actually email people to learn that, you can't just be told about it. The problem solving, yes, definitely. I definitely found that my job, and being involved with the student council, problem solving, talking to a bunch of people, putting plans to place, thinking about something before you do it. Weather or not it works out that way, than having to do it a different way and on the fly, definitely very beneficial for understanding what to expect when it becomes more important than a student council". Student 3

One student attributed classroom learning to the development of transferable skills, in addition to student group-work. She also pointed out that many work placements do not allow students to take on a leadership role:

"I actually think quite a few of these skills come from traditional classroom learning and report-writing, group projects, and stuff like that. As far as leadership, cooperation and collaboration skills, I found actually that a lot of that comes from being involved with student groups, working with peers. I found a lot of the times with job placements, because you are a student, your role is different. You are not going to be taking a strong leadership or a management role. You are going to be one of the people working on that project. So you learn collaboration skills, but maybe not necessarily leadership". Student 1

On the contrary, another student mentioned that student group-work in a classroom is not a meaningful type of learning for her because it generally lacks the student interest:

"Even when there was group-work, people were just like 'ok, let's get this done', and not 'let's actually work on this, and make it good, make it great'. We don't want to change the world, just want a good mark and carry on". Student 4

Graduates: EL and Transferable Skill Development

Unlike student participants, all of the graduates were in agreement that EL (i.e. student jobs, project courses, labs, Co-op program events and networking, travel courses, workshops, and tours) had a significant impact on the development of their transferable skills. For example:

"The piece about communication and collaboration, these are important words, and I think these are critical to being in the field and working. For example communication, you would assume that you can give someone a call and that should be ok. And then realize after, no; that person actually prefers email, or they prefer that we send them a letter, and so on. Every person on the

team, of say 6 people, might have 6 different communication styles. Before your first work

placement, the only emails that you sent were to your classmates and your professors. And that's

all that you were getting. And then, all of a sudden, the stakes are high. Are you going to send it

to the wrong person? How is the tone? Is this professional enough? So yes, I would say it (EL)

contributed a fair bit". Graduate 2

The same graduate mentioned that while she has these reflections now, as a working

environmental professional, she was not aware of them while in the program:

"So I'm trying to think if I had those reflections when I did my Co-op terms or... I don't think I

thought about it that much, I think that I was just enjoying the experience and learning what I

was learning. But now that I think about it, absolutely". Graduate 2

Another graduate talked about different types of EL she undertook during her ESS

studies and the effects they had on her learning and skill development:

"I was fortunate to learn a lot and be involved in many different events. Skills I learned are

endless. I gained confidence in my role through hosting an environmental career fair. I learned

how to approach businesses and future mentors, while making decisions that best supported the

event. I developed a strong network in the environmental community in Manitoba due to my

experience and exposure to MEIA, and green builders, and ECO Canada. I was part of events

and put in situations where I could practice my skills and develop new ones. Skills I developed

through EL were leadership, communication, collaboration, teamwork and some analytical skills

and understanding of what happens after the field work. Tours of the labs helped understand soil

analytical process. EL provided opportunities to develop my skills, but also to use them and refine them in different situations". Graduate 1

4.6 EL and Conceptual Gain, Systems Thinking, and Long-Term Knowledge Retention

All students and all graduate participants thought that EL activities they took part in during their ESS program were effective in long-term knowledge retention:

" I find that, when say, studying for an exam, if there are concepts that you can connect to something that you have already done, then I find it far easier to learn. Cause professors will give you examples, but they may not necessarily be the examples that you can relate to. But then, if you are able to relate them to your own experiences, it's easier to learn and easier to remember". Student 1

"I found that hands-on learning was definitely a lot more effective in long term knowledge retention as opposed to reading and memorizing for an exam. As soon as the exam was over, the things that I memorized, it was just gone, it didn't matter. So come mid-term and exam time, I would have to re-read everything, and write out my notes again just to try to re-learn it, whereas if it was something that I did in a lab, being able to manipulate it, I'd remember it better". Student 4

"When you are sitting in lecture, you are not really paying as much attention, as you are when you are trying to do it on your own. You are teaching your self essentially. In a lecture setting you are learning for the exam, you are going to learn it, you are going to remember it, you are going to pass the exam, and it's gone. You passed the exam and that's all that matters. Whereas

EL, you go off, you are doing a project where you are doing something in the community and it still matters after you leave. It's still going to be there. It's easier to learn and it's easier to keep that knowledge in your head". Graduate 3

"EL learning was a terrific way to retain information and specific concepts. Experiencing a theory or idea in person and having it leave an impression on you only adds to the way you will remember and recall it for a later date". Graduate 8

When discussing the topic of the effectiveness of EL in conceptual gain and systems thinking skills (such as analyzing, synthesizing, applying knowledge, and developing new ways of thinking when responding to new situations), most participants recalled specific experiences where EL has played a role in increasing these skills:

"I believe that El did increase these skills. The best example from my experiences would be my student exchange when I was in a completely new environment and culture and had to solve a ton of small problems on my own. Problems like how to apply for a course, where my classroom was, how the final grades were marked, where to eat without getting sick, etc. This was by far the best long-term knowledge retention experience as well, due to everything being so new. Similar knowledge retention was found in my 10-day travel summer course. I think that being in the setting that you're learning about is crucial". Student 5

"Yes I do. In my job (Co-op), my co-worker (also a student) and I work independently from our supervisor. We are forced to make decisions and use all of these skills every day. While I feel I had a good grasp on them before I started working, I for sure have greatly improved on them by real life trial-and-error". Student 6

"Through EL you learn how to apply that knowledge that you already have, but it's starting to give you different ways to do that. I volunteered for MEIA, so I run a lot of their programs, and now I'm thinking how I can take what I learned through EL and pass that on to other students. I now realize the importance of networking, and now I'm taking that knowledge and giving students opportunities to learn what I learned. We do our career Fair every year. And, we used to do these things for break-out sessions where we would have different speakers, and they would give a little presentation. But not a lot of people were going to them, not a lot of people were getting enough out of them. So rather then continuing to do that, it gave me an opportunity to change it. So now rather than doing break-out sessions, we do workshops". Graduate 3

This statement has sparked new insights and recommendations among graduate participants regarding the value of networking for ESS students:

"I'd like to touch on that. You were saying, different ways to do it and different opportunities to network. I volunteered for the Wildlife Society and I was the student rep for a while. One of the things that we did, and I think that MEIA does what they call speed-mentoring, we called it couch-sessions, where you go around and you have opportunity to discuss with a professional. I think that is huge. TO GRADUATE 2: You were talking about job shadowing, and I think that would be a really cool opportunity. But I think this is like a mini portion, a way to get a bunch of different professionals, you know" Graduate 5

TO GRADUATE 5: *"It was so valuable. I would not have a job without that. If it weren't for those practitioners who were willing to give me the time, and for the Co-op program to work with me, and to say 'you know you might be able to get some extra credit out of this'. So it was a*

very strong relationship between myself, the faculty, and the practitioners in the field to be able to do that". Graduate 2

"Also, through volunteering with MEIA, you get to see that not every student will network the same way. Not everyone is comfortable just walking up to someone and introducing themselves. So, giving them a whole bunch of different opportunities to network. Like speed-mentoring, which is just like speed-dating, you sit in the chair and you can ask as many questions as you want. You have to ask professional questions. It kind of forces you to ask questions, because you are stuck at this table with this person, right? And then we have the career fair where we have booths and you can go up to somebody and introduce yourself. And, as well with conferences, they have this thing called "mentor for a day" where students can go to a conference and they say what their focus area is and the MEIA will pair them with somebody. So people with similar interests go off and talk. It's about recognizing that all students are different, all situations are different". Graduate 3

Similar to the discussion that addressed the role of EL in understanding of environmental complexities and issues, the topic of relevance of EL to concepts taught in class emerged among both participant groups in this discussion as well:

"I found that hands-on learning really drove home what I learned in lectures. I found things easier to learn by doing them instead of just reading it". Student 4

"I found that EL needed a number of integrated concepts to work through questions and activities. For example, through a course Environmental Management Systems – we went to Spruce Woods National Park to have a learning weekend in nature. In two days, we were

exposed to forest fire management and techniques, water conservation and marine health and marsh wildlife habitats. We were asked our opinions in each situation and what we thought the best practices were and why. We were encouraged to think critically and apply the sustainability approach of 'People, Planet, Profit' into consideration – truly fascinating". Graduate 8

"EL should complement classroom knowledge. There has to be a balance of both the settings". Graduate 7

4.7 Graduates: Dealing with 'Real-World' Situations in Environmental Careers: The Role of EL

The graduate participants were asked if and which EL activities in their ESS program helped them in their environmental careers in terms of dealing with the variety of 'real-world' situations. All participants confirmed that EL in their programs did play an important role in helping them deal with these situations, while five of them recalled specific EL activities. For example:

"The two international activities I completed helped adjust to the diversity in the work place. I also attended a generational conference and gained an understanding how different generations work and interact. At PWGSC I learned about projects and what was needed to making them run smoothly. Networking has helped make dealing with clients or uncomfortable situations easier". Graduate 1

"We went on a tour of the Manitoba Hydro building and heard about all the green building features, then had the opportunity to sit down with the Chief Engineer of the company who

worked on designing the technical features of the building. Many of these features I have applied

to my everyday life in the way I conserve energy at work". Graduate 8

4.8 EL in Helping ESS Graduates Obtain Employment in Environmental Profession

The student participants were asked whether they believe that EL in ESS programs is

important in helping graduates obtain employment in their field of study, and what changes (if

any) they recommend in improving the effectiveness of EL in graduate employment prospects.

The graduate participants were asked to explain in what way did EL during their ESS studies

help them obtain employment in an environmental profession, and if not, why do they think that

EL did not help them.

<u>*Students*</u>

All students answered that EL in ESS programs is important in helping graduates obtain

employment in their field of study. For example:

"I feel that EL in ESS programs is very important to helping graduates obtain employment

because it helps create lasting knowledge and skills required in the workforce". Student 5

This topic was marked by a series of longer than usual discussions revolving around

newly emerged themes, and resulted in multiple recommendations. All new themes and

recommendations and/or concerns are illustrated in the table below.

