

**AN INVESTIGATION OF SUSTAINABILITY-ORIENTED COURSES:
STUDENT VIEWS AND EXPERIENCES**

By

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ABSTRACT

With an increased awareness of climate change and environmental concerns, and a worldwide call for the integration of sustainability into the curriculum, universities are looked upon as agents of change to incorporate and integrate sustainability into their operations, research, teaching and learning. To address this call for leadership, institutions of higher education are incorporating a focus on sustainability into their mission statements, policies, practices and courses. In 1997, the University of British Columbia (UBC), Vancouver, was the first Canadian university to adopt a sustainable development policy, and today, UBC continues the pursuit of sustainability education leadership by preparing its students to be global citizens.

This study investigated students' learning experiences in UBC courses that teach about sustainability, as well as students' perceptions and views towards what is valued for their understanding of sustainability concepts and pedagogies.

The study examined students' understanding and awareness of sustainability and their views on their own learning through an in-depth qualitative analysis approach that involved focus groups, one-on-one interviews, classroom observations, and document analysis. Findings indicate two factors play a role in students' understanding and integration of knowledge of sustainability concepts and their motivation to engage in sustainability-related activities: 1) multi-disciplinary environments and peer interactions that involved project-based group work and 2) philosophical and holistic discussions of sustainability-related issues. Data analysis also indicated that while participating in sustainability-oriented courses increased students' interest in sustainability, students felt restricted in

their exploration of the issues due to the strict degree and program requirements imposed by the university departments.

Findings from this study inform future course design and the development of a comprehensive and cohesive sustainability curricula at UBC and other institutions of higher education.

PREFACE

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A version of this study is available in an online repository of the Association for the Advancement of Sustainability in Higher Education (AASHE), Student Research on Campus Sustainability section. Hunter, K., Mayer-Smith, J. and Anderson, D. (2012). A Qualitative Investigation of Sustainability-Oriented Courses at UBC.

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GLOSSARY

Attitude: Attitude refers to the evaluation of a specific object, quality, or behaviour as good or bad, positive or negative (Leiserowitz, Kates & Parris, 2006).

Awareness: To be aware means to be mindful or heedful. Awareness implies knowledge gained through one's own perceptions or by means of information (*The Free Dictionary by Farlex*, n.d.).

Behaviour: Behaviour refers to concrete decisions and actions taken by individuals and groups, which are often rooted in underlying values and attitudes (Leiserowitz *et. al.*, 2006).

Motivation: Motivation is the desire to do things (*Psychology Today*, n.d, How to Get Motivated, para. 1).

Sustainability: Sustainability relates to ways of thinking about the world, and forms of social and personal practice that lead to:

- ethical, empowered and personally fulfilled individuals;
- communities built on collaborative engagement, tolerance and equity;
- social systems and institutions that are participatory, transparent and just; and
- environmental practices that value and sustain biodiversity and life-supporting ecological processes

(Hill, S.B., Wilson, S. and Watson, K., (2003), as cited in UN Decade of Education for Sustainable Development 2005-2014 (DESD), 2006, p. 11).

Sustainable Actions: Sustainable actions are actions that positively impact environmental, social and/or economic sustainability, such as bicycling to school.

Sustainability Education: Sustainability education is fundamentally about values, with respect at the centre: respect for others, including those of present and future generations, for difference and diversity, for the environment, and for the resources of the planet we inhabit (Walking The Talk.bc.ca, n.d., What is Sustainability Education, para. 3).

Values: Values are abstract ideals, such as freedom, equality, and sustainability. They often evoke emotional reactions and are typically expressed in terms of good or bad, better or worse, desirability or avoidance. Values define or direct us to goals, frame our attitudes, and provide standards against which the behavior of individuals and societies can be judged (Leiserowitz *et. al.*, 2006).

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DEDICATION

I would like to dedicate this work to all the individual, grassroots and institutional efforts in promoting sustainability education.

CHAPTER 1: INTRODUCTION

1.0 Introduction

Climate and environmental changes are a serious threat faced by our human society today (Steffen, Crutzen & McNeill, 2007; Intergovernmental Panel on Climate Change (IPCC), 1995, 2001, 2007). Teaching and learning about these issues are essential and crucial ways to not only investigate and elucidate these problems but to also increase awareness, monitor, and evaluate ongoing challenges and propose alternative educational strategies (*Agenda 21*, 1994). In 2002, the United Nations (UN) declared 2005 to 2014 the Decade for Education for Sustainable Development, realizing the growing need for teaching, learning and research in promoting sustainability (UN World Summit Report on Sustainable Development, 2002).

1.1 Background

According to the Halifax Declaration “human demands upon the planet are now of a volume and kind that, unless changed substantially, threatens the future well-being of all living species. Universities are entrusted with the major responsibility to help societies shape their present and future development policies and actions into the sustainable and equitable forms necessary for an environmentally secure and civilized world” (The Halifax Declaration, 1991). Universities are looked upon as important change agents where both knowledge creation and knowledge exchange occurs. In 1990, the University of British Columbia (UBC) became one of 300 universities to sign the Talloires Declaration, an action plan for incorporating sustainability into higher education. “These institutions have pledged to make sustainability the foundation for campus operations,

research, and teaching” (*Inspirations and Aspirations: UBC sustainability strategy, UBC SAS, 2009*).

Recognizing the role universities play as change agents (Stephens, Hernandez, Roma´n, Graham & Scholz, 2008) and the need to educate global citizens who can be leaders in addressing the planet’s environmental problems, the University of British Columbia in Vancouver, Canada adopted a Sustainable Development Policy in 1997. In 1998, UBC became Canada’s first university to open a campus Sustainability Office to help achieve these goals.

As a result of these commitments, UBC made several changes to enhance operational sustainability. Some examples of this can be seen in the UBC’s world-renowned green buildings initiative, student outreach activities, the ECOTrek energy and water reduction project, the implementation of the U-Pass to reduce traffic, and the planned groundwater heat exchange system at the Okanagan campus. Through these changes, UBC met Canada’s Kyoto protocol targets of decreasing greenhouse gas emissions by 22% from 2000 levels, in 2010-2011 (*Inspirations and Aspirations: UBC Sustainability Strategy, 2011*). In 2003, 2005 and 2006, UBC was the country’s first and only university to receive Green Campus Recognition from the U.S.-based National Wildlife Federation (UBC Sustainability Initiative (USI), Overview section, n.d.). With its most recent modifications and revisions in the Sustainability Strategy, UBC aims to further sustainability in three major areas – Teaching and Learning, Research, and Operations (*Exploring and Exemplifying Sustainability: UBC’s Sustainability Academic Strategy (UBC SAS), 2009*).

1.1.1 UBC Sustainability Initiative

The UBC Strategic Plan – Place and Promise (Place and Promise: The UBC Plan, 2009) highlights six key commitments that frame the University’s vision: Aboriginal Engagement, Alumni Engagement, Intercultural Understanding, International Engagement, Outstanding Work Environment, and Sustainability. According to the UBC’s Place and Promise Vision statement – “As one of the world’s leading universities, The University of British Columbia creates an exceptional learning environment that fosters global citizenship, advances a civil and sustainable society, and supports outstanding research to serve the people of British Columbia, Canada and the world” (Place and Promise – The UBC Plan, 2009). In 2009, UBC also developed a comprehensive Sustainability Academic Strategy (UBC SAS), providing “a framework to guide the UBC community in ongoing planning and decision-making for sustainability” (UBC SAS, 2009), through recommendations in three major activity areas – Teaching and Learning, Research, and Operations. One of the major recommendations of the UBC SAS was the creation of the UBC Sustainability Initiative (USI) to further the implementation of the proposed initiatives. Hence, USI is a university-wide support initiative that coordinates and implements these recommendations. USI has three major units of operation: Teaching and Learning, Research, and Campus Operations.

As part of the USI, the Teaching and Learning Office (TLO) focuses on building curricular capacity to offer both undergraduate and graduate students the ability to incorporate sustainability-related curriculum and experiences into their degrees regardless of their programs. The TLO’s mandate is “to educate the next generation of sustainability leaders by transforming and coordinating undergraduate and graduate sustainability education at UBC” (UBC Sustainability Initiative, USI, n.d., Teaching and Learning Office Initiatives section, para.1).

1.2 The Problem

Despite the emphasis on sustainable development over the last decade, and calls for leadership in sustainability education in institutions of higher education (Bhandari & Abe, 2003; Sterling, 1997; Tilbury, 1995), to date there is very little research or evaluation of sustainability courses offered at Canadian universities. There has been considerable research on the general emphasis of sustainability education at higher education institutions, with a major focus on the elements, facts, history, framework and integration of sustainability curricula (Clugston & Calder, 1999; Rowe, 2007; Second Nature, 2001; Yousey-Elsener, Keith & Ripkey, 2010). Authors of such research offer models and frameworks to build upon the existing and new curriculum to integrate sustainability (United Nations Decade for Sustainable Development (UN DESD), 2006); these are explored further in Chapter 2.

With the underlying theme of globalization and encouraging students to be global citizens, UBC adopted a sustainable development policy in 1997 and revised it in the most recent UBC Sustainability Academic Strategy (UBC SAS) in 2009. The UBC SAS focuses on promoting sustainable practices through teaching, learning and research. In January 2011, UBC Sustainability Initiative identified over 450¹ courses dealing with some aspect of sustainability, in its academic calendar. Course instructors have identified these courses as “related to sustainability”. However, no research to date has been conducted to evaluate whether - and how - these courses are promoting sustainability, literacy about climate change, and citizen action among the students who take them. Since curriculum and coursework are still the key elements of learning in universities, it is essential that we examine their influences on students.

¹ The total number of courses offered at UBC in 2011 was 4964 (UBC).

1.3 Purpose of the Study

This study seeks to evaluate the impact of teaching and learning initiatives involving sustainability and sustainability-oriented courses at UBC. Further, the study investigates students' understanding of sustainability concepts, and if students are able to implement the strategies for environmental stewardship that they learned through their coursework. Thus, I ask the question: how do the university courses translate sustainability for the students enrolled?

Specifically, this study investigated three research questions:

1. What aspects of course curricula indicate sustainability content that aims to foster sustainable actions and awareness?
2. What pedagogical and course characteristics enhance student understanding and translation of sustainability concepts into practice?
3. What course-related experiences influence student actions, attitudes towards and motivation for sustainability in their career and personal lives?

1.4 Study Significance

The results of this study may inform the further development and refinement of a sustainability curriculum at UBC and beyond. This study will provide feedback that may assist the UBC Sustainability Academic Strategy (SAS) and the UBC Sustainability Initiative (USI) in the implementation of these courses and curriculum. Moreover, the research will also explore and focus on students' understanding of sustainability, their actions, and involvement in the development of the

curriculum and thus contribute to the larger call for post-secondary institutions to educate future leaders in the area of sustainability.

This research begins to examine how students perceive university-level courses that teach about sustainability. The study is the first phase of research that seeks to understand the long-term impact of sustainability-focused courses and a larger review of sustainability initiatives and courses at UBC that will inform and support the development of a coherent and comprehensive sustainability curriculum. The findings will be of interest to course instructors and curriculum developers interested in sustainability education and may inform the development and re-design of courses at UBC and at other universities world-wide. This research may prompt a review of all courses that claim to teach about sustainability at UBC and other institutions of higher education. There are definable attributes of courses that make sustainability education relevant and comprehensible for students. I believe these attributes can be adapted to enhance and bring a sustainability focus into the larger curriculum arena. Finally, this research begins to examine some of the broader questions regarding the issue of sustainability education such as, “to what extent can we solve the problem of unsustainability through education?” and “what kind of sustainability curriculum is required to bring about the necessary and timely change?”

1.5 Overview of Methodology

Sustainability is a universal educational issue. It is also a community and societal issue. Therefore conducting a qualitative research study that is reflective and dialectical in nature provides a platform for students’ input, reflections, and experiences in these courses through in-depth one-on-one interviews. Hence, for this study, I employed a qualitative research approach using focus groups and one-on-one interviews in addition to in-class observations and course document analysis as the

key methods. I investigated three sustainability-focused courses offered at the University of British Columbia during the 2010-2011 Fall term. Thirteen student participants, three course instructors, and the Executive Director of the UBC Sustainability Initiative (USI) were interviewed to provide a big picture of the scope and future directions of sustainability teaching and learning at UBC.

1.6 Organization of the Thesis

This study is driven by the three key research questions identified earlier. The thesis identifies related research and illustrates how course content, pedagogical approaches, and student experiences in sustainability-oriented courses influence students' understanding of the concepts and their attitude towards sustainability. Furthermore, the study indicates areas where further research is needed in the field. In Chapter One, the context of this study is described in terms of the need for sustainability education and the role of universities, the background of the sustainability education movement and the USI, and the mandate of the Teaching and Learning Office, USI, as well as the issues that exist in the field of sustainability education. The research questions that guided this study are found in this chapter as well as a discussion of the significance of this research and a brief overview of the methodology. In Chapter Two, the related literature is reviewed, with a brief history of sustainability education. Research on sustainability curriculum frameworks, pedagogical approaches, and course characteristics are explored, followed by the theoretical framework that I utilized to explain, analyze and understand the results of the study. Chapter Three presents the study's methodology and methods utilized to investigate the research questions. The research context is described followed by the study procedures and methods implemented for data analysis. The study's limitations are also discussed. In Chapter Four, the study's results are displayed and discussed. Chapter Five presents a synopsis of study findings as they pertain to each research

question and discusses future research possibilities and my personal reflections. The thesis concludes with a Bibliography and the Appendices.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this chapter, I examine the literature starting with a brief history of sustainability education followed by an examination of some sustainability frameworks and models proposed by researchers. I also present the pedagogical and course characteristics that appear to enhance student understanding of sustainability concepts and identify some evaluative research on sustainability curriculum and programs, in terms of examining student learning. My review of this literature sets the scene for the investigation of the three research questions that guided this study and the methodology employed to collect and examine the data.

2.1 Sustainability Education

In North America, the modern environmental movement can be traced back to the late nineteenth and early twentieth century, with major emphasis on nature. In 1987, the United Nations (UN) endorsed the concept of Sustainable Development “in response to a growing realization of the need to balance economic and social progress with concern for the environment and the stewardship of natural resources” (World Commission on Environment and Development, 1987). At the 57th United Nations General Assembly in 2002, the UN declared the years 2005-2014 the Decade for Education for Sustainable Development thus realizing the growing need and importance of teaching, learning and research in promoting sustainability (*UN decade of education for sustainable development 2005-2014, UN DESD, 2005*). Since then, the Association of University Leaders for Sustainable Development has partnered with the International Association of Universities and the

UNESCO to promote the integration of sustainable solutions across university campuses including teaching and learning, research and operations.

Research shows that most advanced and educated nations leave the deepest footprints and have higher energy consumption rates than less developed countries (UNESCO, n.d.). Figures from the 2010 UNESCO Institute for Statistics Data Centre show that in the United States on average 76 percent of the population has received some post-secondary education, and that school life expectancy (the years spent in schools from primary to tertiary education) in developed countries is higher than in developing countries. People in developed countries have better access to education and per capita are more highly educated. However, people with higher education also tend to consume more energy than people in underdeveloped countries (Orr, 1991; Orr, 2002). People with an advanced level of education have higher income, and socio-economic status, and can afford more luxuries, which correlates with higher energy consumption; suggesting there is need for education that addresses the issues of sustainability. Elie Wiesel, author and political activist, points out that our current education emphasizes “theories instead of values, concepts rather than human beings, abstraction rather than consciousness, answers instead of questions, ideology and efficiency rather than conscience” (Global Forum for Environment and Development for Survival, 1990 as cited in Orr, 1991, para 5).

The UN declaration of the Decade for Education for Sustainable Development called for curriculum change, prompting some universities, colleges, and schools to begin integrating sustainability into their curriculum. However, the sustainability movement in elementary, secondary and higher education institutions is still relatively new in development. In British Columbia, Canada, sustainability education in the K-12 school curriculum began in the 1930’s with a ‘Community

Civics' social studies course, which aimed to provide students with "conscious and constant purpose of cultivation of good citizenship" (Nelson, 1916). Drawing upon progressive pedagogy and Dewey's (1916) concept of 'Democratic Education', the purpose of the course was to develop an understanding of the government bodies and their purpose with a focus on the social aspects of community building as well as improving democracy with the emphasis on 'morality-based education' or character education (Broom, 2011). Character education involved advancing students' interest in service, their open-mindedness, and recognition of their responsibilities towards the present and future of their community and the world.

