TRANSFORMATIVE SUSTAINABILITY LEARNING:
A UNITED PEDAGOGY OF HEAD, HANDS AND HEART
by
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Chapter 1

Teaching and learning in sustainability times
Overview of Chapter 1

This chapter serves as a prologue to the thesis, wherein I introduce a new pedagogical model, Transformative Sustainability Learning; provide insight into personal experiences that led me to and connect me with this work; present the context for these investigations; and outline desired outcomes for this research. I conclude this chapter with an overview of the rest of the thesis.

1.1 Introduction to Transformative Sustainability Learning

A novel pedagogy presented in this paper, termed Transformative Sustainability Learning (TSL), provides a simple, fundamental and useful model to facilitate the sustainability transformation by focusing on learning rather than teaching, being rather than doing, and reflecting rather than reacting. Whereas many contemporary teaching and learning models address the need for a new social order based on sustainability values and principles (e.g. Raskin et al., 2002), TSL also offers a simple organizing model to bridge the what is with the what could be (Lange, 2004) by integrating learning processes rooted in participants’ heads (engagement with cognitive learning, such as ecological-footprinting (Wackernagel and Rees, 1996), hands (enactment of practical skills and physical labour), and hearts (enablement of values to be translated into behaviour). This introduction of TSL, and its associated organizing principle, Head, Hands and Heart, is an attempt to explore the question:

How can educators and facilitators engage learners so as to encourage and enable personal, and thus societal, enactment of sustainability principles and goals?

1 The term pedagogy describes “an approach to schooling, learning and teaching, [including] what is taught, how teaching occurs, and how what is taught is learned” (Diekelmann, 2004). In its broadest sense, pedagogy can be understood as an expression of the cultural politics of a school (McLaren, 2003 in Furman and Gruenewald, 2004).
In this thesis, I propose that through TSL, organized by way of Head, Hands and Heart connections, learners can fully traverse the path towards sustainability and transform the landscapes of local and global socioecological\(^2\) justice. As such the pedagogy of TSL explores inter/transdisciplinary\(^3\) (Kates et al., 2001), practical\(^4\) (Gillett, 2003) and place-based\(^5\) (Smith, 2002; Diekelmann, 2004; Furman and Gruenewald, 2004) research and education.

1.2 Personal experience

'Sustainability' captured my attention when I moved to Vancouver three years ago; in fact, I have very few recollections of hearing the term before I arrived at the University of British Columbia (UBC). I became interested in sustainability learning upon leaving a traditional natural science project in search of a more integrative approach to learning, research and practice. My own cultural context for this work has largely grown from seeds planted through my involvement in Habonim Dror, a progressive labour-Zionist youth movement founded on principles of equality, peace and coexistence, and whose primary pillars include social justice and self-actualization. Coming from an academic background in plant biology and ecology, and experienced as a facilitator of consensus decision-

\(^2\) Socioecological systems are those that refer to the integrated concept of humans in nature (Berkes, 2004).

\(^3\) Inter/ transdisciplinary learning refers to integrating knowledge from different disciplines such that various streams of knowledge are embedded within one another (Somerville, 2000, p.285). Some inter/ transdisciplines are considered as "bridging fields" (Berkes, 2004); this phrase also refers more broadly to the combination of different ways and strategies of knowing and being (Kates et al., 2001).

\(^4\) Gillett (2003) cites work by the 20\(^{th}\) century philosopher Wittgenstein to articulate the link between language and praxis, as per Marxist theory. Language, and to some degree cognition, has its roots in practical hands-on work, which informs, elaborates and extends our abilities to interact with and affect our environments.

\(^5\) Place-based learning refers to the engagement of learners through the positioning of a curriculum within the context of participants’ own lives, communities, and regions, thereby taking advantage of students’ and communities’ natural interest in the local (Smith, 2002).
making and informal education, I embarked upon a path that would enable me to merge my interests in natural sciences with a worldview founded on community engagement and participation. In my graduate studies, I therefore incorporated a wide range of courses from six academic programs: Forest Sciences (FRST 507; FRST 517; FRST 533; FRST 584); Agroecology (AGRO 401); Resource Management and Environmental Studies (RMES 500); Curriculum Studies (CUST 416); Science Education (SCED 380); and the School of Community and Regional Planning (PLAN 504).