Table 4.4: New Themes/ Issues and Associated Recommendations

NEW THEMES/ ISSUES	RECOMMENDATION/ CONCERN
ESS program/ focus areas too broad. Co-op disjointed from focus areas	*"I felt that the ESS program at the U of M was very broad and that near the final year it should be narrowed down further then just Sustainable Development or Wildlife Management". Student 5*
	"There are a lot of focus areas in ESS, but very few Co-op jobs pertain. Being in sustainable building, there was not one single job posting for me. It seems that architecture gets more of those. So, more job postings that pertain to all the focus areas". Student 3
	"We are all in ESS, but the thing is there are people that I never had a class with because there are dozen different focus areas. They are very broad. In my eyes, bordering too broad. For example, trying to get one speaker to come in that would pertain to all focus areas, is darn near impossible". Student 3
	"I'm going into Remediation and Mining, and that's not even the focus area. I'm on my own. I'm told to fill out the white boxes. I'm drawing from all the other faculties that are basically more relevant then ESS. I'm doing a lot of soil courses, geology courses, even chemistry. I'm in ESS, I want those courses here!" Student 4
	"I had to do that too. The problem with that is that you go to physics, you go to chemistry, you go to soil and they are working on the same university schedule. They'll be at the same time so you can't go to both of them. And then you have to spend another year because they are only offered at winter! So if we could somehow streamline that?" Student 2
	"And for ES students, you can almost put us into different departments that already exist. You can put us into biology, you can put us into ecology, you can put us into architecture. It's cool that we are all under the same umbrella with a very similar mindset, but at the same time, what makes it cool is what makes it frustrating too". Student 3

	"Like working in the Ministry of Natural Resources and Forestry. 80% of them are biologists, not in environmental anything. Except for the techs that went to the college programs. But everyone above them that does all the lab work, they are all biologists. I'm going to be stuck in a tech position with my university degree because they hire people with biology degrees". Student 4
EL not relevant to concepts studied. Lack of courses with EL that pertains to concepts in class	*"If EL programs could have outreach resources to organizations based on the specific set of issues that were discussed in class. For example, if food security were discussed in an EL setting then there should be resources to contact organizations that deal with these issues and are willing to accept interns/ employees". Student 5*
	"I definitely think that Co-op should be mandatory, especially for our degree, because I found that in ESS programs there are not really many courses that offer hands-on learning in conjunction with it. All my hands-on courses, other than Co-op, have been in other faculties. Well, the ones I found effective anyway". Student 4
	"I would recommend having a course on field sampling, where you have to write a report, but also get to do different sampling like trees, leafs, water, fish, and do all different sampling tasks that we are going to end up doing anyway". Student 4
Gap between the environmental industry and academia	*"Greater avenues to get involved in the community through EL as it would be a fantastic way for organizations to meet students and for students to have an idea of how to focus their efforts to get a job. There were often names of organizations listed in class but rarely did they have room for any interns or employees". Student 5*
	"We are saying 'Professionals! You have to get more connected'. But I think that's going to come off as bring them more to class. I don't really want a class where majority of it is me listening to someone talk about their job. I don't think that's where this needs to go to get better. Maybe more connection outside of the classroom?" Student 2
Department of Geology as a positive example in bridging the gap	*"I know Geology is not ESS, but they are astounding in that area. Connecting professors, industry, and students together and offering various events under various umbrellas. They are all about getting the job skills and networking. ESS, compared to Geology, is just a little kid in a sandbox". Student 3*

	" They didn't even need Co-op to get all that experience, whereas we need Co-op in order to do that and networking" Student 4
	"For example, they have large student groups and events that hook students up with the industry. Professors and professionals give talks to understand what the jobs are all about with different employers. They have been doing it for so long that it is very well worked out". Student 3
	"They have their own like MEIA within the faculty, whereas our faculty is separate from MEIA. For them, everything is combined: industry, university, and the profs. I feel that with us, MEIA is so separate from us, and it is our industry". Student 4
Lack of preparation for life after graduation	*"Helping students prep for life after graduation – like how to find permanent positions, not just student ones". Student 6*
Large class sizes limit meaningful EL and connection with instructors/ peers	*"Not everybody will get a chance to get their hands dirty. So just limit the number. Even in regular lectures, you don't get that connection with your professor when there are another 40-50 people with you in the class. This one professor introduces himself to me every time, and I am like 'yeah, I've known you for 4 years'". Student 1*

The discussion questions for graduate participants were: Did EL activities in your ESS program help you obtain employment in your area of study? If yes, please explain in what way; if not, why do you think it did not help you? The two graduates who discontinued the Co-op program after not being able to secure Co-op placements, and a graduate who was not in the Co-op, answered 'no' to this question with following explanations:

"Unfortunately, it didn't. I got my job because I volunteered for the organization. Not all focus areas are equally represented in the employment sector. There are lots of jobs in Conservation and Wildlife but very few in focus areas like Sustainable development; Policy and Law; Sustainable building; and Northern Studies" Graduate 7

"Very few job opportunities existed at graduation. At the time, an entry-level position at a consulting firm was offered. Most work was focused on socio-economic baseline evaluations and assessment that was very different than anything previously studied. In addition, public engagement was not something I remember learning in any capacity throughout my studies. I was brought into engagement to assist as a consultant and the hands on learning I had with my employer provided more opportunity to apply for other work". Graduate 6

"I gained employment by having the specific title of 'environmental student' at a post-secondary institution. It was assumed by the employer that I would be learning specific skills in university to help me with decision making and transferable office skills within a business setting". Graduate 8

The same participant however, did mention that once she obtained environmental employment, EL activities during her studies helped her adjust to the professional role:

"EL activities in the program helped with being willing to try new things in industry. Since I was exposed to so many different ideas and locations on field trips and speaking with new people, it was easier to integrate into a professional setting". Graduate 8

The graduate who discontinued the Co-op program after the first work placement discussed how it was environmental student jobs she was able to secure on her own due to being exposed to EL in her program that helped her with environmental career after graduation:

"Yes, but it wasn't through the Co-op. I worked for Manitoba Conservation and a couple of different positions. I just applied for the positions, but not through school or anything. But the skills that I learned through school, like those field investigations, have definitely allowed me to get those positions. My jobs at DFO or MB Conservation, I probably wouldn't have got if I hadn't had the experiences through EL. And even volunteer positions. I wouldn't have been a student rep for the Wildlife Society if it wasn't for some of the experiences I had through field investigations courses mainly". Graduate 5

On the contrary, all four graduate participants who completed the Co-op program and the associated work terms stated that they obtained their environmental jobs due to participating in the Co-op program. As put by these two graduates:

"I did my first Co-op term with (company name), and my second Co-op term was that Ethiopia project. The third term was back at (company name). And you know I ended up working with

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them right after I graduated. I would not have worked without the Co-op option in the program".

Graduate 2

"Same for me, it definitely helped in obtaining employment. At the very least, confidence. Starting off as a quiet university student, to now I'm holding three jobs that relate to my program. It gave me the skills and the confidence to put those skills on my resume and say 'I can do this job'. And I'm able to honestly say that. All the things that I have done in school through Co-op". Graduate 3

4.9 Graduates' and Employers' Input in the Development of EL Activities

Next, both participant groups were presented with the following statement and a question: "The results of surveys of environmental employers and environmental graduates in the US, Australia, and UK suggest that both graduates' and employers' input should be solicited when developing EL activities within the ESS curriculum. They argue that this will make the connection between the curriculum and the 'real world' stronger, and effectively integrate skill development into the program. What is your perspective regarding this argument"? Strong agreement was evident among all student participants and six out of eight graduate participants (the two graduates responded through an on-line survey and omitted this question). For example:

"I completely agree. No one knows the pros and cons of a system better than someone who has gone through it. And by listening to employers recommendations you increase the odds of students' success in and after the program". Student 6

" I am in agreement with this argument because students learn so much in their undergraduate studies and gain a huge amount of passion but, upon graduating they can feel useless with a lack of connect between their faculty and real world jobs. In my opinion there needs to be greater collaboration between employers and schools, especially within the often small network of the environmental sector, to better equip students for employment once they graduate. It would be very advantageous for students to have a sense of direction during their studies". Student 5

"I think for sure that would be a great idea because a lot of the time you can hear people when they graduate 'ok, what job am I going to get? What do I need for this job?' If that was something we knew in our 2nd or 3rd year, we could already start picking our courses; know what they are looking for. I definitely think that you can hear this from any student 'why did I take that course?' I think you could eliminate those courses, because the industry or employers have said that we really don't need to be taking these abstract courses". Student 2

"As a public engagement specialist, having any outsider look in and by having an open forum for graduates, students, employers, etc. to comment or provide feedback into the development of a curriculum would greatly benefit all involved". Graduate 6

"I'm actually surprized that we don't do that in Canada. For me, that's a no brainer. How would university know if they are producing good workers, good employees, unless they talk to employers?" Graduate 2

Two graduates highlighted that a formal mechanism for soliciting graduates' and employers' input when developing EL activities within the ESS curriculum is essential in addressing the gap between the academia and practice:

"I feel like this is essential and closing the gap (because there is quite a gap at the moment) with academics and real world knowledge is paramount for the success of graduates. This may work better if industry and the university build stronger partnerships to promote this idea. This sounds like a great idea for decreasing redundancy and irrelevant course material and increasing essential skills that industry is looking for". Graduate 8

"I've been doing EA's for 10 years and just didn't have the time to read the articles, read the journals, and what's being said. And this one time I said, ok I'm going to be responsible and read. And as I started reading, I just got more and more angry about what's being written about EA and how it should be done. And I'm thinking, have you guys ever really done one (EA)? Do you really know the real challenges? But then, it was a good reflection for me: If they don't know, if they have never practiced and just write about it, and I just practice and never write about it, there is a disconnect. I think this (pointing to all participants) would be a great way to bridge the gap there. Both researchers and practitioners have to learn from each other, and this would be a great way to do that. The students would benefit so much, they would have access to people who are there, and those networks, getting some insight". Graduate 2

One student emphasized the importance of having recent ESS program graduates provide input in developing EL activities, as opposed to someone who graduated 10-15 years ago:

"I would agree with that, I think it would be very beneficial, obviously, for both graduates and employers to take each other's hand in developing EL activities. By having graduates do it, and I'm going to mention new graduates, not graduates from the program from 10-15 years ago. People who have recently graduated will have similar mindset to the people who are in the

program right now. By having them involved you would find out what they find interesting, what they find stimulating. They would be able to remember. And having employers there as well would help keep it very relevant to a workplace". Student 3

Another student expressed that this input is of particular importance in the environmental sector, given the constant changes in both research and practice:

"With the ESS the things are changing so much. With the new research coming out all the time. I think that our program is one of the fastest changing ones, whereas geology is, well the rock is going to be a rock. But when you are doing wildlife and stuff like that, that is changing constantly with hunting, fishing, overpopulation, things dying, it changes so fast. Management practices change. It's hard when they are teaching us something and then it's completely irrelevant when we are out in the field". Student 4

While recognizing that the input from practitioners is important, a graduate participant felt that practitioners are not the best choice as instructors, due to their time commitments to their 'real job' and too much emphasis on the 'real world', which inhibits new ideas and creativity:

"I have found that in classes where the instructor has another career and is engaged in other things, they are usually not very accessible. Their focus is usually more on their real job than on the students. They sometimes dismiss student's ideas because it's not feasible or real-world enough. I think it's good to make students realize that you don't have an unlimited amount of funds, or time, or whatever the constraint should be. But, I also think that it's important for students to think outside of the box and bring in new ideas. I think that's the purpose of the classroom work versus the real work. To think about all the possibilities and try to figure out

things that might not necessarily be working in the industry. In industry, you are supposed to be bringing in new ideas, but if you are just sticking with the norm, you won't have those fresh ideas". Graduate 5

One graduate compared the gap between university and practice to the gap she experienced when transitioning from high school to university, and stressed the importance of having a connection between different levels of education and life:

"You graduate high school, you go to university and the next thing is real world. So you have these transition stages. I wish that when I graduated high school universities and high schools were more connected as well"..." I went from straight A +'s to C's, if I was lucky. If my teachers had prepared me in high school for the types of learning and the beginning of university, I feel I would have done better, and I also feel that some of the people I had graduated high school with would have stuck more to university. Same as this, when you are going to the real-world, you have to be able to have that input from the next level, right? Where they might want something from you that you haven't gotten at university, but the faculty doesn't know that. They don't know that you are missing these skills that employers are finding valuable. And the students don't know that because they are in this in-between stage. So I think that connection between different levels of education and life is important". Graduate 3

As in previous discussions, the subject of college-university comparison emerged once again among graduates, generating comments from almost all present in the focus group:

"I think that's the main difference, or a problem you can say, between college and university. At Red River, they are placed with someone in their field and then they have those connections.