In the 1930's, Community Civics was part of the BC Curriculum and included an early sustainability education focus by including recommendations for environmental care and stewardship, advocating conservation, and to use natural resources wisely. The Canadian Community Civics textbook, *Studies in Citizenship* (McCaig, 1925), included lessons on sustainability where cooperation, collaboration, and community were emphasized and advocated. The text included issues of environmental care and stewardship, conservation, and renewable resources (Broom, 2011). However, from 1960 through the mid 1990's the emphasis on sustainability education decreased significantly due to emphasis on other subjects and topics of interest (Broom, 2011). It is only recently that the schools have started to reorient their curriculum to integrate sustainability (UNESCO, n.d.).

2.2 Sustainability Models and Frameworks

In institutions of higher education, there have been several initiatives, programs, and research that promote sustainability education (Fien, 2002; Clugston & Calder, 1999; Clark & Button, 2011;

Bacon, Mulvaney, Ball, DuPuis, Gliessman, Lipschutz, & Shakouri, 2011). There are several research studies on these initiatives and programs which generally focus on campus operations through energy conservation, “green” purchasing policies and assessing and monitoring the ecological footprint of a campus (Fien, 2002; Besant Hill School, 2009; Shriberg, 2002). In the area of teaching and learning and curriculum development, studies focus on providing reasons for the need of curriculum reform, highlighting successful programs (*Education for affective development*, UNESCO, 1992), identifying areas of growth, and providing frameworks for curriculum development (Clugston & Calder, 1999; Fien, 2002; Wals & Jickling, 2002).

Clugston and Calder (1999) identify strategies for the advancement of sustainability in higher education and curriculum. They authors propose that institutions:

1. Incorporate sustainability in the university’s mission statement.
2. Incorporate the concept of sustainability across various disciplines, academic units, faculties and research departments and provide students with a firm grounding in basic disciplines and critical thinking skills through discussion of topics, such as environmental philosophy.
3. Teach students about how a campus functions in the ecosystem and its contribution to a sustainable economy, how the institution views and treats its employees, their involvement in decision making, their status and benefits, and the basic values and core assumptions of academic disciplines.
4. Provide incentives and significant development opportunities to faculty and staff for integrating sustainability into their research, teaching, and enhancing their understanding of the issue.
5. Initiate operational changes to reduce a university’s ‘ecological footprint’ and these practices are integrated into the educational and scholarly activities of the school.

6. Provide campus-life services that emphasize sustainable practices, such as an environmental coordinator, environmental audits, and Earth Day.
7. Create outreach programs and partnership with the university's community to enhance sustainability (Clugston & Calder, 1999).

Clugston and Calder (1999) suggest that these high level changes required to integrate sustainability are crucial to higher education institutions and are a starting point to advancing sustainability through course curriculum. In addition to these strategies, several frameworks have been suggested to incorporate sustainability into the institution's curriculum.

Second Nature is a national non-profit organization in Boston which is helping higher education institutions integrate and promote sustainable education and thinking. They have categorized their sustainability framework for promoting sustainability into seven critical sustainability themes:

1. Scale: time but also the local and global effects
2. Human connections: to the physical and natural world
3. Ethics and values
4. Natural systems
5. Technological and economic sustainability
6. Environmentally sustainable behaviour
7. Pedagogical strategies: for integrating sustainability (Second Nature, 2001).

The UN's framework (UN DESD, 2005) for Sustainability Education highlights seven key characteristics as crucial for a well-rounded education for sustainable development:

1. Interdisciplinary and holistic
2. Values-driven

3. Critical thinking and problem solving
4. Multi-method
5. Participatory decision-making
6. Applicable
7. Locally relevant

These frameworks offer a high level curriculum and course change models that can be used by institutions interested in incorporating a sustainability focus in their educational programs. The UN DESD (2005) framework specifically highlights characteristics and elements that could be incorporated into a course and calls for multi-method and participatory pedagogical approaches and course characteristics that promote sustainability awareness within the student population.

2.3 Pedagogical and Course Characteristics

Research suggests that interactive approaches can support active, experiential, and interdisciplinary pedagogy and learning (McKernan, 2008; Schiro, 2008; Jones, Selby, & Sterling, 2010; Wals and Jickling, 2002). Jones and colleagues (2010, p.46-48) identify and summarize extensive research on several methods that can be used to help students understand sustainability concepts. These are described briefly in the following section:

1. *Role Plays* provide an opportunity for students to gain an in-depth understanding of the situation or another person's perspectives. One challenge is that these activities are time consuming to organize and implement, and therefore not as popular in higher education (Oulton, Dillon, & Grace, 2004, as cited in Jones *et. al.*, 2010).

2. *Group Discussions* are the most popular mode of pedagogy in both higher education institutions and high schools and considered as an appropriate practice for teaching about sustainability (Cotton, Bailey, Warren, & Bissell, 2007, as cited in Jones *et. al.*, 2010). They provide interactive engagement with peers on a relevant topic. However, without guidance and specific instructions as to the purpose of the discussion from the instructor, discussions can be potentially confrontational and turn into social talks between peers (Jones, 2003, as cited in Jones *et. al.*, 2010).
3. *Stimulus Activities*, which involve watching videos or reading newspaper extracts to start a discussion or reflection activity, (Oulton *et. al.*, 2004, as cited in Jones *et. al.*, 2010) are also useful for sustainability learning. Student can get involved in collecting their own photos and videos and take part in campus greening discussions.
4. *Debates* between two groups encourage student to gather data in support of their argument. However, if not well-designed or managed properly, debates can become confrontational and put students in situations where they make up their minds prematurely before gathering evidence in support of their stance (Oulton *et. al.*, 2004, as cited in Jones *et. al.*, 2010).
5. *Critical Incidents* is an approach described by Nott and Wellington (Nott and Wellington, 1995, as cited in Jones *et. al.*, 2010). This strategy involves asking students to identify their stance on a particular situation or problem, and what they would do, what they could do and what they should do. This learning activity encourages students to investigate their personal perspectives and actions in light of a moral or ethical stance.

6. *Case Studies* are also a popular pedagogical approach used in sustainability education, where students investigate a local issue in their community and work on finding solutions. Cases can be used to emphasize “reflection, research, participation, and action” (Junyent & de Ciurana, 2008, p.769, as cited in Jones *et. al.*, 2010).
7. *Reflexive Accounts* provide students with an opportunity to consider their own position, attitudes and knowledge constructs in relation to new knowledge, thereby providing a reflexive experience and an investigation into one’s own prejudices (Jones, 2003; as cited in Jones *et. al.*, 2010).
8. *Critical Reading and Writing* can be used to enhance sustainability literacy (Jones *et. al.*, 2010).
9. *Project-Based Learning* provides students with an opportunity to study a sustainability issue through in-depth planning, action, research, reflection and evaluation. This promotes both conceptual and practical application of sustainability ideas (Brunetti, Petrell, Sawada, 2003, as cited in Jones *et. al.*, 2010).
10. *Fieldwork and/or Outdoor Experiential Pedagogies* are considered the most influential strategies for promoting sustainable practices in students (Sivek, 2002, as cited in Jones *et. al.*, 2010). These approaches promote critical thinking through the examination of multiple stakeholder roles and perspectives while linking theory to real world examples and situations (Hope, 2009, as cited in Jones *et. al.*, 2010).

McKeown (2011) suggests employing rubrics to prompt students to reflect on important elements of sustainability. Implementing correct pedagogical approaches can also help build students' desires for sustainability or environmental advocacy, as college is the ideal time for environmental advocacy and awareness to begin (Meyers & Beringer, 2010). These pedagogical and course characteristics have been shown to provide students with meaningful learning experiences that enhance their understanding of the concepts learned in the classroom. But to evaluate the impact of these strategies with respect to students learning of sustainability concepts and skills in applying those concepts, students' experiences and perspectives need to be studied. Research suggests that student's perspectives are important in the development of teaching and learning processes and to build a healthy sustainable democratic society (Osler, 2010; Cook-Sather, 2002). Understanding students' perspectives on these pedagogical and course characteristics will provide instructors with information to enhance and develop their pedagogies accordingly; to tailor their lessons to better suit their audience and make learning *affective* and student-centered.

2.4 Students' Views and Experiences

Based on my review of the relevant literature, to date there has been limited research on university level students' views on sustainability-focused courses and pedagogical characteristics and what course-related experiences influence student actions, attitudes towards and motivation for sustainability in their career and personal lives. Research aimed at measuring and changing students' environmental beliefs and attitudes through course-based approaches (Bull, 1992; Mangas, Martinez & Pedauye, 1997; Tyler-Wood, Cass & Potter, 1997; Heath, 1996; James, 1997; Leeming, 1997; Thomas, 1996; Bogan, 1992) focused on students' perceptions and beliefs about the environment and

nature (Hart and Nolan, 1999), rather than their experiences in courses and views on course and pedagogical characteristics. A study conducted by Aighewi and Osaigbovo (2010) investigated students' opinion on the introduction of a worldwide environmental literacy. The researchers surveyed 800 undergraduates from Africa, North America, and European universities and found that the majority of students supported the adoption of a worldwide environmental literacy requirement. However students from developing countries who took part in this survey were significantly more supportive of a literacy requirement than students from developed countries. Researchers suggest that this finding could be attributed to increased access to technology in developed countries. But such an explanation is not straightforward. While greater access may lead to students losing connection with nature as they spend more time indoors involved with computers and television, it can also provide online information about environmental and sustainability issues.

Other research has focused on a course or examined case studies and evaluations of specific programs (Michalos, McDonald & Kahlke, 2009; Bacon, *et. al.*, 2011; Clark & Button, 2011; Scott, 2010). These studies provide information on the outcomes and implications for a course or program and offer recommendations to enhance a program's effectiveness through further research. Michalos *et. al.* (2009) conducted an exploratory investigation to develop a standardized test of people's knowledge, attitude, and behaviour concerning the basic theme of the UN Decade of Education for Sustainable Development (DESD) and examined the outcomes of such a survey. Researchers found that an increase in the knowledge and positive attitudes towards sustainable development is not matched by an increase in sustainable actions and behaviour. Bacon *et al.* (2011) discuss their experiences in developing an interdisciplinary sustainability curriculum linking theory and practice. Reflecting on the development process of an integrated sustainability curriculum, the researchers report that an interdisciplinary project-based pedagogical approach enhanced student understanding

of sustainability but challenges were faced due to disciplinary silos and university's organizational structure (Bacon *et al.*, 2011). Clark and Button (2011) investigated a sustainability transdisciplinary education model (STEM) which integrated arts, science, and community to provide shared learning opportunities for university students, K-12 students, and society at large. The integrated interdisciplinary model expanded students understanding of sustainability and metacognition to creatively address sustainability challenges (Clark & Button, 2011). A study by O'Brien on Iowa university students' environmental literacy (2007) showed a correlation between students' environmental knowledge and attitudes. Scott (2010) conducted a comparative evaluative study between two university level environmental courses: a traditional course vs. a social science integrated course with a goal "*to educate students about environmental issues and enable them to become environmental change agents*" (Scott, 2010, p.2). The study concluded that empowering undergraduate students with experiences in a community and open space through expressing their concerns and learning new skills helps them to change their attitudes and behaviours toward sustainability.

The research conducted to date illustrates that students are interested in taking sustainability-related courses and there are positive impacts of such courses on students' attitudes and views about sustainability (Hart & Nolan, 1999). However, the studies reviewed here fail to identify course-related experiences that may influence student actions, attitudes towards, and motivation for sustainability. Studies that simultaneously investigate students' experiences in - and the impacts of - sustainability-oriented courses through a qualitative investigation of students' and instructors' perspectives are not apparent in the literature and are worthy of investigation. There is a need for a qualitative research approach to advancing sustainability in higher education (Fien, 2002; Hart & Nolan, 1999).

2.5 Summary of the Literature

Despite calls for sustainability education, more attention and effort are devoted to ‘greening’ the appearance of campuses and their operations than to developing the pedagogical innovations and curriculum reforms needed to advance understanding of sustainability issues (Clugston & Calder, 1999). Studies have identified areas of growth for the advancement of sustainability in higher education and curriculum (Bacon *et. al.*, 2011; Clark & Button, 2011; Clugston & Calder, 1999; Fien, 2002; Jones, *et. al.* 2010), including the need to add sustainability to university mission statements and to provide support for student-led initiatives (Clugston & Calder, 1999), and calls for sustainability frameworks that introduce the teaching of ethics and values, and strategies that advance environmentally sustainable behaviour (UN DESD, 2006; Second Nature, 2001). These high level changes to integrate sustainability are crucial to post-secondary institutions and are a starting point for advancing sustainability through course curricula. However, studies conducted to date do not focus on identifying students’ experiences in sustainability courses or what course-related experiences influence student actions, attitudes towards, and motivation for sustainability. Furthermore, research suggests (Jones, *et. al.* 2010; McKernan, 2008; Schiro, 2008) a need for interactive instructional approaches that support active, experiential, and interdisciplinary pedagogy and learning. Jones *et.al.* (2010) identify several of these approaches, including role-plays, group discussions, debates, problem-based learning and fieldwork and their respective effectiveness in translating sustainability concepts and messages to students. Much of the research, I reviewed (Bacon *et. al.*, 2011; Clark & Button, 2011; Clugston & Calder, 1999; Fien, 2002; Jones *et. al.* 2010; Yousey-Elsener *et. al.*, 2010), focuses either on higher level changes, such as incorporating sustainability into university’s mission statement or offer general pedagogical characteristics that may enhance learning.

Studies that examine learning in specific environmental and/or sustainability-related courses indicate that students who take such courses have an increased sense of environmentalism and the knowledge to positively alter or enhance their experience and attitude towards the environment (Clark & Gragg, 2011; Scott, 2010; Michalos *et. al.*, 2009; Bacon *et. al.*, 2011). However, researchers concede that students who choose to enroll in these courses appear to have greater interest in acquiring environmental literacy than those who do not (Aighewi & Osaigbovo, 2010).

Overall, there is limited research on sustainability-oriented courses offered at UBC and elsewhere (McKeown, 2011; Fien, 2002). Little is known about how such courses impact learners' attitudes and actions related to sustainability. Thus, there is a need for an evaluative study that investigates students' experiences in sustainability-oriented courses and what students perceive and value as important for their understanding of sustainability concepts and pedagogies.

In the next chapter, I describe the qualitative methodology and methods used to address the study's three research questions.

CHAPTER 3: METHODOLOGY

3.0 Introduction

This chapter details the methodology employed in this study. Given the scope of the three research questions, explained in Chapter 1, a qualitative methodological approach was chosen, to provide an in-depth interpretation of students' experiences, understandings, and awareness of sustainability. The chapter first introduces the general approach of the study. As the research context played a critical role in the study, the research context and the participants are described following the general approach. The data collection procedures are then explained and the data analysis is considered. The analytical methods are then presented and I briefly discuss the theoretical lens that I employed to understand and analyze the data. Finally, the study's limitations are discussed.

3.1 The General Approach

This study was conducted using a qualitative research approach (Corbin & Strauss, 2008; Denzin & Lincoln, 2008; Palys & Atchison 2008). To address the research questions, data were collected from 13 students in three different courses using focus groups, in-class observations, one-on-one interviews, and document analysis. In addition, the three course instructors were interviewed. Student focus groups were conducted early to mid-semester to provide the preliminary base data to help guide the design of interview questions. The focus groups provided a more exploratory and descriptive type of data whereas one-on-one interviews gave a more explanatory and confirmatory type of data. The interview questions were developed to investigate the personal rationale of each student for taking such courses. In-class observations were conducted to provide more information about the course and the pedagogical approaches being described by students in the focus groups and

interviews. In addition to providing triangulation through multiple data sources, these methods together provided an in depth look at students’ perspectives on the course and pedagogical characteristics that enhance their understanding of sustainability concepts and students’ attitudes towards and awareness of sustainability. The course instructors were interviewed to examine their experiences and perceptions of the course, its goals and outcomes.