I became involved in the UBC sustainability community as a co-instructor for the newly developed transdisciplinary field course, *The Science and Practice of Sustainability* (EOSC 448) (initiated by Dr. Kurt Grimm, UBC Earth and Ocean Sciences); a Problem-Based Learning tutor for the Agroforestry course (FRST/AGRO 444) (with Dr. Cindy Prescott, UBC Forestry); as a Faculty of Forestry Sustainability Coordinator through the Campus Sustainability Office (CSO); a presenter at the 4th annual UBC Sustainability Conference; in a UBC Continuing Studies lecture series, *Sustainability: The Way Forward?*; and as a participant in the CSO-organized Sustainability Circles. Ultimately, my interest in sustainability found a home through my involvement in UBC Farm.

Dr. Art Bomke (UBC Agroecology) introduced me to the Farm shortly after I arrived at UBC and I was immediately moved by the potential of this resource that aims to develop a “student-driven model farm integrating sustainable land management and food production practices with basic and applied research, innovation, education and community outreach” (Quayle et al., 2000). This
working landscape, spread over 40 hectares of agricultural land, student and faculty research plots, fallow fields and second-growth forest, is a budding link between the academic theories of the university ("heads-on") and practical applications needed by diverse communities ("hands-on"). As I engaged with the Farm capacities through instructing in two seasons of a sustainability field course, leading Community Service Learning projects, and coordinating the use of an agroforestry trail, I have witnessed and experienced profound heartfelt connections to UBC Farm as a unique place. Much of the work in my thesis occurred at UBC Farm, and as a result of UBC Farm. As an active participant in the movement for sustainability learning in higher education, I have learned that bridges between 'classroom' and 'real-life' learning develop through personal and meaningful relationships, a sense of place, and by being included in the processes and outcomes of creative projects – all of which aid in development of a "hearts-on" connection. My understanding of the pedagogy of TSL and the organizing principle of Head, Hands and Heart emerged from these experiences.

1.3 Premise for TSL

This work is based on three premises:

1. That the sustainability movement is here to stay;
2. That far greater benefit will result from clarifying and re/claiming the 'sustainability' concept rather than abandoning it, and particularly by advancing it as a well-defined movement for socioecological justice; and
3. That the sustainability movement has the potential to engage a broad range of people in dialogue and action around emerging paradigms for positive and proactive individual and collective change.
1.4 Context for thesis

The dominant model of education in modern Western society fragments knowledge into disciplines and often leads to conflict between individuals, ideologies and nations (Birch, 1998), thereby furthering "the conquest of nature and the industrialization of the planet" (Orr, 1994). This prevailing design of education finds its roots in rationalism, a doctrine that knowledge is derived from 'evidence-based,' 'rigorous' and 'scientific' understandings of the world (Lambkin, 1998), which lead to objectivity, certainty, universality and predictability (Phelan, 2004). The hegemony, or dominance, of rationalism over other humanist qualities, such as intuition, common sense, creativity, ethics, memory and spirituality, serves to divide knowledge into smaller and smaller elements, leading society from a focus on reason ultimately to the realm of unreason (Saul, 1996).

This model of rationalism has led to poverty within curriculum and schooling through the search for value-free knowledge, the goal of efficiency and the focus on technology; there exists therefore, weariness "of curricula immunized from the human condition and devoid of story, attachment and meaning" (Phelan, 2004). The recognition of the limitations of rationalism in isolation has resulted in a call for the reassertion of humanist values and an acknowledgement of human fallibility (Saul, 1997); as such, "it is time to ask what we need to know to live humanely, peacefully, and responsibly on the earth, and to set research priorities accordingly" (Orr, 1992).