They have 99% job rate right out of school because they have such amazing relationships with employers. It seems that universities don't have those connections with employers". Graduate 5

"The Co-op program kind of represents that connection between the university and the real world jobs"... "There are a lot of people who don't have a job throughout university, which is fine, but they go through it, they get straight A's in the program, they graduate without having made a single connection, and then they can't find a job. I think Co-op is what kind of opened my eyes. You may have the best GPA in the whole world, but you may be beat out of your dream job by somebody who went out there". Graduate 3

"I think it's unfair to students who come into program thinking, these 4 years will be for me to build my career. And then not having those options available to them, or perhaps if you do have the options, perhaps they do need a little bit more coaching through it". Graduate 2

"College is more job oriented, it's more specific, where in university they push you, and it's more of a research centre, right? They just want you to continue your education, whereas they are not thinking of getting their students jobs. Most students that go there to get a degree to get a better job. But there is that disconnect from what the university stands for, as a research institute, and students who are using it to get a degree and get a good job". Graduate 3

4.10 Additional Recommendations for Future Implementation of EL within ESS

Lastly, participants were encouraged to express additional ideas, comments, and recommendations regarding future implementation of EL within ESS programs. Both student and graduate participants offered a myriad of recommendations:

__Incorporate EL as Part of ESS Courses/ More for-Credit EL (Outside of the Co-Op)__

One student recommended incorporating EL within the required courses in a manner that would connect students with organizations that hire ESS graduates. He suggests that this will improve both lasting knowledge and networking opportunities, which could consequently improve graduates' chances of finding employment:

"I found these required courses were generally very dry and were difficult to retain any lasting knowledge. Incorporating EL within these required courses and having direct contact with organizations and companies willing to hire students would be a great asset to the ESS program. For example, in Environmental Law, instead of having a mandatory class run only in the winter time on Wednesdays from 6 p.m., have there be an EL component where students had contact information to environmental consulting companies. This contact information could be used to fulfill a short assignment. Students might write a report on a local environmental consulting company of interest and have the opportunity to ask questions about what a career in environmental consulting might look. My point is that gearing the required courses to have greater EL components that could establish networking relationships within the environmental sector would be very advantageous to students. I have found that many of my fellow graduates (even those within the Co-op program) were so focused on completing their courses that they

didn't have time to network and are now finding it difficult to find employment within the environmental field. I think that EL within required courses would be a great step in improving the chances of students finding a job when they graduate". Student 5

Another student, also concerned over the possibility of not finding a job upon graduation due to the lack of EL opportunities within the ESS program, mentioned that she is contemplating attending college after graduating:

"If you don't take Co-op, depending on the courses you take, you are not going to get that hands-on learning. So that is when it comes in, do I go to college and get the hands on learning? A lot of people that are in my classes are saying 'I'm going to college after this so that I can get a job', because they have all that hands-on learning integrated with textbook learning". Student 4

Several students recommended integrating the type of EL into the program that would contribute towards professional designations and certifications:

"I'm just going to go back to the Wildlife Management focus area. The U of M is one of the accredited universities for the Wildlife Biologist certification with the Wildlife Society. So once you graduate, you need 4 years of experience. It would be really useful to incorporate that experience in the program and get ahead". Student 2

"One example would be LEED Certifications; I know that takes a couple of years of experience after graduating". Student 3

"Or like Environmental Professional designation". Student 4

One of the graduates talked about moving away from lectures alone and staggering EL to provide access to alternative learning for students who struggle in lecture-based classes:

"I would say move away from lectures, or if you are going to do lectures, make sure you are staggering. That it's not just lectures every day and that you have something in-between. I think lectures aren't the way everyone learns. I think a lot of students struggle in a lecture learning environment". Graduate 5

The Co-Op Program

Notwithstanding that most students and graduates highly regarded the Co-op program; some had concerns over its implementation. Most notably, participants commented on the fact that many students cannot secure work placements through Co-op; limited number and selection of available jobs; not getting credit hours for work-placements; and lack of preparation for non-student positions upon graduation:

"In my opinion students don't get jobs because: 1) our Co-op program doesn't have any connections with big industries. For example, University of Waterloo has an excellent relationship with Blackberry's sustainability department. Our faculty has none. 2) We have very limited jobs in Manitoba. We need to partner with sustainability organizations. We could start by meeting big environmental employers and have some sort of partnership. Maybe a pathway program? Or lobby the government to reserve jobs for University of Manitoba and University of Winnipeg students". Graduate 7

"What sucks is that you do four months, you don't get any credit hours for it, only when I write my report, which I have to take on top of all my courses and it's only 1.5 credits". Student 4

"I feel that the one thing lacking from our Co-op program is that we aren't taught how to apply and get jobs once we are finished school. While we are in school everything is done and organized for us, the jobs are sent to you and you send in a resume for any one that seems interesting. We aren't taught how to seek out employment or where to even look once we graduate". Student 6

Throughout the interviews and during the concluding comments, several participants mentioned the Asper School of Business as an example of having effective Co-op program and providing plenty of opportunities for students to connect with the employment sector:

"The two Co-op Coordinators work very hard for our Co-op program. I can't even imagine what this program would be without these people. We should have a Co-op program like the Asper School of Business. There should be a Co-op department with at least four staff members dedicated". Graduate 7

"Or like that Faculty of Business. They, I believe, get Fridays off to go do things in their industry or business". Student 1

Best things about Asper's Co-op program are lots of partnerships with business organizations, formal dinners and networking opportunities with employers. Our faculty also has that but its way too small". Graduate 7

Types of EL Participants Recommended

Four different types of EL were recommended in this concluding section of the interviews: 1) Research/ internship opportunities; 2) Student groups; 3) Job shadowing; and 4) Workshops.

EL in the form of research opportunities:

"Internship opportunities with professors would be an excellent way to ensure that all students get a job within the Co-op department. It is extremely important to understand that not all students are looking for high paying jobs at the undergrad level. I would choose an internship with professors where I get to assist them on their research even if I don't get paid. Co-op is great but it needs significant changes to enhance student success. Our faculty does a great job in helping write resumes but does very little in providing more research opportunities". Graduate 7

EL in the form of student groups:

"More emphasis on student groups like MEIA, and student chapters of groups, outside of classroom setting where it's not so formal. Those relationships and those experiences are more beneficial than labs. Not that a lab isn't beneficial, but on top of it it would be good to put more emphasis to getting more outside of the classroom and of the lab". Student 2

EL in the form of job shadowing:

"Being able to just shadow somebody for two-three weeks in the field or an office."..." It is definitely going to let you know if you are interested or not in that job in the real world. The job

is so much more than couple of things and lists to do, and I'm sure that anybody that's looked at job outline in a posting is like 'oh wow', and the job ends up being much more than the posting. It will give you a chance to become comfortable with somebody and to indulge yourself in what they are doing, taking interest in it. It gives you a chance to see different things that can happen in a job, not just a glimpse, a day in a life of. Seeing the process of the paperwork being done, seeing who they talk to every day. I anticipate what it would be like, but I don't know what it's like. I just have my small little world trying to relate to this big world. I think it would be really cool if you could have the 3 credit-hour system, where you can spend less time doing homework and slightly more time of seeing what it is like. Maybe over the course of one semester you have gone to two-three different businesses". Student 3

EL in the form of workshops

"I really like the idea of workshop-oriented courses. Not all courses have to be four months long. For example, within the EA stream, there is the very active skill-set that you can learn in a two-week workshop. You would still be taking applied EA course for the four months, but you do two weeks of how to develop stakeholder strategies, how to implement stakeholder strategies, how to do GIS mapping, or whatever. I think that can be applied to a lot of environmental disciplines". Graduate 2

Formal Mechanism to Obtain Student Feedback

During the focus group with graduates, the theme of having a mechanism in ESS program to obtain feedback from students, recent graduates and employers developed:

"I would personally say listen to the students. Listen to what they want and what they think is important, as well as recent grads and employers. Connecting everybody together. Ask these sorts of questions to recent grads and say 'now that you've graduated, what kind of things we could have done to improve the faculty, what did you like about the faculty?' Because there is no opportunity for it. The kind of feedback that you get, you can now build on that. I feel they are taking this program and then they are building their classes, they are building the curriculum based on what the teachers are thinking, what the board of directors are thinking. But they are not looking into what are the students getting out of it". Graduate 3

"I agree with you, asking students what would help them learn. That's a great idea and for university to be able to implement those ideas. And I think we just need to be creative, innovation goes a long way. Maybe at the end of a term, instead of this really intimidating practice of giving out public sheets of filling out an evaluation. Maybe at half course, one class should be dedicated to 'now that you have gone through half of the course, what are some ideas that we can implement?' And make it more like 'can you be creative, what should we do?' Do you guys prefer to have one class outside?'" Graduate 2

This statement led to a discussion about the ineffectiveness of university-wide course evaluation sheets given to students at the end of a term for each course. For example:

"As anonymous as it is, sometimes it is not. I was at a class with 8 people and we had to fill out an evaluation. There is the comment section and I'm like 'you are going to know this was me', there is no way the prof wouldn't know it was me, right?" Graduate 3

The discussion further evolved into what graduates perceived as a more effective mechanism to obtain student feedback on a certain course. It was seen as collaboration between the instructor and the students:

"I had two Profs in two classes, where we made the syllabus together. I think that's awesome, because then the students are involved and they can't be upset with how the course rolls forward because they were involved in making it. Having students involved in how they are going to be graded as well, like making the criteria for grading, is also a really neat idea". Graduate 5

Smaller EL Class Sizes and Stronger Student-Instructor Connection

Some participants agreed that current large class sizes prohibit meaningful EL as well as student-instructor connection:

"EL class should be small enough to facilitate that to give everybody a chance to get in there. Also, increasing that level of contact with your professors; if you don't feel like you can talk to your professor, you are not going to feel like you can talk to people in industry. I think that connection is important, and it is being eroded in my opinion. Last year we had a course, and at one point the prof was saying that this used to be a seminar course with 10 people in it. Now it had 50 at least. She said that she used to bring speakers and have round table discussions with

the students and them. But then we started watching the videos and not getting that experience

because the size of the class prohibits that kind of discussion". Student 1

Chapter 5: Bridging the Gap between the Academia and Practice

5.0 Introduction

The central argument underlying this study is that EL can strengthen environmental program curriculum in higher education, with an overall goal of increasing the understanding about the merit of EL in undergraduate environmental programs, from students' and graduates' perspectives. Therefore, I organized the concluding chapter to capture the key findings that support this overall goal: 1) EL helps develop a deeper understanding of environmental complexities; 2) It is imperative to connect EL activities to concepts taught in class; 3) Not all EL is meaningful; 4) EL motivates students to engage at all levels of their ability; 5) EL did not show to be a significant factor in fostering pro-environmental behaviours in post-secondary environmental students; 6) Well-structured EL engages students in environmental issues with diverse stakeholders; 7) Work-placement EL is important in obtaining employment in the environmental sector; 8) Graduates and employers should provide input in the development of EL activities; 9) EL is decisive in skill development; 10) Most EL opportunities are not communicated to ESS Students; and 11) The wide scope of environmental professions bears implications for ESS programs.

The key findings are ordered by the level of importance the participants gave to each topic (as evident in deeper, more engaged discussions or majority being in agreement); within the framework of literature I reviewed in chapter two. The discussions of findings are in most

cases followed by specific recommendations for each topic. Though majority of recommendations can be applied to other post-secondary environmental programs, a few are more specific to the the case-study location (Department of Environment and Geography at the University of Manitoba). Nevertheless, these too will be of interest to the decision-makers who are facing similar issues, or are curious to learn what students and graduates from another environmental department had to say about experiential learning in their particular programs.

5.1 EL Helps Develop a Deeper Understanding of Environmental Complexities

Understanding of complex environmental issues, such as for example the effects of anthropogenic activities on ecosystems, or action required at the individual or larger level, requires comprehensive understanding of complex systems. The interview results confirmed the previous research, which shows that EL is an effective approach in helping students develop a deeper understanding of environmental complexities (Ben-Zvi Assaraf & Orion, 2005; Keynan et al., 2014; Magntorn & Hellde´ n, 2007; Shepardson et al., 2007).