3.2 Research Context

The University of British Columbia (UBC) Sustainability Initiative (USI) uses a variation of the Triple Bottom Line approach to sustainability (Elkington, 1997), highlighting the Environment, Social, and Economy plus Technology (Figure 4). The phrase Triple bottom Line which was first coined by John Elkington in 1997, highlights the three aspects and the goals of sustainability: People, Planet, Profit. The terms Environment, Social and Economy plus Technology are also used to describe the three “pillars” of sustainability (Figure 1). At UBC, *sustainability-related* courses are defined as courses in which one or more of these pillars of sustainability are discussed, whereas *sustainability-focused* courses have all three pillars clearly identified and are relevantly discussed in the course.



COURSE LEGEND

- Environment
- Society
- Economy + Technology
- Sustainability Focused

The context for this study was three *sustainability-focused* courses that were offered at UBC in winter term 2010-2011. These three courses were selected based on their *sustainability-focused* categorization, meaning all three courses include the three central aspects of sustainability as

Figure 1: The Three Pillar Model of Sustainability, UBC Sustainability Initiative (UBC Sustainability Initiative, Teaching and Learning, Courses section, 2011)

identified by the UBC Sustainability Initiative (USI), namely, Environment, Social, Economy and Technology. Further all three courses were offered in winter term of 2010-2011, providing an opportunity to examine three courses simultaneously. The courses selected for this study were also dependent on the instructors' permissions to conduct research in their courses. The three courses had different agendas, goals, and curricula, and each employed a different approach to introduce students to sustainability concepts and issues. These are described briefly in what follows.

Visualizing Climate Change (CONS 449C)

The Visualizing Climate Change course (CONS 449C) was first offered as a pilot in September of 2010. In the course, students are introduced to the scientific knowledge basis of climate change, and strategies proposed for mitigation of, and adaptation to change. Students met twice per week for 1.5 hours each class. One day of each week was dedicated for guest lectures, where students heard about various topics and research related to climate change and sustainability. The other class was used for lectures by the course instructor and for student group project work. During group work, students developed a plan for communicating science knowledge associated with a specific climate change topic to a non-expert Canadian audience, such as a high school class or community group. The course was open to students from all disciplines and all levels or years of undergraduate experience. In the year this study was conducted, CONS 449C enrolled approximately 35 students. Two of these students (one male and one female) participated in the study.

Climate Change: Global Challenges and Local Responses (RMES 500G)

The Climate Change: Global Challenges and Local Responses (RMES 500G) course emphasized technological aspects of sustainability by introducing students to various climate change mitigation and adaptation strategies using technology. The course presented carbon management

options through carbon capture and sequestration (CCS), their vulnerabilities and carbon economics issues. Students completed group projects which focused on local solutions to global challenges, such as CCS and carbon pricing. Students met twice per week for 1.5 hours each class. Each class was comprised of lecture and interactive discussions, and later in the term, group project work and student presentations. RMES 500G was open to graduate students only. In the year this study was conducted, the course enrolled 12 students. Three RMES 500G students volunteered to participate in the study; all were female.

History and Philosophy of Environmental Thought (RMES 501)

The History and Philosophy of Environmental Thought (RMES 501) course addressed issues of sustainability through a historical and philosophical lens by introducing students to the history of environmental thought from the early hunter-gatherers (~8000 BC) to the present, through the critique of environmental thought. It challenged students to question everything around them and to consider the history of issues, materials, attitudes, or ideas. The course emphasized that understanding the origin of environmental problems is crucial to finding solutions. Students met twice per week, for 2-3 hours each class; one class each week was dedicated lecture time by the course instructor and the other class was a seminar with interactive discussions on the topic of the week. The major course assignment was a paper or graphic art project that addressed the question: “Can current environmental problems be solved through more intelligent application of the conventional modern ideas about humans, the environment and proper relations between them, or are fundamental changes to prevailing basic assumptions and attitudes required?” (Robinson, 2010, pg. 1). RMES 501, similar to RMES 500G is a graduate course. In fall of 2010 when this study took place, the course enrolled 19 students. Eight students participated in the study (seven females and one male student).

The USI has identified four high-level Student Sustainability Attributes (Figure 2) and detailed these in the document “*Transforming Sustainability Education at UBC: Desired Student Attributes and Pathways for Implementation*” (2011).

These attributes are intended to guide the development of program level outcomes, which in turn could be used to guide course level outcomes, and to reflect the characteristics of a student graduating from UBC with sustainability education (Transforming Sustainability Education at UBC: Desired Student Attributes and Pathways for Implementation, 2011). In Chapter 4, I explain how these attributes play a role in the three courses investigated.



Figure 2: UBC Student Sustainability Attributes. Transforming Sustainability Education at UBC: Desired Student Attributes and Pathways for Implementation, 2011.

3.3 Research Participants

The key participants in this study were thirteen students, ages 20 to 28, who were enrolled in one of three selected sustainability-focused courses at the University of British Columbia in Vancouver, Canada. Students were informed about the study during their class through an announcement and invited to participate in focus groups and interviews. Two participants were undergraduate students taking CONS 449C, and 11 were graduate students taking one of the graduate level courses, RMES 501 or RMES 500G. The undergraduate students were in their 3rd year of study, and the graduate students were in their first year of their graduate programs. All 13 students took part in both the focus groups and interviews (details follow in the data collection section). The lead instructors of all three courses as well as the Executive Director of the UBC Sustainability Initiative (USI) were also interviewed.

3.4 Study Procedures

Four separate focus groups with two to five students were conducted mid-semester in the fall term of the 2010-2011 academic year. These four time slots were chosen to accommodate students' schedules and availabilities. Focus group questions concentrated on students' interests and intentions in taking the sustainability course(s), their personal definitions of sustainability, and how the course was helping them make more sustainable choices (See Appendix A for focus group questions and schedule). I conducted one-on-one interviews with the same 13 students during February and March of 2011, two months after the end of courses, to provide some lag time to examine the lasting impacts of these courses on students' awareness of sustainability issues and investigate their attitudes and behaviour changes that might be related to completing these courses. Questions focused on students' perceptions of the course, including their views about what sustainability concepts, strategies, and experiences were relevant and beneficial to them in their career and personal lives (See Appendix B for interview questions). Students were also asked to reflect on their course assignments and how these impacted their understanding of sustainability issues. Interviews provided a longitudinal measure of the impacts of the course on the students. In addition, I also completed in-class observations in all three courses between September and December 2010. Observations focused on how and what was discussed in the class, students' reactions, and types of questions asked by students. I conducted interviews with the three course instructors in March 2011. Instructors were asked about their course goals, to what extent these goals were met and their beliefs about whether students understood and applied the sustainability concepts introduced during the course. All focus group and interview data were transcribed and analysed to identify common messages and themes (Corbin and Strauss, 2008). Findings from my analysis are explained fully in Chapter 4. Observational data were similarly analyzed and categorized into themes. Course documents were

analyzed to identify sustainability concepts or characteristics and to ascertain how these concepts were introduced in the course.

3.4.1 Focus Group Procedures

Early to mid-semester, I invited the participants to the Education Building (Neville Scarfe Building, UBC) during their lunch hour and provided pizza and drinks for lunch during focus groups. Participants were sent the focus group questions in advance via email to encourage thorough, reflective answers and to provide students with the comfort of being prepared and avoiding any unexpected questions. Each participant was asked to reflect on each question prior to coming to the focus group meeting. Students were asked about their interests in taking the course, what other sustainability-oriented courses they had taken or might enroll in at some future date, their expectations from the course, their definition of sustainability, if and how the course has the potential to motivate a change in them and any strategies or pedagogical characteristics used by the instructor in helping them understand the course concepts and learn about sustainability. All focus group meetings were video- and audio recorded. Students' responses to the focus group questions served as the starting points and baseline for further in-depth conversation during one-on-one interviews with each participant (see Appendix A for Focus Group Questions and Schedule).

3.4.2 Student Interview Procedures

Semi-structured interviews were conducted in February and March of 2011; two months after the courses ended. I conducted these one-on-one interviews with all 13 student participants and course instructors. Participants were given full flexibility to choose the interview time, date and

place. Some participants chose to come to the Education building while others chose their study area in the university; a couple of students were interviewed over Skype because they were out of country. Student interviews were approximately 20-30 minutes in length. The interview questions were designed based on the focus group results but students were encouraged to share and recall their experiences in the courses in ways that went beyond the questions that were asked. The questions focused on students' initial response to the courses, their views about the course curriculum and content and how it may have impacted their attitude, behaviour and motivation toward more sustainable practices in their own lives and career, and any tangible strategies they learned or developed. They were also asked to re-visit their personal definition of sustainability, in order to compare that with the definitions they provided in the focus groups. Students were also asked to reflect upon how, if at all, the course had helped them make more sustainable lifestyle choices. Students who completed RMES 501 were also asked about the details of their final project - an art project or a written paper.

Participants were not provided with any compensation for their time for the interviews. Interviews progressed as conversations. I encouraged participants' feedback on their experience in the course and took cues from the participants in asking further questions, i.e. elaborating on their answers. The interviews were audio recorded and transcribed (See Appendix B for Student Interview Questions).

3.4.3 Instructor Interview Procedures

Interviews with all three course instructors were also semi-structured and were held in the instructors' offices or a coffee shop. Instructors chose the time and place for interviews. These

interviews were conducted before student interviews and were approximately 30 minutes long. Questions focused on their experiences and reflections on teaching the course. These interviews explored the instructor's motive and intentions for creating the course, course goals and to what extent these were met. The interviews also explored aspects, strategies and experiences of the course that aimed to foster sustainable behaviour in students enrolled, how the course motivated students, and whether the instructors would make any changes to the course if it were to be offered again. Instructor interviews were audiotaped and transcribed (See Appendix C for Instructors Interview Questions). An interview with the executive director of USI was also conducted similarly with a focus on higher level UBC strategy, in terms of enhancing sustainability education (See Appendix D for Interview Questions).

3.4.4 Document Analysis and In-Class Observation Procedures

Course syllabi, lecture presentations, assignment outlines and other relevant documents such as accessible (student volunteered) student assignments were collected, examined and analyzed for similarities between courses, major sustainability concepts and general course characteristics, and the overall format and framework of the course, such as major topics and themes discussed during the course. In-class observations of teaching and learning were conducted in at least 18-22 of the 24-26 class periods of each course. During in-class observations, I noted any unique pedagogical characteristics and course content that may not have been mentioned in course documents (I refer to these as “hidden curriculum²” and have discussed their significance in detail in Chapter 4). I also observed and kept a record of students' responses to and engagement with the course content

² Hidden curriculum in literature often has a negative connotation, usually described as the side effects of education, which are learned but are not openly intended, such as norms, values, and beliefs. However, for the purpose of this study hidden curriculum is referred to as the positive aspects of the course that influenced student learning and are not mentioned explicitly in the course documents.

including concepts, topics, activities and guest lectures, through their questions, remarks, and comments. These notes were collected and analyzed according to the data analysis procedures described below.

3.5 Data Analysis

All field notes from my classroom observations, course documents, and focus group data were analyzed for themes; this qualitative analysis procedure was adapted from procedures described by Corbin and Strauss (2008). These themes were identified by first reading the raw data transcripts and then highlighting the key or common terms and phrases used by the students or instructors during the classroom observations and focus groups. I then categorized each of these highlighted phrases under common themes which emerged from the data. For example, as one of the key course content characteristics, most students mentioned the presence of scientific knowledge as crucial to understanding sustainability issues; therefore scientific knowledge was identified as one of the themes. Identified themes were compared and contrasted; unique characteristics and perspectives were explored. These were responses that may not have fit well under any of the identified themes. Interview data were also similarly analyzed and commonalities amongst students' answers and re-occurring patterns were identified. Because of the participants' distribution in the three courses and course differences, comparisons were made across courses. All categorized themes from all data sources (Document Analysis, In-class Observations, Focus groups, and Interview) were coordinated to gather popular and commonly occurring themes. Detailed findings from these analyses are presented in Chapter 4.

To understand the overall impact of these three sustainability-oriented courses on students' awareness, attitudes, behaviour, and motivation to engage further in sustainability issues through an exploration of students' perspectives and experiences in these courses, a grounded theoretical lens is required, which I discuss next.

3.6 Analytical Methods

In this section, I briefly discuss the Bloom's Student Learning Model (Bloom, 1956) followed by a detailed description of the *affective* domain of the model, which I specifically employ to understand students' thoughts about and experiences in the three courses. In addition, Prochaska and DiClemente's Transtheoretical Model of Behaviour Change (Prochaska & DiClemente, 1986) provides a mechanism to understand the behaviour change patterns and attitude shift in students. These two models compliment each other in that through the *affective* learning model I was able to identify characteristics that highlighted values and attitudes changes in students while transtheoretical model provided an overall impression of behaviour changes in students. I will discuss this model briefly in the following sections..

3.6.1 Bloom's Student Learning Model

Benjamin Bloom and colleagues (1956) proposed three major kinds or domains of learning: Cognitive, Psychomotor, and Affective (Bloom, 1956). The *cognitive* domain (Bloom, 1956) encompasses "knowledge and the development of intellectual skills, which includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills" (Bloom's Taxonomy of Learning Domains, n.d., para.5). Basic

knowledge about sustainability and climate change would fit under the cognitive domain. The *psychomotor* domain (Simpson, 1972) includes “physical movement, coordination, and use of the motor-skill areas of the brain. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution” (Bloom's Taxonomy of Learning Domains, n.d., para.7). The *affective* domain (Krathwohl, Bloom & Masia, 1973) includes “the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations, and attitudes” (Bloom's Taxonomy of Learning Domains, n.d., para.6). The five major categories or stages of learning within the *affective* domain are listed from the simplest behavior to the most complex: receiving, responding, valuing, organization, characterization or internalizing values. The *receiving* stage refers to awareness, willingness to hear and listen to others, and give their “selected attention” to the topic in discussion (Bloom's Taxonomy of Learning Domains, n.d.). *Responding* refers to contributing through participation in class discussions, questioning new ideas, concepts, models, etc. in order to fully understand them. *Valuing* refers to being sensitive towards individual and cultural differences and can include valuing diversity, ability to solve problems, and initiating plans towards social improvement. *Organization* emphasizes comparing, relating, and synthesizing values. *Internalizing values* refers to leading by action, influencing others, listening to others, proposing, modifying, performing and practicing behaviour, and questioning, revising, solving, and verifying attitudes (Bloom's Taxonomy of Learning Domains, n.d.; Krathwohl *et al.* 1973).

3.6.2 Affective Learning as a Measure of Student Understanding and Change in Attitude and Behaviour

UNESCO defines affective education as “a domain of education where feelings and attitudes

come to play” (UNESCO, 1992, p. i). Furthermore “*affect* is a human pre-disposition towards action based on feelings and emotions” (UNESCO, 1992, p. 10). UNESCO also identifies *affective* learning goals as essential components of holistic or integrative education (UNESCO, 2005). Kerry Shephard (2008) defines *affective* learning as “learning [that] relates to values, attitudes and behaviours and involves the learner emotionally”. She elaborates on *affective* learning:

The affective domain is about our values, attitudes and behaviours. It includes, in a hierarchy, an ability to listen, to respond in interactions with others, to demonstrate attitudes or values appropriate to particular situations, to demonstrate balance and consideration, and at the highest level, to display a commitment to principled practice on a day-to-day basis, alongside a willingness to revise judgment and change behaviour in the light of new evidence (Shephard, 2008, p.88).

Student comprehension of the knowledge presented to them in courses represents *cognitive* learning and can be assessed through formal assessment tools. However, what students *choose to do* with this acquired knowledge and/or skills and to what extent they have a *change in attitude* and *express their motivation to change their behaviour* and *act in more sustainable ways* are *affective* learning attributes (Buissink-Smith, Mann & Shephard, 2011; Miller, 2005 as cited in Shephard, 2008; Shephard, 2008).

In higher education, course instructors often use formal assessments, such as tests, quizzes, and other project-based or research-based student papers to evaluate the extent to which individual students have achieved intended learning outcomes. These approaches work well to measure cognitive learning. However, to evaluate the *affective* impacts of sustainability-oriented courses, better assessment tools are needed. However, it is more difficult to measure *affective* learning (Jickling, 2003; Johnson, 1973) as *affective* learning stages tend to be hidden, are subjective and identifying these stages is at the discretion of the evaluator, are slowly developed, personal and

difficult to observe (Bloom & Krathwohl, 1956; Leng, 2002).