From this point of departure, sustainability issues have acquired a prominent role in many areas of daily life, government policy and industrial activity throughout the world (Costanza and O'Neill, 1996; Meppem and Gill, 1997; Kates et al.,
2001). At UBC, the creation of Sustainable Development Policy #5 (UBC, 1997), the UBC Campus Sustainability Office (1998), and TREK 2010 (UBC, 2004) all reflect international documents, such as the Earth Charter (2000), Agenda 21 (of the 1992 United Nations Rio Earth Summit) and the Talloires Declaration of University Presidents for a Sustainable Future (1990), that highlight the vital role of universities in addressing contemporary concerns in meaningful and useful ways. Despite the recognition of the centrality of education as the primary vehicle to move in the direction of more sustainable ways of living (Talloires Declaration, 1990; Halifax Declaration, 1991; Agenda 21, United Nations Rio Earth Summit, 1992); Earth Charter, 2000; National Council for Science and the Environment, 2003, and the December, 2002 declaration by the United Nations (UN) of 2005-2014 as the UN Decade of Education for Sustainable Development, to be led by UNESCO (UN Educational, Scientific and Cultural Organization)), current statistics with respect to biodiversity, water, and humanity’s ecological-footprint (see Living Planet Report, 2004) do not seem to add up to give sustainability education a passing grade, let alone an “A”. Educational models that aim to address the need for a new social order based on sustainability are missing a key piece of the formula needed to bridge knowledge with action (Lange, 2004). The pedagogy of TSL developed in this thesis explicitly addresses that lack by elaborating the integration of “heads-on” knowledge with “hands-on” practice to include a “hearts-on” connection. The vital role of emotional involvement of learning participants is highlighted with this model, enabling more meaningful and effective personal, and thus societal, transformation (Lange, 2004). The simple and effective pedagogy of TSL introduced in these papers, aims to aid educators and facilitators in better enabling collaborative transformations to sustainability.
1.5 Desired Outcomes

The goals for my research thus incorporate two main contributions:

1. Advancing the emerging field of sustainability education by introducing and evaluating a new pedagogical model, termed Transformative Sustainability Learning (TSL) and the organizing principle of Head, Hands and Heart (see Chapter 2); and
2. Contributing to the development of UBC Farm as a centre for sustainability at UBC, and associated local and international communities (Chapter 3).

1.6 Organization of thesis

Chapter 1 serves as a prologue to the thesis by introducing the general context and desired outcomes for this research.

In Chapter 2, I elaborate the structure and function of TSL by further describing the organizing model of Head, Hands and Heart. In evaluating several related educational models, I discuss their methods and learning outcomes as compared and contrasted with TSL. I present TSL as a unifying pedagogy through its use of the simple and effective organizing principle of Head, Hands and Heart, and present measurable learning outcomes for TSL that can be used for planning and evaluating. TSL is then examined with respect to three sustainability learning case studies: the first two years of a new UBC course, *The Science and Practice of Sustainability* (EOSC 448) and one Community Service Learning program conducted through the UBC Learning Exchange, coined *Edibility and Awareness*. I interpret and discuss these case studies with respect to the learning outcomes of TSL. This work may also contribute to building capacity for transdisciplinary
collaborative teaching, and broader implementation of TSL in formal and non-formal learning environments. Chapter 2 is being used as the basis for a paper co-authored by me and Dr. Kurt Grimm; we will be submitting a modified version to the *International Journal of Sustainability in Higher Education*.

In Chapter 3, I focus on sustainability at UBC, and propose the pedagogy of TSL as a specific means for UBC to actualize the sustainability principles to which it has committed. I explore the development of UBC Farm as a place that contributes to UBC values of sustainability and global citizenship, and as a place for TSL to take root. A slightly modified version of Chapter 3 will be circulated as an internal document through UBC departments such as UBC President’s Office, UBC Properties, UBC Planning and the new Faculty of Land and Food Systems.

Chapter 4 serves as the epilogue, wherein I unite the thesis and offer suggestions for future research to support the further development of TSL as a means of strengthening its transformative potential.
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Chapter 2

Transformative Sustainability Learning:
A United Pedagogy of Head, Hands and Heart

Statement of co-authorship:
This chapter is being used as the basis for a paper co-authored by Yona Sipos Randor and Kurt Grimm, which will be submitted to the *International Journal for Sustainability in Higher Education*.
Abstract