All students and all graduates agreed that EL activities during their ESS studies increased their understanding of the complexities of environmental issues and provided specific examples from personal experiences, most of which came from their Co-op work placements. The participants explained that in addition to helping them see the big picture, EL allowed them to become immersed in one topic and to fully understand all aspects of an environmental issue. The personal recollections ranged from dealing with asbestos in buildings, to understanding the effects of forest fires, to understanding the effects of fishing, to balancing complex stakeholder issues. For example:

"So for me, it was a realization that every project, every situation is different. Every environmental issue is different, depending on the social setting that you are in. I did a Co-op term with an environmental engineering and consulting firm for which I ended up working after I graduated. But working there, that's when I realized that environmental issues are not as much about the environment as they are about people. Trying to balance complex stakeholder interests is one of the most complicated things that you have to do". (Graduate 2)

5.2 It is Imperative to Connect EL Activities to Concepts Taught in Class

An important new theme emerged during the discussion about the importance of EL in understanding of environmental complexities, and was apparent throughout other discussions that followed: there has to be a meaningful integration of EL with concepts taught in classroom. A widely held belief among educators who advocate experiential education is that effective EL must have a clear and significant objective in the curriculum in terms of adding or enhancing on existing portion of the curriculum (Kolb, 1984; Maskall & Stokes, 2008). In other words, a meaningful integration of EL with lectures is important; otherwise it may result in diminished learning and meaning (Kolb & Kolb, 2005; Maskall & Stokes, 2008).

Likewise, most participants in this study emphasized that it is not sufficient to have either EL or textbook learning alone, and that it is imperative to connect EL activities to concepts taught in class. They further explained that lack of connection between EL activities and concepts taught in class results in superficial EL that only "looks good on a syllabus":

"I feel as though most of the available EL activities through required course work did a superficial job of increasing our understanding of complexities associated with environmental issues. There was little to no exposure to the issues discussed in class as well as little to no opportunity for to be involved with meaningful change. Any required volunteering and field trips seemed to be filler that would look good on a syllabus". (Student 5)

Additionally, during the focus group discussion, student participants expressed that the meaningful balance between the two types of learning is achieved if lectures take place prior to EL activities:

"I learned tons while I was working at the ELA (Experimental Lakes Area), and it was great, it was one of the best work things I could have asked for. However, I'm doing the 'knowledging' now, which is the study of lakes, and it would have been really nice to have taken that course before going to ELA". (Student 2)

One of the students in the focus group exemplified this meaningful balance with the college learning, where lectures precede the practicum, receiving agreement from all other participants in the group. This prompted me to think back about Dewey, who called for a pragmatic education, which will link learning and experience, where teachers structure experiences that actively engage students in developing usable knowledge (Katula & Threnhauser, 1999; Lewis & Williams, 1994). Dewey (1938) argued that there is a valuable educational relationship between the outside world and the classroom, and as much as experiences give meaning to concepts studied in class, the concepts give structure and meaning to experiences.

5.2.1 Recommendations

Two specific recommendations stemmed from this discussion - one regarding courses with EL that pertains to concepts studied in class, and the other recommending inclusion of a particular course in the ESS program:

"If EL programs could have outreach resources to organizations based on the specific set of issues that were discussed in class. For example, if food security were discussed in an EL setting then there should be resources to contact organizations that deal with these issues and are willing to accept interns/ employees". Student 5

"I would recommend having a course on field sampling, where you have to write a report, but also get to do different sampling like trees, leafs, water, fish, and do all different sampling tasks that we are going to end up doing anyway". Student 4

5.3 Not All EL is Meaningful

"So, really, it does depend which type of EL you take, and what you take out of it. Because you can go through an EL class and get nothing out of it". (Graduate 3)

Students and graduates perceived certain EL experiences as more meaningful than others. Some were even described as having a life-long positive impact:

"The other meaningful EL experience for me was my exchange to West Africa, where I learnt a tremendous amount about West African culture, trade, history and political structure. This was by far the greatest learning experience of my undergraduate study and my life in general". (Student 5)

International work or study experiences, EL experiences that immersed students with the locals, experiences where they had an active role (as opposed to that of a passive observer), and lasted longer were considered as having higher impact on their learning and personal development. As discussed in chapter two, high-impact experiences in higher education highly correlate to the most significant learning outcomes such as success, retention, graduation, continuing to graduate studies, and which lead to meaningful learning gains (Cantor, 1997; AUCC, 2011; Bass, 2012; Kuh, 2008).

5.3.1 Recommendations

In a 2007 report on college learning, The Association of American Colleges and Universities listed ten high-impact activities (Kuh, 2008), which included EL that reflects the same activities discussed and recommended by participants in this study as being the most meaningful (listed in the order of importance to participants):

1. International work or study experiences

2. Experiences that immerse students in the community and environmental issues

3. EL that incorporates stakeholder engagement and improves students' preparedness to deal with diverse stakeholders involved in environmental issues

4. Experiences where students have an active, leadership role and last longer

5. Job shadowing (e.g. two-three weeks in the field or an office, or two-three different businesses/organizations per semester)

6. Research opportunities (e.g. internship opportunities with professors)

7. Smaller class sizes that enable meaningful EL as well as connection with instructors and peers

8. Workshop-oriented courses (e.g. a two-week workshop within the EA stream)

9. Student groups (e.g. student chapters of groups)

10. Different types of opportunities for professional networking (e.g. discussions with professionals; speed-mentoring where students have an opportunity to sit with different professionals and ask professional questions; career fairs; conferences; "mentor for a day" where students are matched with a professional from their focus area)

5.4 EL Motivates Students to Engage at all Levels of Their Ability

In 1969, psychologists Eiss and Harbeck proposed that learning is a process of interaction between cognitive, affective, and psychomotor learning domains, which means that an individual cannot deal with knowledge alone because it is inseparable from emotions (Maskall & Stokes, 2008). Provided the opportunity to reflect, EL motivates students to engage at all levels of their ability because they see direct experiences as personally meaningful (Basile 2000; Cummins and Snively 2000; Kenney et al. 2003; Smith and Williams 1999).

The results of the interviews (chapter four; table 4.3: Significance of EL in Motivation to Learn), show overwhelmingly positive responses regarding EL in increasing participants' level of interest, self-confidence, optimism, and passion when learning. Moreover, EL helped students realize what type of work they enjoy doing, and consequently shaped the direction of their studies. For example:

"I found that having EL and doing the research in the field helped me shape the courses that I decided to take after doing that. I actually sought-out courses that helped me develop particular skills where I would have something more to take out of it, rather than just picking out an easy course for an easy A. So, now I'm thinking more about learning as something to benefit me into

the future, rather than just getting a degree and a piece of paper. And getting to be outside every single day, it felt worth it, felt like a work day, reminding you that the work that we do is actually impacting something more than just ourselves". Student 1

5.4.1 EL Did Not Show to be a Significant Factor in Fostering Pro-Environmental Behaviours in Post-Secondary Environmental Students

Interestingly, while participants from both groups had many positive comments about the impact of EL on their motivation to learn, there were far fewer comments on the subject of the role of EL in fostering pro-environmental behaviours. Only two participants were able to recall specific behavioral changes resulting from their participation in EL activities: 1) increased recycling practices in public places after working in a recycling organization and 2) influencing friends not to throw garbage from the truck while driving on an ice-road after choosing to pick up waste from the ice-road as an activity (as part of the ESS class) that will benefit the environment.

These findings are contrary to my assumptions and to the findings of studies I explored in the literature chapter. For example, Zint et al. (2014) conducted four syntheses of environmental education research and program evaluations published between 1971 and 2008. Whereas they found only seventeen studies that investigated the effects of environmental education on pro-environmental behaviours of elementary and high school students, all seventeen showed that programs which engage students in EL (field trips, community learning, and investigations of local environmental issues) are more effective in fostering pro-environmental behaviours than classroom-delivered programs (Bonnett, 2004; Ballantyne & Packer, 2005; Zint et al., 2014).

Moreover, their findings are supported by those of behavioural scientists, who claim that direct experiences have stronger influence on people's behaviors than indirect ones (Ballantyne & Packer, 2005; Frisk & Larson, 2011; Maskall & Stokes, 2008).

Perhaps one way of explaining these unanticipated results is the fact that the above research deals with elementary and high school students and not university students, but more importantly, students in environmental university programs. Thinking back to when I first chose to pursue a degree in an environmental field, my pro-environmental mindset and desire to make a difference were already there. They, in fact, prompted me to pursue an environmental degree in the first place. The notion that the same might be the case with some other ESS students stemmed after hearing the following comment from one of the student participants:

"It (EL) hasn't really changed my environmental behaviors and values as much. I would say if anything, the courses have provided knowledge for me to back up why I want to do what I do". Student 3

The phrase "to back up why I want to do what I do" presumably verbalizes that this student already had the pro-environmental mindset upon starting the ESS program, prior to participating in any program-related EL activities. Another contemplation relates to research regarding the significance of EL in facilitating students' role as change agents. The research suggests that effective learning occurs when it is relevant to students' lives, through local initiatives where students are given the opportunity to make a difference and acquire decision-making skills (Bonnett, 2004; Frisk & Larson, 2011; Woodhouse & Knapp, 2000). In this context, the type of EL and student's role in it (i.e. whether or not the student was empowered to

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make a difference) is of great importance. Additionally, the discrepancy could potentially be

attributed to the design of my study, which, unlike many of the behavioural studies, did not

include a pre- and post-test about specific behaviours, but rather asked participants for

recollection of these behaviours, which is a much less effective measure. Nonetheless, the

inconsistency between the interview results and existing research calls for further investigation.

5.5 Well-Structured EL Engages Students in Environmental Issues with Diverse

Stakeholders

Both student and graduate participants were unequivocally clear about their agreement

that EL plays an important role in preparing students to deal with diverse stakeholders involved

in environmental issues. However, whether or not EL activities in their ESS programs helped

them in this regard, depended on the type of EL experiences they undertook. All participants

who worked in more then one environmental position through either the Co-op program or on

their own said that these experiences significantly improved their preparedness to deal with

different stakeholders and allowed them to experience various perspectives in the real-world

environmental issues:

"I have been working in government for the past 6 months. So, first seeing things from a science

perspective, being a field scientist, knowing the concerns within that, such as funding issues,

compared to being in government. There, I get to deal with different issues. It all exposed me to a

range of different stakeholders. So I think that without that experience, you would only have

theoretical idea of what it's like". Student 1

On the contrary, participants who were not able to secure work in an environmental position during their studies, and whose EL experiences involved only field trips, travel courses and labs, did not feel that these EL components improved their preparedness to deal with environmental stakeholders:

"No I don't believe there was. Aside from the odd guest presentation from a member of a local indigenous group or politician, there was no involvement with these stakeholders. This is troubling looking back on my studies because it would have been an excellent way for students to network with potential employment or internship opportunities". Student 5

5.5.1 Recommendations

EL that includes work placements, immersive travel courses, community learning courses and similar opportunities, will increase chances of experiencing diversity through communication with different people and bringing one's values and beliefs into awareness. Well-structured EL engages students in their communities, real-world environmental issues and diverse stakeholders of differing perspectives, while exposing them to the realities of conflicting goals, trade-offs, and uncertainties (Frisk & Larson, 2011; Tan, 2009). In turn, the students can gain skills necessary to engage in collaborative decision-making that reflects diverse stakeholder interests (Frisk & Larson, 2011; Maskall & Stokes, 2008; Zandvliet, 2012).

5.6 Work-Placement EL is Important in Obtaining Employment in the Environmental Sector

The graduate participants were asked to recall whether the EL in their ESS studies helped them obtain employment in an environmental profession. Evidently the Co-op work placements were of the utmost significance: the two graduates who discontinued the Co-op program after not being able to secure work placements, and a graduate who was not in the Co-op, answered no to this question; while all four graduates who took part in the Co-op work placements stated that they obtained their environmental jobs because they participated in the Co-op program. While the Co-op work placements often lead to employment after graduation, the unfortunate reality is that they seem to be hard to obtain (much less in a desired area of interest).