Buissink-Smith *et. al.* (2011) provide an overview of *affective* learning, based on the Krathwohl *et. al.* (1973) taxonomy and offer two organizational methodologies for measuring *affective* learning – quantitative and qualitative. For the quantitative methodology, the authors suggest using self-reporting questionnaires that can include pre- and post-tests and a control group, using a standard Likert scale (Buissink-Smith *et. al.*, 2011). For the qualitative methodology, which is the focus of this study, the authors outline several methods including (1) observations to understand the “hidden curriculum” and “out of class” experiences (Clark, Walker & Keith, 2002; Leng 2002; Shriberg 2003, as cited in Buissink-Smith *et. al.*, 2011); (2) focus groups (Connell, Fien, Lee, Sykes & Yencken, 1999; Elliot 2006; Groff, Lockhart, Ogden & Dierking, 2005; Haigh 2006 as cited in Buissink-Smith *et. al.*, 2011); (3) interviewing students both formally and informally (Mentkowski & Much, 1980, 1985 as cited in Buissink-Smith *et. al.*, 2011); (4) reflective journals or diaries kept by students (Sher, Williams & Sharkey, 2002 as cited in Buissink-Smith *et. al.*, 2011); (5) direct action of students (Manubay, Smith, Houston, Schulz, Dotzour & De Young, 2002 as cited in Buissink-Smith *et. al.*, 2011); (6) making drawings to represent thoughts, feelings and attitudes (Tunncliffe & Moussouri 2007 as cited in Buissink-Smith *et. al.*, 2011); (7) videos, games and simulations to determine the learners’ level of commitment to the *affective* objectives (Leng 2002 as cited in Buissink-Smith *et. al.*, 2011) (8) students writing down words, ideas, images, phrases or thoughts that come to mind related to a key word or phrase, known as personal meaning mapping (Storksdieck, Ellenbogen & Heimlich, 2005 as cited in Buissink-Smith *et. al.*, 2011); or (9) students ‘thinking aloud’ about what they saw, thought and felt (Masin 2002; Tunncliffe & Moussouri 2007 as cited in Buissink-Smith *et. al.*, 2011).

In this study, I utilized the first three of the qualitative methods described above: in-class observations along with the document analysis, which allowed for the “hidden curriculum” to be identified (this is detailed in Chapter 4, section 4.1), as well as focus groups and interviews.

3.6.3 The Transtheoretical Model of Behaviour Change as Theoretical Framework

Attitude change is often a pre-requisite for a behavioural change to occur (CommGap, 2011). Therefore, it is important to understand how individuals adopt attitudes. Zanna and Rempel (1988) view attitude as something that might change based on internal or external cues. Attitude is generated from *cognition* (a source of information), *affect* (feeling, emotions) and past experiences (CommGap, 2011). Research on attitudinal change (Herek, 1986; Kim & Hunter, 1993; Zanna & Rempel, 1988) suggests that, when attempting to change attitude, in addition to having consistent and congruent messages about a particular topic, these messages should be high in affect or emotion and connect to past experiences that focus on changing perceptions about groups or objects. As well as creating situations that will foster attitude change, Herek (1986) stresses the benefits of performing the behavior, the social appropriateness of performing the behavior, and positive *affect* for the behavior (Kim & Hunter, 1993). However, a change in attitude may not directly cause a behavior change; it is the behavioural intent that mediates the process from attitude to behaviour (CommGap, 2011). Behavioural intent is the indication of the individual’s readiness to perform or change a given behaviour (Ajzen, 1991).

In addition to examining *affective* learning to identify students’ understanding and translation of sustainability concepts, Prochaska and DiClemente’s Transtheoretical Model of Behaviour Change (1986) provides a mechanism to understand the progression and cyclical pattern of

behavioural change and attitude shift. In this section, I explain this theory and stages of behavioural change and how this theory could be used as an interpretive lens to understand the findings of the study.

The Transtheoretical Model of Behavioural Change is based on the work of Prochaska and DiClemente (1986). I use this model to explain the outcomes of the study, as it provides a framework to understand the process and stages of behaviour change and attitude shift that I saw and heard from participants in this study. According to the theory, both personal interaction and environment play a crucial role in the learning process. The theory attempts to explain how individual behavioural change and patterns of change occur. Behaviour change occurs in five distinct stages through which people move in a cyclical or spiral pattern. The five stages are briefly explained below:

1. Pre-contemplation: An individual does not have any intention of changing their behaviour.
2. Contemplation: An individual realizes a problem and considers taking an action, however may not commit to making a change.
3. Preparation: An individual has an intention to change and may possibly make a minor action with limited success to change behaviour.
4. Action: Individual takes action to modify or change their behaviour or environment to meet their goal.
5. Maintenance: Individual works on preventing relapse and stabilization of changed behaviour.

The Transtheoretical Model of Behavioural Change suggests that behavioural change occurs in a cyclical pattern that involves both progress and periodic relapse. Therefore, individuals will move back and forth between these five stages; and with persistent successful behaviour change an individual will never remain in the earlier stages for too long but will spiral upwards to higher stages,

eventually making their way to the maintenance stage and spending most their time preserving this stage. Moreover, Prochaska and Di Clemente (1992) propose the fundamental significance and necessity of a supporting and enabling environment to achieve a successful and persistent behaviour change. This model provides a tool to understand and explain the findings of this study in terms of human behavior in changing societal needs. To further explore how we work towards changing behavior and people's understanding or what social influences are necessary to accommodate the changing needs of the society and the earth.

In 1991, at a Theorists Workshop held in Washington, DC (Theories and Models of Behaviour Change, n.d., pp. 12), experts met to identify common elements in the most widely accepted behavioural change models, such as Bandura's Cognitive Learning model (Bandura, 1986), Ajzen and Fishbein's Theory of Reasoned Action (Ajzen and Fishbein, 1980) and Prochaska and DiClemente's Transtheoretical Model of Behavioural Change (Prochaska and DiClemente, 1986). Theorists identified three key factors (amongst eight) as "necessary and sufficient" for a positive behaviour change to occur. An "individual must (a) have strong intentions to perform the behaviour, (b) have the necessary skills to do so and (c) not be restricted by environmental constraints". The remaining factors were viewed as elements that can actively influence the strength and direction of behavioural intention.

These theories (Buissink-Smith *et. al.*, 2011; Krathwohl, Bloom & Masia, 1973; Prochaska and DiClemente, 1986) provide an interpretive lens to understand the results of my study, and to explain them in terms that identify how sustainability curricula could work towards changing behaviour. This can enhance our understanding of how students learn and integrate sustainability strategies into their everyday lives so that we can adapt teaching and pedagogy accordingly.

3.7 Study Limitations

This study investigated the impact of these three sustainability-oriented courses on students' awareness, attitudes, behaviour and motivation to engage further in sustainability issues through an exploration of students' perspectives and experiences in these courses, offered in 2010-2011 Fall term at the University of British Columbia. Students' perspectives and impacts of sustainability-oriented courses were identified and described. The study relied entirely on self-reported data through focus groups and interviews, and a single researcher (the author of this dissertation) analyzed the data. There may be some unintentional researcher biases, as a single researcher gathered and analyzed all data, including in-class observations, document analysis as well as focus groups and interviews. The courses were a subset of sustainability-focused courses offered at UBC and were a "convenience sample", selected for study based on the agreement of the course instructor and the fact the courses were scheduled during the semester when this research was being conducted. Thus the current study may not represent other sustainability-oriented courses offered at UBC or other institutions, and the findings are not intended to represent pedagogical characteristics of individual instructors.

The study was conducted with a selected group of students and instructors, who are already to a certain extent motivated to learn about sustainability as they took the initiative to enroll in these courses. Some students were also enrolled in, or had completed, other sustainability-oriented courses which could influence their views and the results of this study. The study sample is also selective taking into account the selected group of university students in North America who may not be representative of students elsewhere. Students' responses may have been influenced, as the interviews were conducted just two months after the course ended. Students may be more motivated

and influenced during a short period after a course ends and their enthusiasm may diminish with time. An interview conducted with the participants in this study after a year might provide a better understanding of the long-term impacts of course participation on the students' career and personal lives and information about students' affective and cognitive learning.

3.8 Chapter Summary

This chapter describes the methodology and methods employed in a study of three sustainability-focused courses at UBC, and the instructors' and students' perspectives and experiences in the courses. A qualitative approach was used and data were collected through in-class observations, document analysis, and focus groups and one-on-one interviews with 13 student participants and three course instructors. The chapter provides an overview of the research context, study participants, and study procedures used for in-class observations, document analysis, focus groups and interviews, as well details about the procedures followed by details of the data analysis. A discussion of the theoretical frameworks used, including *affective* learning model and transtheoretical model of behaviour change is also provided with a discussion of the limitations of the study.

CHAPTER 4: RESULTS AND ANALYSIS

4.0 Introduction

In this chapter, I present the findings of my study of three sustainability-focused courses at UBC. I begin by discussing each course and my analysis of courses documents and in-class observations. The course descriptions are based on information provided by course instructor in the syllabus. I provide the results of my analyses of courses, course documents, and in-class observations as well as focus groups and one-on-one interviews with both students and instructors. Finally, a brief summary of the chapter is presented.

4.1 Document Analysis and In-Class Observations Findings

Based on materials provided by the course instructor and my classroom observations I generated an overview of the course content and identified the pedagogical approaches adopted by instructors teaching three sustainability-focused courses at UBC. Document analysis and observational data provided information about the “hidden curriculum” and “out of class” experiences of students (Clark *et al.*, 2002; Leng 2002; Shriberg 2003). I identified the hidden curriculum and student experiences as course and pedagogical characteristics that were beneficial to students in terms of understanding of the concepts discussed and that *affectively* translated the messages and concepts presented in the class for enhanced student learning. These characteristics were not mentioned in the course syllabus or elsewhere in course documents and were identified during in-class observations.

4.1.1 Visualizing Climate Change (CONS 449C)

Course Description and Content: This Visualizing Climate Change course is described in the course syllabus as teaching students about the “Exploration of different future scenarios that provide an overview of the science of climate change and potential solutions” (Sheppard, 2010, Course Outline, p. 1). The course is intended to provide undergraduate students with fundamental knowledge of climate change science, the impacts of climate change, mitigation approaches, and adaptation strategies. The course curriculum is divided into three major sections that are presented sequentially: Part 1. Climate Change Foundations: The Science and its Interpretation (approximately four weeks were spent on this section); Part 2: Climate Change Topics: Causes, Consequences, and Solutions (approximately 7 weeks were spent on this section); Part 3: Communicating Climate Change Futures (approximately two weeks were spent on this section).

The major learning outcomes of the course include understanding the multiple implications of climate change with respect to landscape systems, critically evaluating visual media techniques and explaining the role of visualizing future scenarios and conceptualizing and communicating climate change solutions. This course provided students with climate change models and illustrations of the potential consequences of climate change at a given local location, an approach that was intentionally selected to have a deeper impact of student learning.

Pedagogical Approaches: The Visualizing Climate Change course was taught as two lectures of 1.5 hours each, per week over a period of 13 weeks. The course was comprised of guest lectures on various topics of climate change science from meteorological data projections and

biological/biodiversity concepts to carbon management and energy policy. Students were given a broad general perspective on climate change science policy issues.

Students completed group projects on topics proposed by the instructor; students also had an option to choose and work on their own, instructor-approved, topics. These projects were intended to address issues that were relevant to students and provide them with expertise in addressing sustainability issues in their lives. However the major goal of these group projects was to develop a communication plan on a topic relevant to a non-expert Canadian audience, such as High school class or a local community group. For example, one of the group projects focused on integrating sustainability education in K-12 curriculum without major changes to the existing curriculum. The instructor selected topics that dealt with a range of natural resources and issues including snowpack, glaciers, and related water systems, forest ecosystems and related forest issues, sea levels and coastal issues, and urban heat island effects in conjunction with climate change. In addition to the major group project, students also took part in interactive group discussions and visualization demo/critique every week, and completed a written midterm and a final exam. The instructor also utilized interactive quizzes using clickers³ each week to assess student understanding of the concepts discussed during the guest lectures.

Hidden Curriculum and the Student Experience: Group members for the group project were selected by the instructor to establish a representation of various disciplines in each group and to also have different year levels of students in each group, ranging from year 1 to 4 whenever possible.

³ Clickers are wireless personal response systems that can be used in a classroom to anonymously and rapidly collect an answer to a question from every student; an answer for which they are individually accountable (<http://www.cwsei.ubc.ca/resources/clickers.htm>).

This selection of students from various disciplines into groups is unique and important for working on sustainability related issue which is inter- and trans-disciplinary in nature. This pedagogical practice is part of the “hidden curriculum” for this course, as it is not mentioned in the syllabus or any other course document; I noticed it during my in-class observation. This practice was one of the course characteristics, identified by the students, as enhancing their understanding of the topics discussed.

4.1.2 Global Challenges and Local Responses (RMES 500G)

Course Description and Content: This Global Challenges and Local Responses course is described in the course syllabus as teaching students about “how the global challenge results in local effects and local opportunities and challenges. It will provide students with a hands-on perspective on local responses”(Zerriffi & Kandlikar, 2010, Course Syllabus, Course Description section, para.1). This course introduces students to the fundamentals of climate change from impacts, technology, management and economic influences. The course deals with issues such as carbon management, carbon capture and storage options, the impacts of different climate change scenarios and the vulnerabilities associated with various options, models and scenarios, and the economics of carbon mitigation. The course content is presented as five modules: 1) Climate Science and Impacts, 2) Carbon Management, 3) Carbon Capture and Sequestration/Storage (CCS), 4) Impacts, Vulnerability and Adaptation, 5) Carbon Economics.

Pedagogical Approaches: The Global Challenges and Local Responses course was taught as two lectures of 1.5 hours each, per week over a period of 12 weeks. Students completed group projects that were intended to provide them with a “strong understanding of the fundamental climate change

issues ranging from the basic science through technology options and economic impacts” (Zerriffi & Kandlikar, 2010, Course Syllabus, Course Description section, para.3). Each group was self-selected group, i.e. students formed their own groups. The group projects were related to each of the five modules of the course and presented in a case study format. Each student in the class submitted a written assignment based on the groups’ presentation on the five modules; hence students were graded on the five assignments from the five modules. The first module was presented by the course instructors to demonstrate a presentation. Thus, the students became instructors for particular topics, where they had to teach the rest of the class about the topic. In addition to the major group projects and five written assignment associated with them, student also completed three, one-page reflections on the first three modules on the course. In their reflections students were asked to respond to the module by highlighting their learning experiences and outcomes.

Hidden Curriculum and the Student Experiences: After each group project presentation, the groups then lead the rest of the class in a stakeholder stimulation. Students were assigned roles of various stakeholders, such as environmentalists or forester, economists, home-owner and a government representative. Students assumed roles and then debated on a given case study from that stakeholder’s perspective. For example, one of the group assignments was to design a climate change adaptation strategy for a local BC community such as Richmond, BC. After the group presentation, the class was divided into five stakeholder groups: Environmentalists, economists, homeowners, and government representatives. These debates, also referred to as “group plays,” were designed to enhance students’ understanding and appreciation of another perspective. The assigning of roles for stakeholder stimulation was not described in the course syllabus and was noticed during in-class observations. These activities were identified by the students as being highly effective in advancing their understanding of the issues discussed in the course.

4.1.3 History and Philosophy of Environmental Thought (RMES 501)

Course Description and Content: The History and Philosophy of Environmental Thought course is described in the course syllabus as teaching students about “how attitudes towards human nature and non-human nature have changed over the period from Mesolithic times until the present in Western society. The underlying question is whether contemporary concerns about sustainability require fundamental changes in the way we conceive of ourselves or our environment” (Robinson, 2010, Course Outline, p.1).