A novel pedagogy termed Transformative Sustainability Learning (TSL) is a simple, fundamental and useful outcome of three recent experimental learning collaborations through the University of British Columbia (UBC). These case studies include the first two years of a transdisciplinary UBC Earth and Ocean Sciences collaborative initiative, *The Science and Practice of Sustainability*; and one Community Service Learning program coordinated through the UBC Learning Exchange, coined *Edibility and Awareness*. This action research, largely conducted at the on-campus UBC Farm, constituted cyclical processes of innovation, implementation and reflection. These iterative processes formed the basis for four primary outcomes. First, the creation of TSL as a useful model for place-based, learner-centred university education for sustainability. Second, the development of Head, Hands and Heart, a simple organizing principle for working groups and individuals to engage in TSL by integrating cognitive learning activities (e.g. ecological-footprinting), practical skill sharing and enactment (including physical labour), and enablement of passion and values to be translated into goals and behaviour. Third, the development of a cognitive landscape for understanding TSL amongst related learning models clarifies its position as a valuable bridge amongst sustainability pedagogies that share characteristics of being inter/transdisciplinary, practical and/or place-based. Fourth, the explicit TSL model presented here may better enable transformations to sustainability through more effective planning, implementation and evaluation of collaborative sustainability pedagogies. In sum, TSL, at UBC and beyond, can clarify, elevate and further unify sustainability-oriented pedagogies while strengthening their transformative potential.
2.1 Introduction to Transformative Sustainability Learning

TSL is a central outcome of three recent experimental learning collaborations conducted through the University of British Columbia (UBC). These experiences constitute case studies and include the first two years of a transdisciplinary UBC Earth and Ocean Sciences collaborative initiative, *The Science and Practice of Sustainability*; and one Community Service Learning program conducted through the UBC Learning Exchange⁶, coined *Edibility and Awareness*. In this paper, we introduce TSL and its organizing principle of Head, Hands and Heart, and compare TSL with other established sustainability pedagogies.

TSL is a unique pedagogy that builds on the existing foundation of programs, schools, and educational models that explicitly address sustainability (e.g. Rees, 2003; Earth Charter, 2000; Talloires Declaration, 1990). TSL is also informed by transformative education that enables transformations of meaning through the processes of re/constructing knowledge and arriving at new ways of thinking and being (i.e., through a constructivist notion of how knowledge is created Siebenhüner, 2000). Transformative education is also founded on critical pedagogy, which critiques the idea that knowledge is value-free and works to transform society to be more democratic and less oppressive (Share, 2003). As with other contemporary inquiries into teaching and learning (e.g. Furman and Gruenewald, 2004), pedagogy is considered as the cultural politics of the school.

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⁶ The Learning Exchange: The UBC Learning Exchange is a community outreach initiative located in the Downtown Eastside area of Vancouver, BC. The role of the Learning Exchange is to foster connections between people at UBC and people in the Downtown Eastside and other inner city communities who share common interests. [http://www.learningexchange.ubc.ca/Welcome.html](http://www.learningexchange.ubc.ca/Welcome.html)
(McLaren, 2003), that which embodies "an approach to schooling, learning and teaching, including what is taught, how teaching occurs, and how what is taught is learned" (Diekelmann, 2004). In literature and in practice, there exists a notable array of sustainability 'educations,' that address 1) place-based education (e.g. Furman and Gruenewald, 2004), 2) experiential enactment (e.g. Moore, 2004), 3) inter or transdisciplinarity (e.g. Berkes, 2004); and/or 4) community service (e.g. Charbonneau, 2004). These pedagogies, though broad in their combined scope, are often viewed as distinct from one other, remaining more narrowly focused and not imparting truly transformative teaching and learning experiences (Lange, 2004). In developing TSL, we articulate similarities amongst some established sustainability educations and propose TSL as the bridge(s) between these seemingly discrete genres of education. TSL organizes and encapsulates that which exists, and re-creates, rather than creates, them anew. Thus, the learning outcomes of TSL that are introduced in this paper have emerged from the combined synergistic effects of other pedagogical learning outcomes, such that the whole (i.e., TSL) is greater than the sum of its parts (i.e., sustainability educations). We aim to advance the field of sustainability education by offering TSL and the organizing principle of Head, Hands and Heart to assist in planning, implementing and evaluating sustainability programs.