When I asked student participants whether they believe that EL is important in helping ESS program graduates to obtain employment in their field of study, they undisputedly agreed. Moreover, it was evident from longer and avid discussions that this topic was of particular importance to students. Consequently, new themes, concerns and multiple recommendations emerged related to the effectiveness of EL in graduate employment prospects, most of which were regarding the Co-op program.

5.6.1 Recommendations for the Co-op Program

While students and graduates agreed that the Co-op program is essential in the ESS, they strongly suggested that it needs to be modified and strengthened to ensure that it meets student needs. Every Co-op student needs to be guaranteed a work/ practicum placement, using college model as an example. This, of course, calls for further investigation on ways that various colleges are securing work placements/ practicums for every student. Likely, these placements would be shorter in duration; the students would not get paid for them, but would receive full credit hours. Additionally, it was recommended that the Co-op program provides opportunities for work experiences that will count towards professional designations and certifications (e.g. LEED Certification, Environmental Professional Designation, and Wildlife Biologist Certification).

Further, the participants recommended that the Co-op program expand partnerships and connections with all areas of environmental industry (including private, corporate, non-profit, and all three levels of government) so that all focus areas (specializations) and students' interests are represented in work/ practicum placements. Here, business faculty and geology department were exemplified as positive and long-standing models for faculty - industry relationship. In this context, students would have greater avenues to get involved in the community through EL and to network with organizations while learning how to focus their efforts to obtain a job. To achieve this level of efficacy, the Co-op program would need to be expanded to include sufficient level of staff and resources.

5.7 Graduates and Employers Should Provide Input in the Development of EL Activities

The UK study on the effect of employability skills teaching on the graduate employment outlook, which encompassed surveys of recent graduates from 34 departments in eight UK universities as well as surveys of their supervisors, reported that workplace EL and/or employer involvement in the curriculum were found to positively impact graduates' immediate employment prospects (Cranmer, 2006). The researchers argue that despite the best intentions of academics to help develop employment-related skills, these skills cannot be effectively developed in the classroom, and that resources would be better invested on employment-based EL and employer participation in courses (Cranmer, 2006). In the ESS context, the research points that environmental employers look for graduates with teamwork, decision-making, problem-solving, efficiency, analytical, critical thinking, interpersonal, communication, project management and leadership skills in addition to the job-specific environmental knowledge (Maskall & Stokes, 2008; Thomas, 2003; Vincent & Focht, 2010; Watton & Truscott, 2006).

As can be seen in the results chapter, this was another topic that identified a gap between the academia and practice, and sparked significant interest and engagement among both groups, resulting in many insights and several recommendations. The results revealed strong agreement among all student and most graduate participants that both graduates' and employers' input should be solicited when developing EL activities within the ESS curriculum. In fact, they suggested that there should be a formal mechanism for soliciting graduates' and employers' input when developing EL activities within the ESS curriculum and to have recent ESS program graduates provide input in developing EL activities, as opposed to someone who graduated 10-15

years ago. This in turn, will strengthen the connection between the program and the 'real-world' and effectively integrate skill development into the EL activities. For example:

"I think for sure that would be a great idea because a lot of the time you can hear people when they graduate 'ok, what job am I going to get? What do I need for this job?' If that was something we knew in our 2nd or 3rd year, we could already start picking our courses; know what they are looking for. I definitely think that you can hear this from any student 'why did I take that course?' I think you could eliminate those courses, because the industry or employers have said that we really don't need to be taking these abstract courses". Student 2

The conversation further flowed to what can be described as this overall notion of bitterness over being an 'easy target' for believing in the value of an ESS degree, a credential that will bring about a better job:

"I think it's unfair to students who come into program thinking, these 4 years will be for me to build my career. And then not having those options available to them, or perhaps if you do have the options, perhaps they do need a little bit more coaching through it". Graduate 2

Although I remained impartial throughout the discussions, limiting my participation to merely asking the interview questions and listening, being a recent ESS graduate who struggled to find a job in my field of study for over a year, I find it easy to empathise with their bitterness. Besides being a financial necessity, finding a job after graduating is a social norm that presents an additional pressure on graduates. Therefore, it is reasonable to expect that students will gravitate towards courses and programs that they believe will lead them in this direction. Developmental psychologists explain it within a framework of "readiness to learn" towards a

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"developmental task" as people learn more readily the things that are necessary for them to know to move to the next developmental phase (Knowles, 1980). Adults tend to engage in learning in a performance-centered mindset, primarily in response to current life pressures (Knowles, 1980). Thus, the case for supporting graduate employability is an overwhelming one in terms of being backed by students, employers, and governments (Watton & Truscott, 2006). This research demonstrates that students' and graduates' perceptions of the role of EL in obtaining employment is undeniably positive, and suggests that the ESS program needs to be structured correspondingly.

5.8 EL is Decisive in Skill Development

The research points that collaborative and social skills, which are regarded as essential for environmental practitioners (Brand & Karvonen, 2007; Maskall & Stokes, 2008; Vincent & Focht, 2010) are developed more effectively in EL activities than in traditional classroom environment (Falk, 2005; Maskall & Stokes, 2008; Tal & Morag, 2009; Zandvliet, 2012). Further, literature review reveals that EL increases the development of other transferable skills such as communication; problem-solving; critical thinking; cooperation; teamwork; leadership; decision-making; interpersonal (Basile 2000; Cummins and Snively 2000; Gruenewald 2003; Kahn 1997; Zandvliet, 2012); and technical skills (Basile 2000; Maskall & Stokes, 2008; Penny et al., 2012). The EL activities have shown to result in increased conceptual gain; increased systems thinking skills (Ben-Zvi Assaraf & Orion, 2005; Falk, 2005; Kern & Carpenter, 1986; Tal & Morag, 2009; Zint et al., 2014); and improved long-term knowledge retention (Bass, 2012; Kenney et al. 2003; Maskall & Stokes, 2008; Penny et al., 2012).

To corroborate the above findings, participants were asked to reflect on the significance of EL in the development of transferable and technical skills; long-term knowledge retention; conceptual gain; and systems thinking skills:

5.8.1 Technical Skills

Both groups were unanimous in the agreement that EL played a significant role in the development of their technical skills (providing multiple examples such as sampling, GIS, laboratory work, wilderness orientation etc.) and emphasized that these skills cannot be effectively developed in lecture formats:

"And technical skills, I only got those from hands-on learning. My sampling work, my lab-work, my GIS, field safety. A lot of personal awareness when I'm in the field". Student 4

5.8.2. Transferable Skills

The difference between student and graduate participant responses was notable when they were discussing the role of EL in the development of their transferable skills. Unlike student participants, all of the graduates were in strong agreement that EL (i.e. student jobs, project courses, labs, Co-op program events and networking, travel courses, workshops, and tours) had a significant impact on the development of their transferable skills.

As much as graduates were confident in their belief, the students seemed uncertain and divided in their views on which types of learning experiences attributed to the development of these skills. For example, when several students commented that EL (most notably work-placements and travel courses) helped them develop communication; collaboration; cooperation;

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teamwork; leadership; social skills; decision-making; problem-solving; and critical thinking skills, one student disagreed with them and attributed classroom learning and student group-work to the development of most of her transferable skills. Student work placements, she added, do not allow students to take on a leadership role. On the contrary, another student commented that student group-work in a classroom is not a meaningful type of learning for her because it generally lacks the student interest.

This division in views within the student group points out that not all EL experiences play an equal role in the development of transferable skills, which brings us back to the topic of high-impact, or meaningful EL activities. For example, a student who felt that EL significantly contributed to the development of his transferable skills, reflected on his highly immersive ten-day travel course:

" From my experience, being outside one's comfort zone and forced, so to speak, with other students to accomplish a common goal was the most significant factor in the development of communication, collaboration, cooperation, teamwork, leadership, social skills, decision-making, problem-solving, and critical thinking. For example, during discussion periods in my 10-day travel course we were provided a platform to ask questions and talk about issues that we had just discussed with local farmers. I felt that people actually cared and were interested in talking about such issues, and it was a far more passionate discussion than anything inside a university classroom because we were in the subject environment". Student 5

Equally, one graduate summarized all of her high-impact EL experiences that played an important role in the development of her skills:

"I was fortunate to learn a lot and be involved in many different events. Skills I learned are endless. I gained confidence in my role through hosting an environmental career fair. I learned how to approach businesses and future mentors, while making decisions that best supported the event. I developed a strong network in the environmental community in Manitoba due to my experience and exposure to MEIA, and green builders, and ECO Canada. I was part of events and put in situations where I could practice my skills and develop new ones. Skills I developed through EL were leadership, communication, collaboration, teamwork and some analytical skills and understanding of what happens after the field work. Tours of the labs helped understand soil analytical process. EL provided opportunities to develop my skills, but also to use them and refine them in different situations". Graduate 1

The unanimous agreement among the graduates on the effects of EL on the development of their transferable skills possibly points out to their readiness to reflect on the skills gained. Perhaps this can be contributed to the fact that these graduates are working in an environmental profession, which requires them to use their transferable skills on a regular basis, thus making it easier to articulate their reflections regarding skill acquisition. This is evident in the statement of one graduate who mentioned that while she has these reflections now, as a working environmental professional, she was not aware of them while in the ESS program:

"So I'm trying to think if I had those reflections when I did my Co-op terms or... I don't think I thought about it that much, I think that I was just enjoying the experience and learning what I was learning. But now that I think about it, absolutely". Graduate 2

5.8.3 Long-Term Knowledge Retention

Most of the early research on the effects of EL on learning focused on retention and recollection of information (Frisk & Larson, 2011) and found that active participation in EL helps students form 'easily recalled episodes' which increases their ability to remember what they had learned (Frisk & Larson, 2011; Maskall & Stokes, 2008). The interview results confirmed these findings: all students and graduates agreed that EL activities they took part in during their ESS program were effective in long-term knowledge retention, offering myriad of examples to support their comments. As exemplified in the following statement, they frequently mentioned the comparison of EL versus 'just learning for the exam' in terms of EL having an impact on both their long term knowledge retention and meaningful learning gains:

"When you are sitting in lecture, you are not really paying as much attention, as you are when you are trying to do it on your own. You are teaching your self essentially. In a lecture setting you are learning for the exam, you are going to learn it, you are going to remember it, you are going to pass the exam, and it's gone. You passed the exam and that's all that matters. Whereas EL, you go off, you are doing a project where you are doing something in the community and it still matters after you leave. It's still going to be there. It's easier to learn and it's easier to keep that knowledge in your head". Graduate 3

5.8.4 Conceptual Gain and Systems Thinking Skills

The findings of this study corroborated what the studies from the literature review have found: EL activities have shown to result in increased conceptual gain and increased systems thinking skills (Ben-Zvi Assaraf & Orion, 2005; Falk, 2005; Kern & Carpenter, 1986; Tal & Morag, 2009; Zint et al., 2014). During the discussion on the effectiveness of EL in conceptual gain and systems thinking skills (i.e. analyzing, synthesizing, applying knowledge, and developing new ways of thinking when responding to new situations), most participants recalled specific experiences where EL has played a role in increasing these skills. For example:

"Through EL you learn how to apply that knowledge that you already have, but it's starting to give you different ways to do that. I volunteered for MEIA, so I run a lot of their programs, and now I'm thinking how I can take what I learned through EL and pass that on to other students".
Graduate 3

5.9 Most EL Opportunities are Not Communicated to ESS Students

Currently, and during my undergraduate studies three years ago, ESS students looking for EL courses or courses with EL activities in the ESS programs at the department's website will not find a link that would direct them to these courses or any other obvious link for any other types of EL opportunities. On the umbrella faculty's website, there are two barely noticeable (each fused with other themes) links informing students of the EL opportunities: the Co-op link and the travel/study courses link. The later directs students to three travel courses, which are available during the summer term:

- Banff, Alberta (Parks and Protected Areas Planning and Management);

- Churchill, Manitoba (Ecotourism and the Environment; Research Project in Churchill)

- Clearwater MB (Living Rural Communities and Environments)

Although there are other EL courses and opportunities with EL activities, they are not being communicated to students by any consistent means. Rather (such was my case and a case of most students and graduates I had discussions with), these opportunities are communicated by a word of mouth amongst students, with many students graduating without ever hearing of some of these opportunities. The following list shows the variety of EL participants undertook during their ESS studies, starting with experiences most elaborated on and described as having the most impact on their learning:

- International travel course and a semester-long international student exchange

- Summer research under a PhD student

- Travel courses to Banff National Park; Riding Mountain National Park; Clearwater farming community; and Churchill

- Co-op work placements

- Personal volunteering (e.g. Wildlife Society)

- Volunteering as part of the course requirement (e.g. one-on-one language and cultural exchange meetings with an international student; work at FortWhyte Alive)

- Membership and involvement with different student groups (e.g. MEIA)

- Project courses (e.g. CIDA; self-directed Environmental Assessment course)

- Community work

- Survival workshop

- Field trips (e.g. tours inside and outside of the city)

- Field courses (e.g. Environmental Field Investigations)

- Lab work

- Seminars

Moreover, several focus group participants just learned from other participants about some of the EL activities available through the department, indicating regret over not knowing about these opportunities in time to take advantage of them.