This course is intended to promote understanding of sustainability through historical and philosophical lenses by having students examine how attitudes, behaviours, and ways of thinking have changed over time in human history. The course considers: hunter-gatherer societies, Judeo-Christian and Greek roots, medieval perspectives, modernity and critiques of modern environmentalism. The class meets twice each week for two- three hours each day, once for a lecture and once for a seminar discussion on the week’s topic. The course curriculum is divided into eleven sections: 1. The Challenge and the Question: “Can current environmental problems be solved through more intelligent application of the conventional modern ideas about humans, the environment and proper relations between them, or are fundamental changes to prevailing basic assumptions and attitudes required?” which was also the topic of the final project, 2. Origins: hunter-gatherer societies, 3. Early influences: Judeo-Christian and Greek Roots, 4. The Lost World: The Medieval Perspective, 5. Modernity, Part I: The Genesis of Modern Science, 6. Modernity, Part II: The Rise of Market Economics, 7. Second Thoughts, Part I: Critics in a Rapidly Changing World, 8. Second Thoughts, Part I: Critics in a Rapidly Changing World, 9. Second Thoughts, Part II: The

Beginnings of the Environmental Critique, 10. Second Thoughts, Part III: Modern Environmentalism, 11. Where Do We Go from Here?

Pedagogical Approaches: During the seminar period, students explore the week’s topic in depth through peer-to-peer and student-to-instructor interactions and discussions. Students are asked to keep a course journal and to write weekly entries with reflections on that week’s topic. The other course assignments include a short presentation during one of the seminar classes on that week’s topic with a two to three page written article, and a final project reflecting on all the course readings and addressing the “The Challenge and the Question” mentioned in the previous paragraph.

Hidden Curriculum and the Student Experiences: The final student assignment for this course may be a written paper or an art project – such as a painting, sculpture, play, or a piece of poetry, where students are required to reflect on and address the big question asked at the beginning of the course. Some students create pieces of art to represent their interpretation of the question, whereas other students submit a written paper. Having the flexibility to create a final project in an art or written form provided students autonomy and control over their preferred medium, as reported by the students in the course. This aspect of the course is not mentioned in the course syllabus and was identified during an in-class observation.

4.1.4 Analysis of the Course Documents and In-Class Observations

Table 1 below summarizes the key outcomes of my analysis of three sustainability-focused courses offered at UBC in the fall term of the 2010-2011 academic year. In addition to each of these courses being a “sustainability-focused” course, i.e. incorporating all three “pillars” of sustainability

(as described in Chapter 3, Section 3.2), these courses also incorporate to some extent the four Sustainability Student Attributes (*Transforming Sustainability Education at UBC*, 2011), described in the Research Context in Section 3.2. All three courses incorporate: 1. a *holistic systems thinking* approach, evidenced by the inclusion of discussions of various sustainability issues and topics and making links between these issues; 2. foster understanding of *sustainability knowledge* by providing students with the fundamentals of sustainability and climate change; 3. promote *awareness and integration* by supporting student learning with multidisciplinary interactions; and 4. encourage *acting for positive change* by inspiring and motivating students to apply and implement their ideas through practical applications and project or group work.

Table 1: Summary of Document Analysis and In-Class Observations

Course	Course Description	Course Content	Pedagogical Approaches	Hidden curriculum/student experiences
CONS 449C	Science of climate change	Foundations of climate change science, impacts, mitigation, and adaptation strategies with visualization as delivery mechanism and strategic tool	Guest Lectures, Group projects, visualization tools and techniques, clicker quizzes	Instructor chosen interdisciplinary groups
RMES 500G	Global challenges and hands-on perspective on local responses	Fundamentals of climate change from impacts, technology, management and economic influences	Group projects, reflections and group play	Stakeholder simulation
RMES 501	Examine how attitudes towards human nature and non-human nature have changed over time	Examining attitudes, behaviours, and ways of thinking through historical and philosophical lens through discussions on origins: hunter-gatherer societies, Judeo-Christian and Greek roots, the medieval perspective, modernity, environmental critique and modern environmentalism	Lectures, Discussion seminars, individual paper/project, course journal, short paper and a final paper	Flexibility of expression: Choice between a written paper and an art project.

4.2 The Focus Groups Findings

In this section I summarize students' responses to the focus group questions and discuss the key ideas. Each subsection presents data from one of the focus group questions and concludes with the data analysis where key themes are identified.

4.2.1 Students' Interests and Intentions in Taking the Course

Of the 13 student participants (henceforth designated as students, A through M), eight identified their primary motivation in taking the course as self-interest in the topic of sustainability. For four students the course was a program requirement, and for one student the course satisfied a degree requirement. CONS 449C students wanted to explore sustainability issues to enhance their knowledge and possibly include sustainability in their career as well as their personal lives.

It could count towards that [program] requirement and sounded interesting, both personal interest and career goal to orient my area toward this [sustainability]. [CONS 449C student A]

I thought it would be a good idea to explore a course beyond just the scope of economics and this sounded like a good course to take; both personal and career oriented. [CONS 449C student B]

RMES 500G students wanted to focus mostly on their career pathway and learn the concepts and issues that were relevant and fit with their program and thesis.

I want to study now not just because I enjoy studying it but so can I get a career out of it....found this program....trans-disciplinary....really interesting course....teaching science, policy, technology and all aspects of this issue. [RMES 500G, student C]

RMES [500G] course fits into my thesis concepts....how to formulate policy recommendations....the course is sort of indirectly about policy but maybe the end of the course will tie altogether. [RMES 500G student D]

RMES 501 students offered various reasons for taking this course, from the course being required for their program, to career relevance, to their own personal growth and knowledge of the history of environmental thought. Most students in the course were involved in graduate degree program that focused on a sustainability-related issue. Students' responses indicated reasons for studying sustainability issues might not always relate to their career plans and academic interests but also to personal inspirations and growth.

[This is] not a requirement but a student recommended it to me and I think it's a great introduction into my masters because it has open(ed) my eyes to a lot of aspects that I didn't think about (it) before and its really worth it; it motivates me into looking at something different than what's required. "[I have] never done any history or philosophy course. It is a wonderful course to take; the context of the course is great. [RMES 501, student E]

It is a program requirement for me but if it wasn't I would still take it because it is very helpful to know and get an idea of where these thoughts are coming from, how they evolved and become what they are today. [RMES 501, student F]

Thus, as expected, there were a variety of motivations that lead students to enroll, however, the majority was influenced by personal interest in the topics of sustainability.

4.2.2 Enrollment in Other Sustainability-Oriented Courses

Nine of the 13 students were enrolled in one or more other sustainability-oriented courses while the remaining four were planning on taking more of sustainability-oriented courses, which suggests that these courses maybe inspiring students to learn more about these issues.

It had inspired me to look at the other courses that are similar. [CONS 449C, student A]

Even though if you're not aiming a career in it, taking a course definitely helps you and makes [sic] a part of you and stay with you. [RMES 500G, student D]

I am taking another [sustainability-related] policy course. [RMES 501, student G]

4.2.3 Student Expectations from the Course

For CONS 449C students, the general course expectations were to learn the basics of climate change and sustainability, to increase awareness of sustainability issues, and to make informed decisions in their personal lives about integrating sustainability into their careers.

I was a bit confused and ignorant about [climate change and sustainability] and this is [a] perfect course to take because it could hopefully clear that up. [CONS 449C, student B]

RMES 500G students expected to learn about policy-making and decisions, new research and technological innovations, current and future technologies for mitigation and adaptation strategies, as well as explore global perspectives and research.

[I] will love to hear more about Germany...and other locations, such as Africa. [RMES 500G, student C]

[I would like to] learn about how policies are made and current technological mitigation and adaptation strategies. [RMES 500G, student D]

RMES 501 students came into the course expecting to learn about the history of environmental thought and how it may relate or translate into changing people's attitudes and behaviour towards sustainability and climate change in general.

For me it's about examining a lot of assumption that kind of go unlooked and looking into what goes on unnoticed and looking into views and ideas that are uncomfortable to look at it's exposing those underlying assumptions is the best thing that I get out of the course. [RMES 501, student H]

It's also looking at the distant past and present and looking at both old ancient and modern ways of thinking....starting at where we started and looking what and where we are coming from; there is a lot of thought provoking aspects of the course. [RMES 501, student E]

It will give me the context and background of where we are coming from, what is the kind of knowledge that I need to be able to make the decisions. [RMES 501, student I]

Students in the three courses had a variety of expectations from the courses which differed with the type of course. CONS 449C students were interested in learning about the scientific facts about climate change. RMES 500G students were also interested in learning about the facts about climate change and sustainability. However they wanted to discuss and learn about policy making and higher level changes. RMES 501 students wanted to focus on how attitudes and behaviours change over time in history. This could be due to the fact that RMES 500G and RMES 501 students were graduate level students. Their level of knowledge and motivations for enrolling in these courses may differ from undergraduate students, as graduate students may focus their learning on their chosen topic of interest and their thesis.

4.2.4 Students' Personal Definitions of Sustainability

When reporting about their personal understanding and definitions of sustainability, students highlighted the consistency and longevity of resources 'something that can be done for long period of time' (RMES 500G, student C focus group) and reported variations of the most commonly used Brundtland (1987) definition, as their personal definition of sustainability. In *Our Common Future*, 1987 Brundtland commission, Sustainable Development is defined as "development that meets *the needs of the present without compromising the ability of future generations to meet their own needs*" (World Commission on Environment and Development, 1987, *Our Common Future*, Chapter 2, section 1.). Mostly focusing on resource and energy consumption, students emphasized the need for better education and a need for realization in people that a change is needed.

[Sustainability] is looking into the future and looking at our position at climate change and whether we can survive the way we do right now and whether or not earth has enough resources to sustain us. [CONS 449C student B]

[Sustainability] is an action that can be continually done...if it's a sustainable action it's something suiting to human nature, something that can be done for a long period of time.....for you and the nature. Behaviour and action that can last for longer. [RMES 500G, student C]

using the resources but at the same time preserving it for future generation. [RMES 501, student G]

It's very difficult to do but the definition that I will go by is to live in such a way that you don't do any harm to others, earth, each other, and other species. [RMES 501, student I]

4.2.5 Course-Based Learning Outcomes

CONS 449C students reported that the course motivated them to communicate the science behind climate change with other people and increase the awareness of the current situation and how it might affect them if they do not make a change in their behaviour and attitudes towards the environment and sustainability in general.

Communication aspect: it's all about communicating the sciences behind it. About educating the people about it, you can give numbers and all ppm and all but it really helps when telling people and showing or visualizing what's going to happen to their areas if they keep on doing what they are doing. [CONS 449C student A]

Making me more resourceful and encouraging me to take this knowledge and spread it. [CONS 449C student B]

This course has the potential to change a person not concerned about climate changes because it intrigues you to aspects that make you inspired and motivated to do the changes. You really have to be a really ignorant person to not be concerned about it. [CONS 449C student B]

RMES 500G students realized that the course they were taking was not trying to change their behaviour to lead a more sustainable lifestyle, but rather, was presenting the facts about climate change and sustainability and offering choices to make the changes after recognizing the facts.

It depends on the individual.....the point is not the make us more sustainable.....the course aims is to present the facts on climate change. [RMES 500G, student C]

Here is the current knowledge and understanding and in some indirect way there is a pressure that I better take this current knowledge and make the subsequent behaviour.
[RMES 500G, student D]

Findings for RMES 501 were similar to RMES 500G in that students in this course also recognized that the course or the instructor was not trying to change their behaviour directly. However the way course material was presented and discussed challenged their prior assumptions and motivated them to question their decisions, behaviour and attitudes.

The course is more philosophical and challenges you to think about your thoughts and feelings and decisions. It's enlightening and transformative. The course is not motivating students to change their behaviour directly but it's making them aware of their behaviours and attitudes and decision they make and question those decisions and behaviours. [RMES 501, student K]

I don't know if I'll say its motivating to change my behaviour but it's motivating me to look and be aware of my behaviours and what I do and examine at a deeper level.
[RMES 501, student G]

Students' ideas about the courses' intended learning outcomes of the courses also differed in each course. While CONS 449C students viewed the communication of the scientific facts about climate change as the primary learning outcome, RMES 500G students believed that the course focused on relaying the facts about sustainability rather than directly influencing their behaviours. RMES 501 students understood that the course challenged their own prior assumptions and understandings about issues discussed in the course.

4.2.6 Influential Elements of the Courses

For CONS 449C students, the communication aspect of the course was crucial in terms of learning the scientific background of climate change and effective communication tools such as visualizing future scenarios. Students reported that learning about the scientific facts and the

importance of communicating the science behind climate change motivated them to talk to their friends and family about the issues in a easily understood language with facts to back-up their statements.

Communication aspects, scientific foundations of climate change and spreading the knowledge, I feel I can communicate the basics of climate change to people and make them realize the importance of sustainability. [CONS 449C student A]

RMES 500G students focused on the economic and technological aspects of climate change that they were learning in the course. This included mitigation and adaptation strategies such as Carbon Capture and Sequestration (CCS) and other carbon management strategies. Students reported that learning about the current research and sustainability policy making strategies gave them a better understanding of the breadth and depth of the issues discussed in the course. They noted the importance of understanding the fundamentals of climate change and sustainability and various perspectives to start influencing others and making the necessary changes.

This course is making me realize what's going on in terms of research and policies in the world, giving me a better understanding of the problem, these guys [course instructors] are experts in their fields and this is what you should know. [RMES 500G, student C]

Fundamental ...systematic approach to understanding the fundamental issue of climate change... about why we at least we think the climate change is happening and then what we think is contributing factors are that is keeping the sustainability and the unsustainability. I think what they are trying to achieve in the course is quite heroic because climate change is such a huge topic and there are so many aspects to it...also looking at the macroscopic... ok here is the larger issue and we are focusing at this one issue. [RMES 500G, student D]

RMES 501 students reported that learning about the history of environmental thought provided them with the understanding of current human behaviours and recognition of their own attitudes, assumptions, and decisions. They appreciated discussing the historical background of the issues through a philosophical lens (during the in-class lectures and seminars) and reflecting on these topics

in their journal entries. These activities enhanced their understanding of behaviour and attitude changes overtime and subsequently challenged them to question and critically analyze their own personal assumptions.

It makes me notice my internal inconsistencies into how and what I believe and question everything I do.....it makes you aware of things around you. [RMES 501, student F]

Challenging my underlying assumptions, why I'm doing what I'm doing. [RMES 501, student L]

If there is anything that I could call what I'm taking away from this course is critical thinking.....lets critically analyze everything and how we view the world....maybe a purely critical view isn't going to do it and we need a combination of both technical and critical thinking.....and art....and you have to kind of figure it out on your own what you want and what you think. [RMES 501, student H]

4.2.7 Analysis of the Focus Groups

In the CONS 449C course, students who participated in focus groups demonstrated behaviors indicative of the *receiving* stage of the *affective* learning (Krathwohl, Bloom & Masia, 1973). These students were open to new ideas and willing to listen, learn and then communicate the knowledge they gained to others. Students in the RMES 500G course displayed characteristics of the *responding* stage of the *affective* learning, as they questioned the concepts and models they learned, in order to fully understand and potentially integrate these ideas into their careers. RMES 501 students who came from interdisciplinary backgrounds had experiences in different fields, depending on their year level and individual student background. Students in this course displayed attributes representative of the first three stages of the *affective* domain: *receiving*, *responding*, and *valuing*. They were willing to listen and learn, question assumptions and ideas, and were sensitive towards individual and cultural differences.

Based on my examination and analysis of focus group data, and my application of the Transtheoretical model of behaviour change as a framework, I identified all thirteen students in this study as being at the *preparation* stage of behavioural change. They illustrated *the intention* of changing their behaviours and recognized that there was a problem worthy of their taking action. Moreover, these students were already making minor changes in their behaviour through personal life changes such as biking to school, recycling, composting and attempting to integrate sustainability into their studies through courses. These courses seem to further increase their motivation to participate in such activities and inspired them to do more, such as encouraging others to make similar changes.

4.3 Course Instructors Interviews

This section presents findings from the interviews I conducted with the three course instructors. The CONS 449C instructor's description of the course was similar to that of his students in that he identified that the major goal of the course was to enhance students' understanding and comfort with the fundamentals of climate change.

To reach out to and inform students who don't have the information about climate change, in order to motivate them to make the necessary changes and encourage them to do more about it, make them comfortable with the science behind the issue. [CONS 449C Instructor]

The instructor further highlighted the importance of considering local landscapes during visualization activities as a means of increasing student interest and helping them identify with the situation or location.