5.9.1 Recommendations

It is clear that there is a definite need for EL opportunities to be defined, articulated, as well as formally and consistently communicated by ESS programs to both students and those who are considering an ESS degree. Given the growing financial burden of attending a university, and the fact that they are becoming more aware of the increasingly competitive graduate labour market (Kuh, 2008; Watton & Truscott, 2006), prospective students are more critical about their program selection in terms of weighing costs and benefits, and perceiving programs that are better connected with the industry as more beneficial (Atkins, 1999; Kuh, 2008; Watton & Truscott, 2006).

5.10 The Wide Scope of Environmental Professions Bears Implications for ESS Programs

Although this final topic is not entirely EL related, it was of notable importance to student participants, as evident from their increased level of engagement and desire to express their views. As table 4.2: Graduate Participants' Job Description in the results chapter illustrated, the wide-ranging nature of jobs in which environmental program graduates find their careers is quite remarkable. This ambiguity can indeed present a challenge to the ESS programs as they have to provide their students with the corresponding array of specializations (focus areas) and consequently structure the programs broadly. For example, in a group of only eight ESS graduates in this case study, the participants reported to be working in five distinct environmental areas and roles:

1. Coordination of all environmental programs in an agricultural private company

2. Public outreach activities in an international organization for wildlife conservation and protection

3. Supervision of decommissioning, remediation and reclamation in an oil/ gas clean-up private company

4. Sustainability education to public and students in a non-profit recycling organization

5. 3 graduates work in environmental assessment in an utility providing company as well as in an environmental consulting and engineering company

This student's quote effectively summarized the mixed feelings among interview participants regarding the broadness of the program:

"It's cool that we are all under the same umbrella with a very similar mindset, but at the same time, what makes it cool is what makes it frustrating too". Student 3

While some participants said they enjoy taking wide array of courses from different disciplines (which they have to attend at other departments as they are not offered in theirs), most felt that the ESS program is too broad, which presents an obstacle when it comes to specializing in one focus area (in addition to running into problems with conflicting schedules with courses at various departments) and that it should be streamlined and narrowed down in the final year. Moreover, several students felt that there are too many focus areas for the program to function adequately:

"We are all in ESS, but the thing is there are people that I never had a class with because there are dozen different focus areas. They are very broad. In my eyes, bordering too broad. For example, trying to get one speaker to come in that would pertain to all focus areas, is darn near impossible". Student 3

"I'm going into Remediation and Mining, and that's not even the focus area. I'm on my own. I'm told to fill out the white boxes. I'm drawing from all the other faculties that are basically more relevant then ESS. I'm doing a lot of soil courses, geology courses, even chemistry. I'm in ESS, I want those courses here!" Student 4

"I had to do that too. The problem with that is that you go to physics, you go to chemistry, you go to soil and they are working on the same university schedule. They'll be at the same time so you can't go to both of them. And then you have to spend another year because they are only offered at winter! So, if we could somehow streamline that". Student 2

In the EL context, the participants indicated concern over the lack of EL opportunities in their focus areas in general, and disconnect between the Co-op placements and focus areas offered in the program:

"There are a lot of focus areas in ESS, but very few Co-op jobs pertain. Being in sustainable building, there was not one single job posting for me. It seems that architecture gets more of those. So, more job postings that pertain to all the focus areas". Student 3

5.10.1 Recommendations

Given the broad and interdisciplinary nature of ESS programs, and the fact that students are pursuing their focus area courses at various departments outside of their own, there is an obvious need to take a closer look at these outside courses to streamline, coordinate, possibly even offer them as ESS courses in order to meet the demand. Further, an inventory of the most demanded (by students) focus areas and their corresponding courses needs to be conducted on a regular basis (e.g. annually) in conjunction with a comprehensive overview of available local and national jobs (e.g. by type, frequency) to make informed decisions on the types and quantity of focus areas offered in the ESS program. Finally, partnerships with organizations and companies which employ graduates in these focus areas need to be forged in order to enable the specialization-specific EL opportunities for students.

5.11 Conclusion

As put by Bovill et al. (2011), students have a vested interest in their education and they should be invited by educators to share their insights. Students and graduates in this study were encouraged to express ideas, comments, and recommendations regarding future implementation of EL within ESS programs. Both groups offered a myriad of recommendations throughout discussions, which are all summarized and listed in Appendix 4: Summary of Recommendations.

This study has filled the gap in previous research, which does not address students' and graduates' perspectives on the role of EL in their undergraduate environmental programs as a whole, and added to the credibility of a small, but important body of research that shows the merits of EL in postsecondary environmental education. Furthermore, the study shows that effectively implemented EL can play a significant role in enhancing ESS curriculum, and that ESS students and graduates place a great value on EL in their education.

It is my hope that decision-makers will see this study as an important resource in curricular enhancement at environmental university programs, and adapt these recommendations according to their specific circumstances. As this is an exploratory study, further research is needed to assess the impact of the promising EL activities recommended by students and graduates, as well as to determine what institutional supports would be needed to implement these recommendations. Moreover, it would be beneficial to build upon this study with additional research to include a large sample of ESS students in order to obtain statistical validation, and research that would explore the perceptions of employers and instructors regarding the EL in environmental university programs.

References

Association of Universities and Colleges of Canada (AUCC). (2011). *The Revitalization of Undergraduate Education in Canada.* A report on the AUCC workshop on undergraduate education in Halifax, March 6-8, 2011.

Atkins, M. J. (1999). Oven-ready and self-basting: Taking stock of employability skills. *Teaching in Higher Education,* 4(2), 267–278.

Ballantyne, R., & Packer, J. (2005). Promoting Environmentally Sustainable Attitudes and Behaviour Through Free-choice Learning Experiences: What Is the State of the Game? *Environmental Education.* espace.library.uq.edu.au.

Ballantyne, R., & Packer, J. M. (1996). Teaching and learning in environmental education: Developing environmental conceptions. *The Journal of Environmental Education,* 27(2), 25–33.

Basile, C. (2000). Environmental education as a catalyst for transfer of learning in young children. *The Journal of Environmental Education,* 32, 21–27.

Bass, R. (2012). Disrupting Ourselves: The Problem of Learning in Higher Education. March/ April 2012 *Educause review* 23.

Belton, C. (2013). Successes, Drivers and Barriers of ESD in Canada, England and Australia. Thesis submitted to the Faculty of Graduate Studies of The University of Manitoba, Department of Environment and Geography.

Ben-Zvi Assaraf, O., & Orion, N. (2005). Development of system thinking skills in the context of

    Earth System Education. *Journal of Research in Science Teaching,* 42, 518– 560.

Bonnett, M. (2004). Lost in space? Education and the concept of nature. *Studies in Philosophy and*

    Education, 23, 117–130.

Booth Sweeney, L., & Sterman, J. D. (2007). Thinking about systems: Student and teacher conceptions

    of natural and social systems. *System Dynamics Review,* 23(2/ 3), 285–312.

Bovill, C. (2014). An investigation of co-created curricula within higher education in the UK, Ireland

    and the USA, *Innovations in Education and Teaching International*, 51:1, 15-25.

Bovill, C., Cook-Sather, A., & Felten, P. (2011). Students as co-creators of teaching approaches,

    course design, and curricula: implications for academic developers, *International Journal for*

    Academic Development, 16:2, 133-145.

Boyle et al. (2007). Fieldwork is good: the student perception and the affective domain. *Journal of*

    Geography in Higher Education, 31, 299-317.

Brand, R., & Karvonen, A. (2007). The Ecosystem of Expertise: Complementary Knowledges for

    Sustainable Development. *Sustainability: Science, Practice & Policy,* 3:21–31.

Cain, J. (2006). In Defense of Adventure-Based Education and Active Learning Opportunities.

    Teamwork & Teamplay. Available at www.teamworkandteamplay.com

Canadian Council on Learning (CCL). (2007). *Report on learning in Canada 07: Postsecondary education in Canada: Strategies for success.* Ottawa. http://www.ccl-cca. ca/pdfs/PSE/2007/PSEFullReportENLR16july08Bookmark.pdf

Cantor, J. A. (1997). Experiential Learning in Higher Education: Linking Classroom and Community. *ASHE-ERIC Higher Education Report*. Series 95-7, (Volume 24-7).

Carey, P. (2013). Student as co-producer in a marketised higher education system: a case study of students' experience of participation in curriculum design, *Innovations in Education and Teaching International*, 50:3, 250-260.

Cortese, A.D. & McDonough, W. (2003). Education for sustainability: accelerating the transition to sustainability through higher education. National Council for Science and the Environment, paper presented at the 3rd National Conference on Science, Policy and the Environment: Education for a Sustainable and Secure Future, January 30-31.

Crebert, G., Bates, M., Bell, B., Patrick, C. J., & Cragnolini, V. (2004). Developing generic skills at university, during work placement and in employment: graduates' perceptions, *Higher Education Research & Development*, 23:2, 147-165.

Cranmer, S. (2006). Enhancing graduate employability: best intentions and mixed outcomes. *Studies in Higher Education*, Vol. 31, No. 2.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches.* (4th Ed.). Thousand Oaks, California: SAGE Publications.

Cummins, S., & Snively, G. (2000). The effect of instruction on children's knowledge of marine

ecology, attitudes toward the ocean, and stances toward marine resource issues. *Canadian

Journal of Environmental Education,* 5, 305–326.

Dennis, L. J., & Knapp, D. (1997). Viewpoint: John Dewey as environmental educator. *The Journal of

Environmental Education*, 28(2), 5-9.

Dewey, J. (1938). *Experience and education* (Kappa Delta Pi lecture series; [no. 10]). New York: The

Macmillan Company.

Duncan, R. G., & Reiser, B. J. (2007). Reasoning across ontologically distinct levels: Students'

understandings of molecular genetics. *Journal of Research in Science Teaching*, 44(7), 938–959.

Dunn, K. (2010). In Iain Hay (Ed). *Qualitative Research Methods in Human Geography,* 3rd Edition,

Don Mills, ON: Oxford University Press.

Eilam, B. (2002). Strata of comprehending ecology: Looking through the prism of feeding relations.

Science Education, 86, 645–671.

Endreny, A. H. (2010). Urban 5th graders' conceptions during a place-based inquiry unit on

watersheds. *Journal of Research in Science Teaching,* 47, 501–517.

Falk, J. H. (2005). Free-choice environmental learning: Framing the discussion. *Environmental

Education Research,* 11, 265–280.

Foddy, W. (1993). *Constructing questions for interviews and questionnaires: Theory and practice in

social research.* Cambridge University Press: Cambridge, U.K.

Freire, P. (2009). From pedagogy of the oppressed. *Race/Ethnicity: Multidisciplinary Global Contexts.* 2(2), 163-174.

Frisk, E., & Larson, K. L. (2011). Educating for Sustainability: Competencies & Practices for Transformative Action. *Journal of Sustainability Education.* Vol. 2, March 2011, ISSN: 2151-7452.

Fuller, I., Gaskin, S. & Scott, I. (2003) Student perceptions of Geography and Environmental Science fieldwork in the light of restricted access to the field, caused by Foot and Mouth Disease in the UK in 2001. *Journal of Geography in Higher Education,* 27, 79-102.

Gruenewald, D. (2003). The best of both worlds: A critical pedagogy of place. *Educational Researcher,* 32(4), 3–12.

Healey, M. & Jenkins, A., (2000). Kolb's Experiential Learning Theory and Its Application in Geography in Higher Education, Journal of Geography, 99:5, 185-195.

HIrd, M. (2003). Case Study. In Robert L. Miller, & John D. Brewer (Eds.), *The A-Z of Social Research.* (pp. 23-25). London, England: SAGE Publications, Ltd.

Hmelo-Silver, C. E., & Azevedo, R. (2006). Understanding complex systems: Some core challenges. *Journal of the Learning Sciences,* 15, 53–61.

Jacobson, M. (2001). Problem solving, cognition, and complex systems: Differences between experts and novices. *Complexity,* 6(3), 41–49.

Kahn, P. H., Jr. (1997). Children's moral and ecological reasoning about the Prince William Sound oil spill. *Developmental Psychology,* 33, 1091–1096.

Katula, R. A., & Threnhauser, E., (1999). Experiential education in the undergraduate curriculum. *Communication Education,* 48:3, 238-255.

Kenney, J., Price-Militana, H., & Horrocks-Donohue, M. (2003). Helping teachers to use their school's backyard as an outdoor classroom: A report on the watershed learning center program. *The Journal of Environmental Education,* 35(1), 15–21.

Kern, E. L. & Carpenter, J. R. (1984). Enhancement of student values, interests and attitudes in Earth science through a field-orientated approach. *Journal of Geological Education,* 32, 299-305.

Kern, E. L. & Carpenter, J. R. (1986) Effect of field activities on student learning. *Journal of Geological Education*, 34, 180-183.

Keynan et al. (2014). The repertory grid as a tool for evaluating the development of students' ecological system thinking abilities. *Studies in Educational Evaluation,* 41, 90–105.

Kibbe et al. (2014). Exploitative vs. appreciative use of nature – Two interpretations of utilization and their relevance for environmental education. *Studies in Educational Evaluation,* 41, 106–112.

Kimble, G. (2014). Children learning about biodiversity at an environment centre, a museum and at live animal shows. *Studies in Educational Evaluation,* 41, 48–57.

Knowles, M. S. (1980). *The modern practice of adult education: From Pedagogy to Andragogy.* Revised and updated. Cambridge Adult Education, NJ.

Kolb, A.Y., & Kolb, D.A. (2005). Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education. *Academy of Management Learning & Education*, Vol. 4, No. 2, pp. 193-212.

Kolb, D.A. (1984). Experiential learning: experience as the source of learning and development. Available at: http://www.learningfromexperience.com/images/uploads/process-of-experiential-learning.pdf (31.05.2006) local file name: kolb84 Kolb Experiential learning.pdf

Kraljevic, G.M. (2011). Does the Manitoba science curriculum help teach teens to be more environmentally-minded? Thesis submitted to the Faculty of Graduate Studies. University of Manitoba, Faculty of Education, Department of Curriculum, Teaching, and Learning.

Krueger, R. A., & Casey, M. A. (2009). *Focus groups: a practical guide for applied research.* 4th ed. SAGE Publications, Inc.

Kuh, G. D. (2008). High-Impact Educational Practices: What they are, who has access to them, and why they matter. Association of American Colleges and Universities.

Lake et al. (2010). Examining Trends in Adolescent Environmental Attitudes, Beliefs, and Behaviors across Three Decades. *Environmental Behaviour,* 1; 42(1): 61–85.

Leopold, A. (1949). A Sand County Almanac: With essays on conservation from Round River. New York: Ballantine Books.

Lewis, L.H., & Williams, C.J. (1994). Experiential Learning: Past and Present. *New directions for adult and continuing education*, no. 62. Jossey-Bass Inc.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Beverly Hills, California: SAGE

    Publications, Inc.

Magntorn, O., & Hellde´ n, G. (2007). Reading new environments: Students' ability to generalize their

    understanding between different ecosystems. *International Journal of Science Education,* 29(1),

    67–100.

Manoli et al. (2014). Evaluating the impact of the Earthkeepers Earth education program on children's

    ecological understandings, values and attitudes, and behaviour in Cyprus. *Studies in Educational*

    Evaluation, 41, 29–37.

Maskall, J., & Cotterell, S. (2009). Staff Development Awards Fieldwork Module Evaluation –

    Environmental Techniques. Experiential Learning CETL Centre for Excellence in Teaching and

    Learning, University of Plymouth, UK.

Maskall, J., & Stokes, A. (2008). Designing Effective Fieldwork for the Environmental and Natural

    Sciences. GEES Subject Centre Learning and Teaching Guide.

Mazzocchi, F. (2006). Western science and traditional knowledge: Despite their variations, different

    forms of knowledge can learn from each other. *Science and Society,* 7 (5), 463-466.

McPherson, C. F., & Mayer, S. M. (2014). The importance of connection to nature in assessing

    environmental education programs. *Studies in Educational Evaluation,* 41, 85–89.

Merriam, S. B. (1998). *Qualitative research and case study applications in education.* San Francisco:

    Jossey-Bass.

National Center for Education Statistics (NCES). (2002). *Non-traditional undergraduates: Findings from the condition of education 2002*. Washington: U.S. Department of Education.

National Environmental Education and Training Foundation (NEETF). (2000). *Environment-based education: Creating high performance schools and students.* Retrieved from http://www.neetf.org/pubs/NEETF8400.pdf.

National Environmental Education and Training Foundation (NEETF). (2005). *Environment literacy in America.* Retrieved from http://www.neetf.org/pubs/ELR2005.pdf.

Nisbet et al. (2009). The Nature Relatedness Scale: Linking Individuals' Connection with Nature to Environmental Concern and Behavior. *Environment and Behavior,* 41 (5), 715-740.

Orrell, J. (2001). Work-integrated learning in universities: Cottage industry or transformational partnerships? Paper presented at the GIHE/IPON Symposium on Work-Integrated Learning, Griffith University, Australia.

Orrell, J. (2004). Work-integrated Learning Programmes: Management and Educational Quality. AUQA Occasional Publication. Proceedings of the Australian Universities Quality Forum 2004.

Payne, P. G. (2006). Environmental education and curriculum theory. *The Journal of Environmental Education*, 37(2), 25-35.

Penny et al. (2012). Curriculum, climate, and community: a model for experiential education in higher education. Ryerson University, Toronto, Ontario, Canada, under the auspices of the Senate Learning and Teaching Committee.

Quay, J., & Seaman, J. (2013). *John Dewey and education outdoors.* Sense Publishers.

SAGES update. (2012). March 2012. Case Western Reserve University. Available at
www.case.edu/sages/documents/March2012SAGESUpdate.pdf.

Schneider, C. G. (2008). Introduction. High-Impact Educational Practices: What they are, who has
access to them, and why they matter. Association of American Colleges and Universities.

Shepardson et al. (2007). What is a watershed? Implications of student conceptions for environmental
science education and the national science education standards. *Science Education,* 91, 523–553.

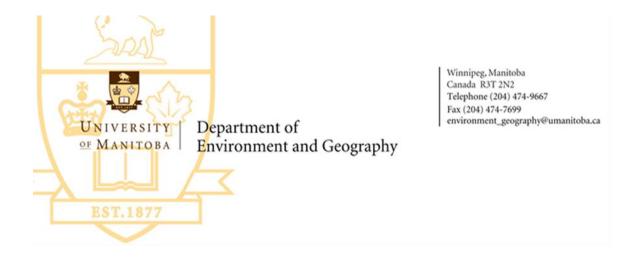Sims, L. & Falkenberg, T. (2013). Developing Competencies for Education for Sustainable
Development: A Case Study of Canadian Faculties of Education. *International Journal of
Higher Education*, Vol. 2, No. 4.

Sipos, Y., Battisti, B., & Grimm, K. (2008). Achieving transformative sustainability learning: engaging
head, hands and heart. *International Journal of Sustainability in Higher Education*, (9), 1: 68-86

Smith, G. A., & Williams, D. R. (1999). *Ecological education in action: On weaving education,
culture and the environment.* Albany, NY: SUNY Press.

Tal, T., & Morag, O. (2009). Action research as a means for preparing to teach outdoors in an
ecological garden. *Journal of Science Teacher Education,* 20, 245–262.

Tam, K.P. (2013). Concepts and measures related to connection to nature: Similarities and differences.
Journal of Environmental Psychology, 34, 64–78.

Tan, M. (2009). Science Teacher Activism: The Case of Environmental Education. *Journal for Activist Science & Technology Education,* 1(1), p. 33. Ontario Institute for Studies in Education, University of Toronto, Canada.

Thomas, I. (2003) Employers Expectations of Graduates of Environmental Programs: An Australian Experience. *Applied Environmental Education & Communication,* 2:1, 49-59.

Thomas, I. & Meehan, B. (2010) Student Preparation for the International Environmental Profession, *Journal of Geography in Higher Education,* 34:1, 91-107.

UNESCO (2006), United Nations Decade of Education for Sustainable Development: Reorienting Programmes, available at: http://portal.unesco.org/education/en/ev. php-URL_ID ¼ 27544&URL_DO ¼ DO_TOPIC&URL_SECTION ¼ 201.html.

Vincent, S. & Focht, W. (2010). In Search of Common Ground: Exploring Identity and Core Competencies for Interdisciplinary Environmental Programs. *Environmental Practice,* Volume 12, Issue 01, pp 76-86.

Watton, P., & Truscott, J.B. (2006). Enhancing student employability & entrepreneurship through the environmental and natural sciences. Centre for Excellence in Teaching and Learning, University of Plymouth, UK.

White, D. (2010). Foreword. In K. Cushman, Fires in the mind: What kids can tell us about motivation and mastery (pp. ix–xi). San Francisco, CA: Jossey-Bass Inc.

Wilensky, U., & Resnick, M. (1999). Thinking in levels: A dynamic systems approach to making sense of the world. *Journal of Science Education and Technology*, 8(1), 3–19.

Zandvliet, D. B. (2012). Development and validation of the Place-Based Learning and Constructivist Environment Survey (PLACES). *Learning Environ Res,* 15:125–140.

Zandvliet, D. B. (2014). PLACES and SPACES: Case studies in the evaluation of post-secondary, place-based learning environments. *Studies in Educational Evaluation,* 41, 18–28

Zint et al. (2014). Evaluating Meaningful Watershed Educational Experiences: An exploration into the effects on participating students' environmental stewardship characteristics and the relationships between these predictors of environmentally responsible behavior. *Studies in Educational Evaluation,* 41, 4–17.

Winnipeg, Manitoba
Canada R3T 2N2
Telephone (204) 474-9667
Fax (204) 474-7699
environment_geography@umanitoba.ca

UNIVERSITY
OF MANITOBA

Department of
Environment and Geography

EST. 1877

Interview Schedule for ESS Students

1. Experiential learning (EL), sometimes called hands-on learning, can take many forms and take place in travel courses, field trips, in the community, work-placements, in the lab, international learning opportunities and others.

   a. Can you please start with your name and telling me if you are in Environmental Sciences or Studies program? Are you in the Co-op program?

   b. Can you tell me about the specific types of EL you undertook in your program?