[Working with a] local perspective - gives them [students] something tangible to look at and do something about, makes them identify with the situation and make it urgent enough to do something about it. [CONS 449C Instructor]

He also commented that the visualization aspect of the course appeared to motivate students to inquire more about the situation. The instructor hoped that the students would leave the course with sufficient knowledge to be ‘worried’ about the climate change and with the information necessary to stimulate and support behaviour change. Group project work where students proposed solutions instead of just being a non-engaging recipient of information were employed to further engage and motivate students. Concerned about the ‘impact’ of his course, the instructor identified the need for a long-term study to measure that type of impact. He was optimistic about ‘making a difference’ as the students did inquire about and showed interest in other sustainability courses and pathways that they could explore more after the course. The instructor noticed differences in the way students viewed climate change. He identified an “advanced” group of students as those students who were really keen and motivated about sustainability and climate change issues, a “middle” group of students who were “on the fence” about the sustainability ideals and ideas, and a group of students who were not interested at all. Further, the instructor noted that his course was aimed at motivating 1st and 2nd year students in this “middle group” (as those in the ‘advance’ group were already ‘on board’).

This courses focused most on the middle group: students who might be a little interested in the issue, to get them more involved and motivated to do more, for the more advanced students the science may have been more redundant but we have to provide the basic foundation to explore more advanced topics for the students who might not have the basics. Students were interested in particular topics, such as conservation and they might explore it further. [CONS 449C Instructor]

The leading RMES 500G instructor identified a need for a course that informed students of the climate change impacts, technological and economic changes and models and their limitations.

end to end climate change course such as this one available which starting with science and going through impacts and vulnerability and economic and technological change or at least that’s what we felt like and also to link it to the local responses and challenges. [RMES 500G Instructor]

A course goal was to examine the global challenges but to work with local implementation models.

Climate change is a global challenge but how to also think about it in local aspect [sic] and do something about it. [RMES 500G Instructor]

The idea was to bring together students from different disciplines and have them think about the issue by giving them a sense of the topics. According to the instructor, the proposed goals of the course were met by introducing the challenges and having students complete project-based work on local issues. In terms of the course making an impact on the students' attitudes and behaviours, the instructor's reflections were similar to those of his students. He noted that the course was not meant to change behaviours but rather to provide students with the facts and information to make relevant and informed decisions.

This is not a course about what you can do about climate change, it's to make student think more critically about the issues and integrating ideologies and dogmas about sustainability from all over and integrating it, you need to think about it critically, student already come in with that interest, that drive is already there but my goal is to make them think about it more critically. It [is about] understanding what are the right questions, how to answer them, what tools are available. [RMES 500G Instructor]

The instructor noticed that some students struggled with the material more than others, and he linked this difficulty with the students' background in terms of their program of study. For example, students may have difficulties understanding the mathematical environmental models given their backgrounds. The instructor highlighted that learning about "asking [the] right question and challenging assumptions" were core learning goals of this course. Regarding of any changes to the next offering of the course, the instructor noted that he will add more assignments instead of including reflection papers as he noticed that reflective writing did not provide the student learning outcomes he had hoped for.

[I] will add more assignments instead of reflection papers. Response or reflection papers were to get them to articulate their thinking about the module, it worked to a certain degree but didn't to a certain degree. I think actual assignments might be better, in terms of getting some concrete results and outcomes. [RMES 500G Instructor]

The RMES 501 instructor highlighted the following as the major intentions of the course, to promote an in-depth understanding of the history of environmental thought and its connections to societal and personal assumptions that may play a key role in fully grasping sustainability issues.

The premise was to have a series of steps from barbarous to civilization - the accent of man, to allow the students to question the assumptions about the external and internal nature, to unpack those assumptions and question the nature of things from ancient time to now. How we are doing things from when we started and how we are doing things now; examine assumptions and become aware of things that don't get examined and see if there are any lessons to be learned. [RMES 501 Instructor]

The instructor believed the purpose and the goal of the course were met, in terms of students becoming aware of their assumptions and questioning their decisions, attitudes, and assumptions. His conclusions were based on the students' self-reports and papers. The instructor also used a pedagogical approach where he asked his students to re-submit papers after receiving his feedback and comments. He asked students to keep an ongoing journal with at least one page entries for the first three weeks of classes to encourage *affective* learning and understanding of the concepts and papers discussed in the class.

No one does it [papers/assignments] again; but it helps them. I edit them [the papers/assignments] precisely; usually students don't pay attention to those edits unless they have to do it again. [RMES 501 Instructor]

To enhance student learning, the instructor posed a key question regarding the week's topic about assumptions. For example during the hunter-gatherer topic week, the question was aimed at challenging assumptions about human nature and what was human life was like back then. The instructor also explained how this kind of course was connected to sustainability:

assumptions about nature and assumption about people, the environmental and social...those assumptions have to be challenged....that's what sustainability is all about, so its connected to it for sure. [RMES 501 Instructor]

The instructor pointed out that the RMES 501 course distinguishes between emergent and persuasive dialogue in sustainability. Instead of adopting the more common persuasive approach to sustainability, which tries to convince students to act in particular ways, the course reflects the UBC Sustainability Initiative in focusing on the emergent approach to teaching sustainability. This approach uses a more discussion-based strategy to increase awareness and encourage dialogue that can advance thinking about how to co-create the future.

4.3.1 Analysis of Instructor Interviews

Although, each course instructor used various pedagogical approaches and course content to enhance student understanding of sustainability, they all had a common underlying goal when designing their curriculum. That goal was to provide the depth and/or breadth of knowledge needed to equip students with the tools to make informed decisions and explore sustainability issues further, rather than directly influencing their decisions and behaviours. This approach is in alignment with the UBC SAS, USI and the executive director; supporting and encouraging emergent dialogue approach rather than a persuasive approach. Instead of trying to persuade their students to make behavioural changes, each instructor emphasized emergent dialogue through in-class discussions, guest lectures, group plays, group projects, and reflective writings. It is also important to note some of the pedagogical approaches used by the instructors to enhance student understanding of sustainability. From using visualizing and climate change models to students re-submitting assignments to promote learning, instructors in these three courses utilized the pedagogical approaches that supported and encouraged student learning and understanding of the issues and concepts discussed in the class. Moreover, the graduate level courses, RMES 500G and RMES 501,

emphasized the importance of challenging assumptions to understand sustainability and implement ideas.

4.4 Interview with the UBC Sustainability Initiative Personnel

In addition to the course instructors, I also spoke with the executive director of the UBC Sustainability Initiative (USI) to get his perspectives on sustainability education and curriculum at UBC and its future. He discussed how in addition to using an emergent dialogue approach to foster sustainability on campus, the USI is working on building capacity for learning as well as tracking sustainability. According to the executive director, the Teaching and Learning Office of the USI has launched several initiatives and programs, such as funding programs to help support the incorporation of sustainability into existing courses. He also highlighted that the UBC SAS (Sustainability Academic Strategy) aims to integrate sustainability into the curriculum and develop pathways that will allow every student, regardless of their degree program, to study sustainability.

Mandatory courses don't work very well, and creating programs means that only those students will get exposed to sustainability. [Executive Director, USI]

According to the executive director, community engagement was being emphasized through collective and significant policy changes and a multilevel change approach.

4.5 Student Interviews

In this section, I present the findings from one-on-one student interviews. These are organized and discussed under the categories: student reflections of the overall course experience,

course content and pedagogical approaches, strategies learned and any changes in their perspectives on sustainability.

4.5.1 General Student Reflections on the Courses

To gauge their overall experience in the course, students were asked to reflect on their respective course experiences and say the first few words and phrases that came to mind. This provided information on how students identified the courses and their main and initial perceptions of the course. The following list shows some popular responses that reflect key elements of the course that students recalled and what stood out in their memory.

CONS 449C: Guest lectures, Sustainability, future, changes, possibility, different generation, media perception, and boundaries.

RMES 500G: Technology, energy, Techno innovation, hopelessness, energy studies, solar power, wind power.

RMES 501: Environmental thought, challenging assumptions, fun, stimulating, it was a bit more work than other course but it was worth it.

These responses coincide closely with the goals of each course and intended learning outcomes set by the course instructors. This alignment suggests the courses met their primary goals.

To gain more information about the effectiveness of these courses, I asked students to reflect on whether they would recommend the course to their friends. Students were mostly very honest about their course experiences and learning outcomes from the course.

Yes, would recommend, it's fairly easy workload plus there is a lot of the fundamentals of climate change covered, which gives you the basic understanding of the issues surrounding sustainability and then you may choose the ones that interest you. [CONS 449C, student A]

First I'll ask them why they want to take it, I'll tell them that it's very general if they already have some kind of knowledge then I will tell them not to take it; I learned lot because I needed that basic knowledge, a course on general environmental issues. [RMES 500G, student C]

I actually took the course because it was recommended to me by another student. He told me about this course and I took his word for it that it would be a good course and it's a great course to take to start out with. [RMES 501, student E]

Ten out of 13 student endorsed their respective courses. Students who did not fully endorse the course typically reflected on the reason for a student to take the course. For example, for CONS 449C a student highlighted that the course is aimed at students who may not have a good understanding of climate change and sustainability. Therefore those students who are already immersed in the topics may find the course redundant and not interesting. The same concern was noted for RMES 500G. For RMES 501, the student who did not fully endorse the course highlighted the main focus of the course (History and Philosophy) and commented that if a student is not interested in such topics then the course might be a challenge or not of interest to them. Overall I found that most students endorsed their courses fully or partially with some minor caveats.

4.5.2 Student Reflections on the Course Curriculum and Pedagogy

Students reflected upon the course content and pedagogical approaches or characteristics that helped enhance their understanding of the concepts discussed in the course and subsequently assisted them in translating these concepts into their personal lives or career options. In terms of the course content and curriculum, students focused on learning the fundamentals of climate change and sustainability – the scientific knowledge and/or the historical background to enhance their understanding of the issues. Students also mentioned the importance of communication and

increasing awareness of sustainability and appreciated course instructors' efforts in wanting to expose their students to the breadth of sustainability issues.

I learned science behind climate change that students feel they can communicate with others [CONS 449C, student A]

The instructors were trying to explain that it's not an easy subject that there are different layers to the issue. [RMES 500G, student D]

I learned a lot about different technologies and there were a lot of solutions proposed and there are lots of projects world wide, we learned how we are using renewable energy, which was good. [RMES 500G, student C]

The reading gives us the fundamental knowledge and helps us make our own framework. [RMES 501, student J]

I think that this kind of course is incredibly valuable in it's not about gaining the knowledge but it's about leaning about, gaining the knowledge of how complex the situations are; its changed the way my understanding of, it gives me a broader starting point, that are things I should and could consider related to sustainability. But really this course should be and could be for any discipline for any topic not just sustainability. It's not something that is directly translatable but its more subtle but more important. [RMES 501, student M]

Students wanted to further explore further into the issues through more practical projects and learning current information and research. However, students were frustrated and discouraged by the rigid degree requirements that hinder their exploration of various courses and topics.

I would love to know some of the details about how things are done....policies are made etc... [RMES 500G, student C]

I find that there is a lot of redundancy between courses. I feel frustrated when we discuss the same thing over and over again and don't know how to use it towards what I'm actually doing. [CONS 449C, student A].

Feel a bit helpless in terms of not being able to do anything about the issue in terms of policy making unless you take the avenue and go into that sector; all we can do as individuals is do little things, such as eat less meat, travel less, turn off the lights and save energy, but don't know if that will make any difference. [RMES 500G, student C]

Having other courses that we can easily take is definitely good. I can only take this course as it satisfies a requirement to take a society impacts course or as part of my

electives. There should be a major and a minor in all faculties and departments, I think that having that option would be great and a lot of students would be interested.
[CONS 449C, student B]

In terms of pedagogical characteristics that made a difference in their learning, students reported that working with other students from different disciplines and various forms of activities such as writing reflections, role playing, and group projects. These activities supported and enhanced their learning by helping them to apply what they learned in class to real life situations and by providing them with skills they needed to understand sustainability issues, such as critical thinking and challenging assumptions.

[It's] great working with students from different disciplines, coming together and work on a project that could actually be used. [CONS 449C, student B]

[Group play] helps to deepen my understanding of climate change the various issues connected to climate change and sustainability, my personal feeling about sustainability. [RMES 500G, student D]

Writing reflections are [sic] a really good activity... to reflect....I did not like it at first but I find it extremely helpful now...it forces me to think about what I've learned and what I got out of the discussion and the concept....forced to think about an issue which is easy to just let pass. [RMES 500G, student C]

...large part of my training is in theory and the role playing gives me the personal practical knowledge and more a part of my understanding of concepts.....relating theory to practical concepts. [RMES 500G, student D]

Changed my worldview to think about things critically. It affects my personal and professional life and it affects everything I do, gives you a critical perspective towards everything. I value that kind of knowledge and cognitive ability than most any other thing, than gaining skills such as playing a violin or interpersonal skills. [RMES 501, student H]

RMES 501 students, specifically, reported having a 'transformative experience' during this course. They realized their potential and learned about their own personal assumptions about issues, situations, and concepts. Students reported that learning how changes take place over time helped

them recognize and become aware of their own internal inconsistencies and therefore question the way they live and act.

Are we better off now than the hunter-gather man? We do think right but we don't want to act right. This course is more about having an influence on yourself. It does change your behaviour and have an effect at a higher level, it creates a lot more consciousness about what is happening around you, when people start to recognize what's happening around them and what's wrong with certain things, because not that many people think about what wrong with the way they are doing things, it does have an impact, the more people recognize the more changes will happen. [RMES 501, student I]

I struggled with a lot of ideas, democracy is constraining the possibility of rebellion. Our need to work within the confines of democracy and people do not have the power to make the big change. Radical enactment might be prevented by democracy but we need the radical thought to make the change. It was a thought process. [RMES 501, student K]

I loved the final project, I ended up doing art work, the instructor gave us the option to do art work, incorporating somewhat more romantic qualities of what we have studying throughout the course, so it was an exercise of how I would assimilate things and how. [RMES 501, student G]

Students' reflections on the course content and pedagogical characteristics show that gaining fundamental knowledge of sustainability and undertaking interdisciplinary practical project work can enhance student understanding of the issues. Furthermore, these course characteristics encourage students to further explore sustainability issues and seek more flexibility in their university programs to allow them to do so.

4.5.3 Strategies Learned Through or In the Course

Students were asked to reflect on any strategies and/or experiences that they learned or valued from the courses. CONS 449C students identified the importance of communication and developing a communication plan. RMES 500G and RMES 501 students reported that in their

courses they did not learn any particular skills or strategies (for addressing sustainability issues).

However, they regarded learning about their own potential and developing their thinking skills as important outcomes. A RMES 501 student, who chose to do an art project, also reported discovering she had an interest in art and indicated she would like to explore that further.

[We] made a communication plan that's a skills that could be used later in other areas. [CONS 449C, student B]

No skills or strategies, it's not a hands-on course, I find it very useful for myself, its a good class to take with people with clashing idea to think about different points of view. I don't know if it's a skill but to deconstruct and to think about things, collaborative questioning. [RMES 500G, student C]

Certainly artistic one, I could apply, it did trigger something more so I'll definitely apply that and do more of art work. Being able to look at something, think about its history, not taking anything for granted, which could be a curse sometimes than a blessing. Personal growth, philosophical, socio-cultural and historical events. [RMES 501, student I]

I'm probably more open to thinking outside the box, I would be open to different approaches, it kind of clarifies more of my own thinking about sustainability, I would try to make that more than a core of my life and my personal life and thinking about my research too. [RMES 501, student L]

Overall, students in RMES 501 reported having a 'transformative change' as they analyzed their own assumptions about human nature in general and specifically about themselves and also identified skills sets, such as art as a result of the instructor providing the space, flexibility and opportunities for student exploration.

4.5.4 Students' Personal Definition of Sustainability

To understand how participation in these courses influenced students' personal definitions of sustainability during the one-on-one interviews I asked each student to define sustainability and to

comment on how the course may have affected their definitions. I then compared their responses to definitions of sustainability offered during focus groups conversations.