2. Research points to a number of benefits when EL is incorporated in the undergraduate ESS curriculum. I am interested in your views and personal experiences regarding these benefits. Specifically:

a. In what way, if any, do you feel that EL activities during your ESS studies increased your understanding of the complexities of environmental issues (e.g. natural and anthropogenic interactions, understanding of an ecosystem etc.)? If not, why not?

b. Do you believe (and if so, in what way) that EL activities in your ESS studies improved your preparedness to deal with some of the diverse stakeholders involved in environmental issues (e.g. indigenous communities, government departments, local residents, businesses, environmental groups, politicians, school systems etc.)?   If not, why not?

c. What role, if any, did EL during your studies have in your motivation to learn (the level of interest, optimism, and passion when learning)? What was the significance of EL in your pro-environmental behaviours and values? If not, why not?

d. Generic, or transferable skills are high-order skills that apply across all fields, e.g. communication, collaboration, cooperation, teamwork, leadership, social skills, decision-making, problem-solving, critical thinking, and others. From your experience, what was the significance of EL in the development of these skills? What about technical skills, such as sampling, lab-work, GIS and others? If not, why not?

e. Do you believe that EL helped increase your conceptual gain and systems thinking skills (such as analyzing, synthesizing, applying knowledge, and developing new ways of thinking when responding to new situations)? If yes, can you give me an example? Did you find EL activities in your program effective in long-term knowledge retention? If yes, can you give me an example? If not, why not?

3. Do you feel that EL in ESS programs is important in helping graduates obtain employment in their field of study? What changes, if any, would you suggest in improving the effectiveness of EL in graduate employment prospects?

4. The results of surveys of environmental employers and environmental graduates in the US, Australia, and UK suggest that both graduates' and employers' input should be solicited when developing EL activities within the ESS curriculum. They argue that this will make the connection between the curriculum and the 'real world' stronger, and effectively integrate skill development into the program. What is your perspective regarding this argument?

5. Lastly, as the purpose of this study is to evaluate and learn how to improve EL within ESS programs, what recommendations can you provide for the future implementation of EL? Any other comments or issues that we haven't discussed here?

Appendix 2: Interview Schedule; ESS Graduates

Winnipeg, Manitoba
Canada R3T 2N2
Telephone (204) 474-9667
Fax (204) 474-7699
environment_geography@umanitoba.ca

Interview Schedule for ESS Graduates

1. Can you please start with your name and graduation year? Are you Environmental Sciences or Studies program graduate? Were you in the Co-op program?

2. What is your employer's primary business/function? Can you describe your role and tasks?

3. Can you tell me about the types of EL you undertook in your ESS program (e.g. travel courses, field trips, in the community, work-placements, in the lab, international placements)?

4. In what way, if any, do you feel that EL activities during your ESS studies increased your understanding of the complexities of environmental issues (e.g. natural and anthropogenic interactions, climate change, lake eutrophication, understanding of an ecosystem etc.)? If not, why not?

5. Do you believe (and if so, in what way) that EL activities in your ESS studies improved your preparedness to deal with some of the diverse stakeholders involved in environmental issues? If not, why not?

6. What role, if any, did EL during your studies have in your motivation to learn (the level of interest, optimism, and passion when learning)? What was the significance of EL in your pro-environmental behaviours and values?

7. Transferable skills are high-order skills that apply across all fields, e.g. communication, collaboration, teamwork, leadership, social skills, decision-making, problem-solving, critical thinking, and others. From your experience, what was the significance of EL in the development of these skills? What about technical skills, such as sampling, lab-work, GIS?

8. Do you believe that EL helped increase your conceptual gain and systems thinking skills (such as analyzing, synthesizing, applying knowledge, and developing new ways of thinking when responding to new situations)?

9. Did you find EL activities in your program effective in long-term knowledge retention? If yes, can you give me an example? If not, why not?

10. Can you tell me which EL activities in your ESS program helped you in your environmental career in terms of dealing with the variety of 'real-world' situations?

11. The results of surveys of environmental employers and environmental graduates in the US, Australia, and UK suggest that graduates' and employers' input should be solicited with respect to the development of EL activities within the ESS curriculum. They argue that this will help

strengthen the connection between the curriculum and the 'real world', and effectively integrate skill development into the program. What is your perspective regarding this argument?

12. Did EL activities during your ESS studies help you obtain employment in your area of study? (If yes, please explain in what way; if not, why do you think it did not help you?)

13. Lastly, as the purpose of this study is to evaluate and learn how to better integrate EL within ESS programs, what recommendations can you provide for the future implementation of EL?

14. Any other comments or issues that we haven't discussed?

Winnipeg, Manitoba
Canada R3T 2N2
Telephone (204) 474-9667
Fax (204) 474-7699
environment_geography@umanitoba.ca

Interview Informed Consent

Researcher: Lorna Roca, MEnv. Candidate, Environment and Geography, University of Manitoba. Email: umroca@myumanitoba.ca Phone: xxx-xxx-xxxx

Research Supervisors: Dr. Michael Campbell, Director, Natural Resources Institute, Phone: 204-474-8514, Email: michael.campbell@ad.umanitoba.ca & Dr. Bruce Erickson, Assistant Professor, Environment and Geography. Phone: 204-474-6991, Email: bruce.erickson@umanitoba.ca

Purpose of the Research: To increase understanding about the merit of experiential learning (EL) in undergraduate environmental programs, from students' and graduates' perspectives through a case-study of Environmental Sciences and Studies (ESS) programs in the Department of Environment and Geography at the University of Manitoba

Research Procedure: You will participate in a focus group interview/discussion format, consisting of approximately 6-8 ESS students (if you are a student) or 6-8 graduates (if you are a

graduate). The focus group is designed to last approximately 2 hours. During this time, you will be offered food and refreshments, free of charge. The interview protocol will be used for asking questions and recording answers, using a digital audio-recorder device combined with my note-taking. Specific questions/topics for discussion include your experience in the ESS program, your recollection of EL activities, the knowledge and skills you acquired from them, your perspectives of the role of EL in the ESS curriculum and in environmental careers, and your recommendations on the future implementation of EL within the ESS programs.

Permission to be recorded: Your eligibility to participate in this study is dependent on your agreement to be recorded. If you wish to proceed, please check the box below:

☐ I agree to the use of voice recorder during the interview/focus group.

Confidentiality: I will keep any information gathered in this research strictly confidential. You will not be named or identifiable in any reports or any other public forums. Any direct quotes will be assigned an alias for any public presentation or communication. All data will be identified only by code number and kept in a locked filing cabinet in my home office and on my password-protected personal computer. The only persons who will have access to information collected in the project are research supervisors and me. I will transcribe interviews and in the process, remove all personal identifiers. Data containing personal identifiers (e.g. this consent form) will be destroyed once the project reaches its conclusion, approximately 01/16.

Voluntary Participation: Your participation is completely voluntary. You may discontinue your participation at any time and for any reason up to October 1st, 2015 (anticipated date of

interview information analyzing/ thesis writing) by contacting Lorna Roca (the researcher) at email: umroca@myumanitoba.ca or phone: xxx-xxx-xxxx.

Feedback: In order to make your experience as educational as possible, I will provide to you a brief summary of study results within one month after this interview via email. In addition, if you would like to receive a copy of the final thesis document upon its approval, please contact me via above noted contact information and I will be happy to provide you with one. I anticipate having the final thesis document available by May of 2016. If you would like to receive the summary of study results via surface mail, please provide your mailing address here:

$\rightarrow$

Dissemination: After this research is completed, I will be presenting it at the University of Manitoba as a part of the master's degree requirement. Pending approval, the thesis will be published according to Faculty of Graduate Studies' guidelines. Additionally, the results from this research may be disseminated at professional meetings and by publication in academic journals. No form of dissemination of this work will jeopardize your right to confidentiality.

Risks and Benefits: There is no risk to you from participating in this research. There may be a short-term benefit to you in terms of having an opportunity to network with individuals with the same educational background and interest, and to share your educational experiences and ideas as they pertain to EL in your field of study. In the long-term, you may benefit if the findings of this research help persuade decision-makers to give EL a more prominent role in the ESS

program curriculum, by having a satisfaction of knowing that your ideas and recommendations have helped make a change in a positive direction.

Participant Consent: Your signature on this form indicates that you have understood the information regarding participation in the research project and agree to participate. In no way does this waive your legal rights nor release the researchers or involved institutions from their legal and professional responsibilities. You are free to refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout the research.

This research has been approved by the Joint Faculty Research Ethics Board, Protocol number: J2015:076. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat (Maggie Bowman) at 204-474-7122. A copy of this consent form has been given to you to keep for your records and reference.

_____

Participant Signature   Date

Thank you for being an important part of this research project!

Appendix 4: Summary of Recommendations

- Define, articulate, promote and communicate to ESS students all EL opportunities available through the department

- Design the required courses to have greater EL components that could establish networking relationships within the environmental sector

- Incorporate a higher number of for-credit EL courses that pertain to all focus areas (specializations) within the ESS programs so the students do not have to look for these courses at other faculties/ departments and consequently run into problems with conflicting schedules

- Connect EL activities to concepts taught in class, with lectures taking place prior to EL activities

- Types of EL Participants Recommended In the ESS programs:

    — International work or study experiences

    — Experiences that immerse students in the community and environmental issues

    — Experiences where students have an active role (as opposed to that of a passive observer) and last longer

    — EL that incorporates stakeholder engagement and improves students' preparedness to deal with diverse stakeholders involved in environmental issues

— Research opportunities (e.g. internship opportunities with professors)

— Student groups (e.g. MEIA, student chapters of groups)

— Job shadowing (e.g. two-three weeks in the field or an office, or two-three different businesses/organizations per semester)

— Comprehensive sampling course that includes all types of sampling (in environmental science context) and all pertinent sampling and lab tasks

— Different types and opportunities for professional networking (e.g. Wildlife Society's couch-sessions/ discussions with different professionals; Speed-mentoring, where students have an opportunity to sit with different professionals and ask professional questions; career fairs; conferences; "mentor for a day" where students are matched with a professional from their focus area)

— Workshop-oriented courses (e.g. a two-week workshop within the EA stream)

- Stagger EL classes between lectures to provide access to alternative learning for students who struggle in lecture-based classes

- Investigate the approach to EL in college learning and integrate the components of this model into the ESS programs

- Provide opportunities for work experience that will count towards professional designations and certifications (e.g. LEED Certification, Environmental Professional Designation, Wildlife Biologist Certification etc.)

- Expand and strengthen the Co-op program to ensure that:

  — Every student in the Co-op is guaranteed a work placement

  — The Co-op program is well connected with environmental industry (including private/corporate, non-profit, and all three levels of government) so that all focus areas (specializations) and students' interests are represented in work placements (business faculty was exemplified as a model)

  — Students get full credit hours for work placements

  — Students get coaching on how to seek and apply for professional (non-student) positions after graduation

  — There is a sufficient number of Co-op Program Coordinators to provide adequate support to students

- Implement a formal mechanism for obtaining students', graduates' and employers' input when developing EL activities within the ESS curriculum:

  — Have recent ESS program graduates provide input in developing EL activities (as opposed to someone who graduated 10-15 years ago)

  — Ask students what is important to them and what they would like to get out of the program, ask for ideas

— Ask graduates these types of questions (from the interviews), as well as what they liked about the program, what needs to be changed, ask for ideas

— Eliminate the "intimidating practice of giving out public sheets of filling out a course evaluation" at the end of the course (participants perceived this practice as not being anonymous and not producing results that will benefit students)

— Implement a collaborative evaluation between students and the instructor, where suggestions and ideas can be discussed and exchanged at mid-point of the course so that students can benefit directly from this process

- Provide smaller class sizes which will allow for more meaningful involvement in EL activities and discussions

- Coach students and establish a connection between different levels of education and life to make the transition easier: high school to university to practice