The course has evolved my personal definitions of sustainability, in terms of considering the micro and macro levels involved and exploring various views on a given situation, from government policy making to grassroots activism. [CONS 449C, student A]

Sustainability is about providing a comfortable standard of living, not just the necessities but more than the necessities, so the future generation can live with same standards as us; with our lifestyle right now, definitely it is not sustainable. [RMES 500G, student C]

Sustainability is this quest of something outside that we need to achieve. [RMES 501, student K]

The course never gave a definition of sustainability.....it just focused on different areas of your life and then you have the decision to make the wrong and the good. In the end it's up to you and it's a very very [sic] subjective. [RMES 501, student I]

Students in all three courses reported that their personal definitions evolved which they interpreted as a result of their participation in these courses. Most students spoke about how they now knew more about the breadth and the depth of sustainability issues and the importance of acknowledging various related perspectives.

4.5.5 Brief Summary of Student Interviews

CONS 449C and RMES 500G students reported learning about the scientific foundations of climate change and about mitigation and adaptation strategies in their courses, with an emphasis on either the visualization aspect or the technological and economic aspects of climate change. The RMES 501 students reported having a stimulating experience through learning about the history of environmental thought through philosophical discussions and by challenging their own assumptions in the process of understanding sustainability. Other than learning a communication strategy in the

CONS 449C course, students in all three courses did not report learning any hands-on strategies or practical applications of the knowledge taught in the courses. However, students did report gaining a deeper understanding of sustainability through writing reflections about the personal understandings of sustainability. These understandings evolved over time as they gained more knowledge and appreciation of the depth and complexity of sustainability issues. My findings suggest that the interactive and practical pedagogical approaches adopted in these courses were useful for providing an in-depth understanding of the course concepts discussed but not for providing students with strategies they could apply in a practical sense. A holistic systems thinking approach and information about sustainability issues that included perspectives from science, technology, history, and philosophy, provided students with the cognitive knowledge and skills they needed for a positive attitude change.

4.5.6 Analysis of Student Interviews

Over the course of the term, the 13 students I interviewed appeared to develop in terms of both *cognitive* and *affective* learning. By the end of the term, students taking CONS 449C who appeared to be in the *receiving* stage during focus groups were demonstrating characteristics of the *responding* stage as evidenced by their questioning of ideas and concepts and willingness to learn more. RMES 500G students showed a progression from the *responding* stage to the *valuing* stage where they displayed more sensitivity to others' ideas, cultures and diversity of viewpoints. The RMES 501 students who participated in my interviews reported having a 'transformative experience'. By the end of the term, every student participant progressed; students who were at the *valuing* stage moved to the *organization* stage, where they were synthesizing ideas and developing concepts, such as integrating knowledge into their program through their thesis topic.

Students did not display behaviours characteristic of progression beyond the *preparation* stage of the Transtheoretical Model of Behavioural Change (Prochaska and DiClemente, 1986), although I identified areas of growth, suggesting some students were in transition from the *preparation* to the *action* stage. Since behavioural change may occur in a cyclical pattern that involves both progression and periodic relapse, it is expected that students will move back and forth between these stages. However, according to the Model, with persistent successful behaviour change an individual will never remain in the earlier stages for too long but will spiral upwards to higher stages. There is evidence that students in the courses I studied, wanted to integrate sustainability into their lives or career by either taking more sustainability-oriented courses, adapting their theses topics, or living more sustainably through biking, recycling, composting, etc. This suggests that they were transitioning from the *preparation* stage to the *action* stage of behaviour, where they are continuing to learn and at the same time taking the action to make that change happen, through their behaviour and attitude towards sustainability.

More than behavioural changes, the students I interviewed showed an overall attitude shift towards sustainability in general. From being motivated to take action in terms of integrating either more sustainability courses in their programs or tailoring their thesis towards sustainability, students were generally more receptive and open to learning more about the issues discussed in their courses. Students also craved more relevant information that could be implemented practically or could help them build upon their previous knowledge. These factors – having strong intentions to perform the behaviour, having the necessary skills to do so and not be restricted by environmental constraints - helped the attitude shift in students. These factors are also consistent with the three “necessary and sufficient” (Theories and Models of Behaviour Change, n.d., pp. 12) factors developed by the 1991

Theorists Workshop (as discussed earlier in chapter 3, section 3.6.3). All thirteen student enrolled in the three courses examined in this study come with some intention and motivation of making a sustainable behaviour or attitude change and these courses re-enforced these “strong intentions to perform the behaviour” while providing the “necessary skills” and guiding students to explore ways to overcome “environmental constraints”.

4.6 Chapter Summary

My examination of course documents and in-class observations provided information about which course content and activities promoted and enhanced students’ understanding of sustainability. I also identified “hidden curriculum” that supported and re-enforced learning. From a close analysis of the focus groups, I was able to identify students’ interests and intentions for taking sustainability-focused courses, their expectations for such courses, and what they regard as important for motivating them to make a change in their behaviours and actions. The student interviews provided more in-depth responses about students’ experiences, attitude shifts, and understanding of the content and sustainability issues. Students’ responses indicated that they were experiencing *affective* change through taking these courses. This suggests that these courses are making a difference and promoting change in students’ attitudes towards sustainability. Every student in the study indicated they wanted to integrate sustainability into their careers and personal lives. The interview component offered the most productive and insightful reflection of the students’ experience in these courses. The interviews indicated that students want more such courses and experiences where they are challenged and encouraged to implement projects.

At the same time, my findings also suggest that more needs to be done in terms of offering

students program flexibility and advanced and current knowledge of the sustainability issues to promote a more holistic understanding and to keep students motivated and engaged. Interviews conducted with the course instructors and USI Executive Director provided information about the pedagogical approaches employed in these three sustainability-focused courses, the goals of each course, the connections to the UBC Sustainability Initiative, and the overall goal of sustainability education at UBC. Overall my findings suggest that while these courses are providing students with the knowledge and motivation to study sustainability, students need and require more time and opportunities to explore sustainability issues through practical project work if we wish to assist them in making a positive change in their own personal lives and their communities.

In the next chapter, I summarize my answers to the research questions, and support these answers by presenting the key themes that emerged from my data analysis. I also present conclusions, and discuss some future directions for research and practice.

CHAPTER 5: SUMMARY OF RESEARCH QUESTIONS

5.0 Introduction

In Chapter 4, I provided a detailed discussion of the study's findings based on my data analysis gathered through documents, in-class observations, focus groups, and interviews. In this chapter, I answer the study's three research questions by summarizing the results of my data analysis. This is followed by a brief conclusion and my suggestions for future research.

5.1 Research Question #1

What Aspects of Course Curricula Indicate Sustainability Content that Aim to Foster Sustainable Actions and Awareness?

While there were distinct differences in the content and curriculum and the pedagogical approaches of the courses examined for this study, I identified characteristics that were common to all three courses. I discuss these under two categories: Course Content and Focus and Pedagogical Approach.

5.1.1 Course Content and Focus

The CONS 449C and RMES 500G courses dealt specifically with the issue of climate change examined through environmental, economic, and technological lenses. The RMES 501 course dealt with sustainability and environmental thought in general, examined through a social lens. To introduce the fundamentals of climate change in CONS 449C and RMES 500G, the instructors

focused on scientific content to provide students with the basic foundational knowledge needed to understand more advanced topics on the issue, such as scientific interpretations, carbon management, impacts, and vulnerabilities associated with mitigation and adaptation strategies.

CONS 449C and RMES 500G provided information about current mitigation and adaptation strategies being employed for climate change in addition to discussing current and advanced technological developments in the field, their uses, limitations, advantages, and disadvantages. RMES 501 took a more philosophical approach, by providing an in-depth history and background of sustainability issues and environmental thought.

5.1.2 Pedagogical Approach

All three courses had lecture-based instruction and used group discussions and project work to help students gain a more in-depth understanding of topics through peer discussions. All three courses employed guest lectures and held seminars to encourage student participation in discussions of the issues and to advance student understanding through peer-to-peer and student-to-faculty interactions.

Based on my analysis of course syllabi and in-class observations conducted in the three courses, I identified six defining content and pedagogical characteristics. These characteristics were evident across the courses' curricula and were consistent in lessons throughout the term.

5.1.3 Six Central Characteristics of Sustainability-Focused Courses

Six central characteristics were discussed by the 13 student participants as key to providing an overall knowledge and in-depth exploration of sustainability. These are:

1. Introduction to the scientific basis of climate change,
2. Presentation of mitigation and adaptation strategies,
3. Involvement of students in group and/or project work,
4. Information about technological innovations and advancements related to the issue,
5. Discussion of the history and background of the sustainability issue, and
6. Critical examination of sustainability issues through guest lectures, multidisciplinary group discussions and seminars

Based on interviews with the course instructors, the same six course characteristics were identified as representing what instructors regarded as important for promoting student understanding and application of sustainability concepts.

5.2 Research Question #2

What Pedagogical and Course Characteristics Enhance Student Understanding and Translation of Sustainability Concepts into Practice?

Students in this study, identified particular attributes of course content and pedagogical approaches that they valued and believed need to be included in a course about sustainability to make that course credible and useful.

5.2.1 Course Content

I identified four core course content characteristics that were highlighted as important in enhancing sustainability understanding for students. These are:

1. Scientific Background

Students valued acquiring scientific knowledge of the issues under discussion that prepared them for communicating with others about climate change and sustainability issues.

2. Multi-disciplinary and Holistic Understanding

Students valued being presented with a wide range of both global and local research and solutions from across the disciplines of science, arts, engineering, forestry, land and food systems, and interdisciplinary studies. In addition, working with peers from other disciplines helped enhance students' understanding of concepts and implementation of strategies from multiple disciplines, and assisted them in learning how climate change problems needed to be addressed through a holistic strategy.

3. Current Research and Technological Innovations

Students believed it was important to learn about new and emerging research and technologies for dealing with climate change, and to explore the possibilities of implementation and correct use of technologies that may be underdeveloped or under consideration.

4. Strategies and Resources for Making Change

Students respected hearing about “sustainability principles” but valued and wanted to learn tangible

strategies they could easily incorporate and implement in their lives or career.

5.2.2 Pedagogical Approach

Two main pedagogical approaches were highlighted through the results analysis. These are described below:

1. Engaging in Project-Based Student Discussions, Reflections, and Group Play

A project-based learning environment that provided time for peer engagement and discussions on a relevant topic was considered more valuable than lectures for advancing understanding and implementation of the strategies being presented.

2. Making Links Between Theory and Practical Application

Students believed that the learning of theory was important but questioned the value of a course when there was a disconnect between the theory presented and the real life application of that theory or strategies emanating from the theory. Students wanted to hear how they could relate what they learned in the courses to their career and personal lives; they wanted to learn and explore the relevance and implementation of theories and concepts learned in the classroom.

5.2.3 Six Pedagogical and Course Characteristics that can Enhance Student Understanding

From my analysis of the study data, I identified a set of pedagogical attributes and course characteristics that students valued and believed needed to be included in a course about sustainability to make that course useful and credible:

1. Scientific Background,
2. Multidisciplinary and Holistic Understanding,
3. Current research and technological innovations,
4. Strategies and resources for making change
5. Project-based Student Discussions, and
6. Links between theory and practice through practical applications

5.3 Research Question #3

What Course-Related Experiences Influence Student Actions, Attitudes Towards and Motivation for Sustainability in Their Career and Personal Lives?

Overall, I found that sustainability-focused courses can influence student thinking, and their motivation for continuing to focus on sustainability in their education and career plans. Different pedagogies and course content used to enhance student understanding of sustainability issues provide different experiential outcomes for students. Although students' reasons for taking these courses varied from matching their personal interests to being a program requirement, all 13 students reported a valuable learning experience and left their course with an interest in taking more such courses in their academic careers. It was also interesting to note that students in the RMES 501 course used words such as "fun" and "stimulating" to describe their initial recall of the course, suggesting *affective* takeaways from a learner-centered pedagogical approach and course content that delivers a 'transformative experience' for students. Students were not able to positively identify any tangible strategies they learned from these courses, and the course instructors also indicated this as not the primary aim of the course. Furthermore, it is important to note that these courses did not directly aim to alter student behaviours but rather to raise students' awareness of the issues and shift

their attitudes towards sustainability in general. The success of the courses in achieving these aims is evidenced by the students indicating their wish to take more sustainability-oriented courses or wanting to integrate sustainability into their programs. I have summarized students' experiences in these courses in the three sections below.

5.3.1 Participating in Sustainability-Focused Courses Can Lead to Positive Changes in Students' Views and Attitudes About Sustainability

Students' personal definition of sustainability evolved over the term from their first reflections in the focus groups to interviews after the end of the courses. Students appreciated learning about the depth and breadth of sustainability issues in terms of identifying and discussing different aspects of sustainability, such as environmental, economic, social perspectives, and others. Students in all three courses reported having a better sense and understanding of sustainability and related issues, which appeared to contribute to an attitude change that motivated them to further enhance their knowledge of the issues through integrating sustainability into their studies.

5.3.2 Participating In Sustainability-Focused Courses Can Motivate and Inspire Student Involvement in Sustainability

Students who enrolled in the courses I examined were motivated to either take more sustainability-related or -focused courses, complete a major or a minor program, or degree specialization in a sustainability-related issue, such as water conservation or food security, or make positive changes in their lifestyle (e.g. composting or riding a bike to school and making sustainability-oriented career choices). However, students found their goals for pursuing a career in sustainability were limited by policies previously established regarding degree requirements. They

indicated that due to strict degree requirements, some courses that interested them could not be taken as a part of their programs. This restriction limited their ability to enhance their understanding of sustainability.

5.3.3 Experiencing Different Approaches to the Teaching of Sustainability Promote Different Responses To and Understanding Of Related Issues

While sustainability-focused courses can foster consciousness and understanding of sustainability issues and integration of knowledge and reflection, the extent to which these outcomes were achieved varied with the pedagogical approach and type of course content used to advance understanding of sustainability. For example, students enrolled in RMES 501, which focused on how behaviour and attitudes regarding sustainability changed over time, reported having a ‘transformative experience’ that altered their philosophy, understanding, and subsequently their actions for incorporating sustainability into their lives. In contrast, students enrolled in CONS449C which provided a more “scientific approach” to understanding sustainability and some “practical applications and strategies”, reported that the depth of knowledge they acquired would help them in their careers as future sustainability leaders. However, these students indicated they personally were not influenced or ‘changed’ in terms of their practices.

5.3.4 Overall Impact of Sustainability-Focused Courses

Through this study I found that sustainability courses can influence student attitudes towards and their motivation for, continuing to focus on sustainability in their education, career plans and lives in three major ways:

1. Participating in sustainability-focused courses can lead to positive changes in students’ views

and attitude about sustainability.

2. Participating in sustainability-focused courses can motivate and inspire student involvement in sustainability.
3. Experiencing different approaches to the teaching of sustainability promote different responses to and understanding of issues.

5.4 Conclusions

Courses about sustainability should enhance students' understanding, interest, and their commitment to a more sustainable lifestyle (UBC SAS, 2009). Moreover, sustainability-oriented courses should aid students in understanding their role as global citizens. This investigation of three sustainability-focused courses offered at the University of British Columbia, Vancouver indicates that students respond positively to concepts learned in such courses and can identify course features that they believe will aid them in understanding the concept of sustainability and current issues. My findings suggest that for effective, influential, and student-focused learning to occur, theory and principles of sustainability discussed in the classroom need to be connected explicitly to real life applications. Students value resources and the knowledge that courses about sustainability can provide. But they believe these are just a start. Students want to engage in group-processes with real world problems in order to gain a deep understanding of how to integrate sustainability practices into their lives. While courses may motivate students to make positive attitudinal changes, students at UBC (and perhaps at other institutions of higher education) find it difficult to pursue degrees in sustainability due to limited program flexibility and the lack of majors/minors presently offered in this field, and because the university's strict degree requirements provide little opportunity to enroll in sustainability electives. Including a multi-disciplinary approach that involves working with peers

from different academic programs and disciplines, and presenting local as well as global research on sustainability appear to be important pedagogical approaches that provide students with a holistic view of the issues.

The two theoretical lens applied in this study were useful in understanding the impacts of these courses on students' attitude and behaviour changes. The *affective* learning model varied across courses and identified students' characteristics that implied progression over the *affective* learning stages. However, students did not display progressive behaviour characteristics beyond the *preparation* stage of the Transtheoretical Model of Behavioural Change, suggesting that the courses did not alter student behaviours but intrigued their interest and motivated them to learn more.

5.5 Implications, Recommendations and Future Directions

This research contributes to the growing body of literature on sustainability education by examining how students perceive university-level courses that teach about sustainability. The study is the first phase of research that seeks to understand the long-term impact of sustainability-focused courses and a larger review of undergraduate sustainability initiatives and courses at UBC that will inform and support the development of a coherent and comprehensive sustainability curriculum. Findings from this study will be of interest to course instructors and curriculum specialists interested in sustainability education and can inform the development and re-design of courses. The research to date suggests it may be fruitful to review all courses that claim to teach about sustainability at the University of British Columbia and other institutions of higher education.

My study indicates that there are definable attributes of courses that make sustainability

education relevant and comprehensible for students. Besides multi-disciplinary cohort or group discussions and project work students value working on real world situations related to sustainability. Philosophical and holistic discussions of sustainability issues and multi-method pedagogical approaches seem to encourage student learning and motivation. I believe these attributes can be adapted to enhance and bring a sustainability focus into the larger curriculum arena such as K-12 classrooms and other university courses. Although there are positive impacts of these courses on students' values, attitudes, and motivation students need the flexibility to choose and explore the courses that interest them to further enhance their learning.

The positive impacts of these courses on the students' attitudes and motivation need to be further encouraged to facilitate positive behaviour changes. Some aspects that I believe were missing from these courses and that can be built-in are 1) a cultural aspect of sustainability, 2) aboriginal perspectives, and 3) participatory course curriculum development and teaching. Cultural and aboriginal perspectives would offer a chance to learn about a variety of historical and societal practices and knowledge, while a participatory approach to course teaching and curriculum development would be more democratic and offers students ownership of their learning. Furthermore, it is important that a course provide students with a balance between acknowledging the complexities of sustainability issues while at the same time not discouraging them from the potential to change or make a difference. A course that incorporates these aspects may help students make that leap from a positive attitude to a change in behaviour.

Finally, this research begins to examine some of the broader questions regarding the issue of sustainability education such as, "to what extent can we solve the problem of unsustainability through education?" and "what kind of sustainability curriculum is required to bring about the

necessary and timely change?” While my study has provided some initial answers, these are two key and critical questions where future research is needed.

5.6 Reflections and Final Comments

My journey through this research study has been challenging at times yet very educational and inspirational. I learned a great deal about designing and conducting a research study, about methodological approaches, and about publishing my work. I also learned the importance of collecting data and reflecting on it immediately and taking notes along the way for a better analysis. Effective time management and keeping detailed field notes are crucial for a good study.

Specifically, during the initial stages of this research I found that some course instructors were reluctant to participate in this study. Their hesitancy could be due to a lack of time, concerns about their teaching being “put under the microscope”, or not wishing their students to participate in a study that might lead them to question instructional practices. I also found it interesting that all instructors I interviewed had somewhat similar course goals in mind, namely to provide students with the knowledge and tools that would permit them to decide how to behave and make appropriate changes in their lives or career. All three courses were developed and delivered in a way that did not attempt to alter students’ behaviours, but rather, provided the facts to help them make their own decisions. It was also an eye opening experience, as I discovered that UBC is one of the leading universities in sustainability teaching and learning, and yet there is much work that needs to be done, in terms of integrating sustainability throughout the curriculum. This includes encouraging and supporting faculty who wish to add a sustainability focus to their courses and teaching. Students who participated in this study and took one of the three courses investigated are already to some extent

committed to sustainability. However during my research I discovered that a large percentage of the university population does not commit to sustainability or have the basic fundamental knowledge of climate change occurring in the world. The challenge of integrating sustainability into every faculty, department, and course is not easy but UBC has created some initiatives to support and advance this commitment. There remains however a large number of courses that and faculty members who need to integrate sustainability, as reflected by the number of sustainability-oriented courses (over 450) out of thousands of courses offered at UBC each year. Integrating sustainability into every operation or academic decision is what UBC is working toward to make sustainability a norm and a part of the culture. Changing a culture is a slow process. From my study I learned that an attitude shift does not necessarily result in a behaviour change. We still have much to learn about how courses and instruction can not only transform attitudes but also encourage, support, and advance behaviour changes that lead to more sustainable life practices.

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APPENDICES

APPENDIX A: Focus Group Protocol

A QUALITATIVE EVALUATION OF SUSTAINABILITY-RELATED COURSES AT UBC With Kshamta Hunter

Introductions

Explanation of the research study and consent form

1. Which sustainability related course(s) are you enrolled in currently or have taken in the past?
2. What is your interest or intentions in taking this course(s)? What do you hope or expect to get out of this course(s)?
3. What does the term “sustainability” mean to you? According to you, what are some examples of sustainable actions and/or behaviours?
4. According to you, how is the course content related to sustainability and in some way motivating a career or lifestyle changes in students’ lives? What are some of the personal or career-oriented goals you have in relation to this course?
5. Do you think this course has a potential to help motivate you to make more sustainable choices? In what ways? What kind of strategies do you expect to learn in this course to make more sustainable choices?
6. Do you think the materials and knowledge you gain in this course will motivate you to make some small or big changes in your own life or new/different attitudes about sustainability? How and in what ways?

Clarify any doubts/questions/concerns

Thank you!

Please contact us if you’ve any further questions regarding the study and the focus group.

Contact Information:

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Vancouver, BC. V6T 1Z4,
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University of British Columbia
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APPENDIX B: Student Interview Protocol

1. What is one thing that you remember the most or the first thing that comes to your mind when you think back about this course (CONS449C, RMES 500, RMES 501)?
2. If a friend comes to you, a friend and says that they are thinking of taking this course, what would you tell them about it?
3. Please say the words or phrases that come to your mind when you think about this course? Can you please list them whatever comes to your mind.
4. What do you remember about the course curriculum?
5. What strategies, aspects, or experiences gained in this course have had the greatest impact in any way with your career, personal life, or in making everyday decisions?
6. What does sustainability mean to you? How would you compare it to what it meant or translated as in the course?
7. RMES 501 students only: What did you end up doing for your final project (Art or paper) and how did you answer the question: do we need any fundamental changes in order to make the necessary changes?
8. Would you say that this course has helped you in making better sustainable choices?
How?

APPENDIX C: Instructor Interview Protocol

CONS 449C and RMES 500G Instructor Interview Protocol

1. Why did you create this course? What did you want your students to take away from this course? To what extent were these hopes met, in your opinion?
2. What are the aspects of the course, if any, foster or nurture sustainable actions?
3. How do the students understand and translate sustainability as framed in the course and potentially into sustainable actions and behaviour?
4. How are these aspects of the course motivating a change in students' lives and career?
5. Do you think that the strategies learned or experiences gained in this course will aid students in making a more sustainable choice?
6. How does this course reflect the objectives of the new UBC Sustainability Initiative?
7. What changes will you make to this course? If not, why not?

RMES 501 Instructor Interview Protocol

1. Why did you create this course? What did you want your students to take away from this course? To what extent were these hopes met, in your opinion?
2. How does understanding the roots of environmental thought, basic to solving environmental problem? What are the aspects of the course, if any, foster or nurture sustainable actions?
3. Do you think understanding the roots of the problem will help or aid students in coming up with better sustainable solutions? According to you, how well do you

think students translate this purpose of the course and implement the ideas into their own research or personal lives?

4. How should this course aid students in understanding the issue better and making better choices? How are these aspects of the course motivating a change in students' lives and career?
5. Do you think the history and philosophy learned in this course will help students make that leap into making their own but the right decisions? Do you think that the strategies learned or experiences gained in this course will aid students in making a more sustainable choice?
6. What changes will you make to this course? If not, why not? How does this course reflect the objectives of the new UBC Sustainability Initiative?

APPENDIX D: USI Personal Interview Protocol

UBC Sustainability Initiative's Executive Director Interview Questions

1. How does the new USI is reflected in UBC curriculum?
2. What kind of changes are taking place as a result of this new initiative? (In teaching and learning)
3. How are instructors/professor reacting to USI?
4. As an executive director of USI: Do you think teaching and learning about this issue will make a difference?

APPENDIX E: Consent Form

Vancouver, B.C., Canada

Tel:

Fax:

educ.ubc.ca

Consent Form

A QUALITATIVE EVALUATION OF SUSTAINABILITY-RELATED COURSES AT UBC

Principal Investigator:

Dr David Anderson
Deputy Head & Associate Professor
Department of Curriculum & Pedagogy
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Vancouver, BC,
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Telephone:
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Kshamta B. Hunter
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Telephone:
Fax:
Email:

This study is being conducted as part of a graduate research thesis. The results of this study will be published.

Conflict of Interest: The authors declare no conflicts of interest.

Purpose:

The purpose of this study is to evaluate the extent of success of teaching and learning initiatives involving graduate sustainability and sustainability related courses. Furthermore, an investigation of students' understanding of these concepts (sustainability, sustainable actions and related concepts, such as carbon neutrality, carbon footprint, why it is crucial and important to live sustainably) and how they implement the strategies developed through these courses will be conducted. Hence the question: How do these course experiences translate sustainability messages into sustainable actions?

You are being invited to take part in this research study because you are enrolled in one or more graduate level sustainability or sustainability related course(s) and your participation in the study will be highly appreciated.

Study Procedures:

The study will require your participation on two different occasions and settings, for a total time commitment of 2 hours. Firstly, you will be asked to participate in a 1 hour focus group with 4 other participants and 1-2 co-investigators of the study; this will be held at the beginning of the course. Secondly, an interview will be held approximately one month after the course end date, which will also be one hour in length.

There will be a video tape recording of the focus group session and an audio recording of the interview. Please refer to the Confidentiality section for further information on these recordings.

Potential Risks:

Your participation in this study has no connection with your assessment within this course or with your identity in relation with your responses to your instructor.

Potential Benefits:

This study has the potential to inform both personal and university scale goals about integrating sustainability into our lives and education. Moreover, it might raise awareness of potential benefits of the courses taken and their impact on everyday life in integrating more sustainable actions.

If you would like to be informed of the results of this study please provide your contact information in the space provided below.

Address: _____
City _____ Province _____ Postal code _____
Email: _____ Tel.: _____

Confidentiality:

All research material that will be gathered will be saved and kept in a locked filing cabinet and computer files, which are password protected, at the University of British Columbia

Education facility. Afterwards the tapes will be demagnetized or computer files deleted and any paper copies will be shredded. In order to ensure and protect participants' privacy and confidentiality your name or identity will not be used or mentioned anywhere in the reports of the study or any published papers; participants will be identified by a code number.

Due to the nature of focus groups we cannot control what other participants do with the information discussed. However, we encourage all participants to refrain from disclosing the contents of the discussion outside of the focus group.

Remuneration/Compensation:

No Reimbursement

Contact for information about the study:

If you have any questions or desire further information with respect to this study, you may contact Dr. David Anderson at _____ or _____ or the co-investigator of the study Kshamta Hunter at _____ or email _____

Contact for concerns about the rights of research subjects:

If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at _____ or if long distance e-mail to _____

Consent:

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your class standing and enrollment.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

I consent to my participation in this study, I consent to my participation in the focus group being video recorded and I consent to my interview being audio recorded.

Subject Signature

Date

Printed Name of the Subject

The signature of a Witness is not required for behavioural research.

Instructors' Consent Form
A QUALITATIVE EVALUATION OF SUSTAINABILITY-RELATED COURSES AT
UBC

Principal Investigator:

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Deputy Head & Associate Professor
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Co-Investigator(s):

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Dr. Jolie Mayer-Smith
Associate Professor and Chair of Science Education
Department of Curriculum and Pedagogy
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Email:

This study is being conducted as part of a graduate research thesis. The results of this study will be published.

Conflict of Interest: The authors declare no conflicts of interest.

Purpose:

The purpose of this study is to evaluate the extent of success of teaching and learning initiatives involving graduate sustainability and sustainability related courses. Furthermore, an investigation of students’ understanding of these concepts (sustainability, sustainable actions and related concepts, such as carbon neutrality, carbon footprint, why it is crucial and important to live sustainably) and how they implement the strategies developed through these courses will be conducted. Hence the question: How do these course experiences translate sustainability messages into sustainable actions?

You are being invited to take part in this research study because you are enrolled in one or more graduate level sustainability or sustainability related course(s) and your participation in the study will be highly appreciated.

Study Procedures:

The study will require your participation in an interview will be held approximately one month after the course end date, which will also be one hour in length.

There will be an audio recording of the interview. Please refer to the Confidentiality section for further information on these recordings.

Potential Risks:

Your participation in this study has no connection with your assessment and/or pedagogy involving this course.

Potential Benefits:

This study has the potential to inform both personal and university scale goals about integrating sustainability into our lives and education. Moreover, it might raise awareness of potential benefits of the courses taken, their impact on everyday life in integrating more sustainable actions, and further development of the course as a result of this evaluation.

If you would like to be informed of the results of this study please provide your contact information in the space provided below.

Address: _____
City _____ Province _____ Postal code _____
Email: _____ Tel.: _____

Move this to next page --- so subtitle goes with the text: Confidentiality:

All research material that will be gathered will be saved and kept in a locked filing cabinet and computer files, which are password protected, at the University of British Columbia Education facility. Afterwards the tapes will be demagnetized or computer files deleted and any paper copies will be shredded. In order to ensure and protect participants’ privacy and confidentiality your name or identity will not be used or mentioned anywhere in the reports of the study or any published papers; participants will be identified by a code number.

Remuneration/Compensation:

No Reimbursement

Contact for information about the study:

If you have any questions or desire further information with respect to this study, you may contact Dr. David Anderson at _____ or _____ or the co-investigator of the study Kshamta Hunter at _____ or email _____

Contact for concerns about the rights of research subjects:

If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at _____ or if long distance e-mail to _____ .

Consent:

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your class standing and enrollment.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

I consent to my participation in this study, I consent to my interview being audio recorded.

Subject Signature

Date

Printed Name of the Subject

The signature of a Witness is not required for behavioural research.

APPENDIX F: Invitation to Participate

A QUALITATIVE EVALUATION OF SUSTAINABILITY-RELATED COURSES AT UBC Invitation to Participate

Dear Students,

Dr. David Anderson, Dr. Jolie Mayer-Smith, and Ms. Kshamta Hunter of the University of British Columbia, Canada invite you to participate in a research study entitled “A Qualitative Evaluation of Sustainability-Related Courses at UBC”. This invitation to participate is made to you because you are enrolled in one or more sustainability-related course(s) at UBC.

This study seeks to evaluate the extent of success of teaching and learning initiatives involving graduate sustainability and sustainability related courses. Further, the study is aimed to investigate students’ understanding of these concepts (sustainability, sustainable actions and related concepts, such as carbon neutrality, carbon footprint, why is it crucial and important to live sustainably) and how they implement the strategies developed through these courses. The particular research questions which drive the study include: 1) What aspects of course curricula indicate sustainability content and intend to foster sustainable actions and behaviours? 2) How do the students understand and translate sustainability as framed in the courses into sustainable actions and behaviours? 3) What course related experiences promote new attitudes and motivate students to make subsequent behaviour changes relating to sustainability?

We invite you to participate in 1 hour focus group concerning your interests and motivation in taking this course. This focus group will be held with 5 student participants and one or two co-investigators of the study; the session will be video recorded for later transcription and analysis. Participation in this study is voluntary. You may decline to participate OR choose to withdraw from the study at any time without consequences. We thank you for considering our request and look forward to hearing from you. Data collected in this study will remain confidential between the investigators, research assistants and you.

HOW TO PARTICIPANT

If you wish to participate in this study please provide us with your contact information on the sign-up sheet or contact:

David Anderson
Department of Curriculum & Pedagogy,
University of British Columbia,

Kshamta Hunter
Department of curriculum and Pedagogy
University of British Columbia

Vancouver, BC. ,

Telephone

E-mail:

Vancouver, BC. ,

Telephone

Email:

Yours sincerely,

Dr. David Anderson

Associate Professor and Deputy Head

Department of Curriculum and Pedagogy