In the first section, we introduce thirteen established pedagogical models that may be considered within the realm of sustainability education. In addition to defining these pedagogies, we position them on a 'pedagogical map' in the form of a ternary (three-sided) diagram to depict their relatedness through the TSL categories of Head, Hands and Heart to each other as well as to TSL. The
innovative mapping of these pedagogies on a conceptual landscape aids in understanding their relationships with one another within the uncharted territory of sustainability education. In the second section, we introduce the learning objectives of TSL, a combination of guidelines, strategies, outcomes and assessment criteria that have been learned from the introduced sustainability educations. In the third section, we introduce and critically analyze three learning programs that have both informed and benefited from the development of TSL. These learning programs constitute case studies, and we use them to examine how the learning objectives for TSL can be used to plan, implement and evaluate sustainability programs. We conclude the paper with an assessment of how TSL does and can contribute to the enactment of sustainability. The overall aim of this paper is to clarify the relationship of TSL with related pedagogies, and assess the methods and outcomes of three TSL case studies to better understand the effect of the organizing principle, Head, Hands and Heart, on the enactment and actualization of sustainability.

2.2 The united pedagogy of TSL: Head, Hands and Heart

Numerous studies attest to the precarious situation of Homo sapiens (e.g. Costanza and O’Neill, 1996; Kates et al., 2001), also contemporarily referred to as Homo oeconomicus (Rees, 2002). Discussion about environmental problems acknowledges that such issues are not only ecological; rather they arise from social problems within human society (see Rudd, 2000; Furman and Gruenewald, 2004). Humanity must therefore develop individual and collective ideologies and actions to be implemented at local, regional, national and international levels, as a means of both limiting further environmental degradation (Ostrom, 1999), and
building social capital\(^7\) (Rudd, 2000). TSL aims to enable these synergistic processes through personal and collective transformations. The development of a society of *Homo sustinens* (Siebenhüner, 2000) or *Global persona sapiens*, with the qualities of sensitivity, global consciousness, trans-generational thinking and moral courage, among others (Malaska, 1997), requires learning models such as TSL that address questions relating to the transition towards sustainability, such as "what must we learn and who will teach us?" (Gudz, 2004). Various educational frameworks, developed since the 1960's, aim to address the need to develop appropriate methodologies, train a new cadre of sustainability professionals and build institutional capacity as part of a transition to a "preferred future" (Raskin et al., 2002). Particularly because sustainability is still often viewed as a messy and contested term, these changes can only occur as we stop seeking standards for sustainability and instead start setting them, particularly for the sustainability education movement (Arjen and Jickling, 2002).

Many of these learning models share common features that can be broadly grouped into the arena of experiential education, or "learning by doing" (Bell and Morse, 2003). Such pedagogies contribute to the goals of sustainability education – including sustainability sciences (Kates et al., 2001; Clark and Dickson, 2003) – through their embodiment of cognitive engagement with the transdiscipline of sustainability and practical enactment of the principles and study of sustainability. To facilitate such connection, a common approach of many sustainability educators is to promote the notion that learners should, for

\(^7\) Social capital is a term that describes the complex of social relationships, norms and institutions. Social capital has been identified as an important aspect in sustainability debates and issues (see Dudd, 2000).
example, "work on actual, real-world problems facing communities, government and industry" (Cortese and McDonough, 2003).

These goals can be grouped as:

1. **"heads-on"; "critical thinking"**: lecture and reading based information transfer, process decision-making and practical problem solving

2. **"hands-on"; doing**: practical skills, skill sharing, physical labour.

In practice, many learning models that incorporate components of head and hands may often emphasize one more than the other; most contemporary education therefore does not enable participants and thus societies to personally and collectively transform towards sustainability (Lange, 2004). Thus, a third focus of sustainability education is that of **enablement** via the goal of:

3. **"hearts-in"; being**: engaging values and passion; motivating; inspiring; experiencing; living.

### 2.3 Why hearts-in? The role of emotions in learning

The question of how to engage students to "move from inspiration to action" (Cohen, 2003) in various social agendas has received, and continues to receive transdisciplinary study (Palmer, 2004). Research indicates that in order to successfully connect students to material, several motivational factors must be incorporated (Goodman, 2000) particularly those that extend evoked feelings into actual emotional experiences (Damasio, 2001). An appeal to empathy, morality and spirituality (all aspects of emotional connection) often tie into self-interest in such a way as to encourage action, and more importantly perhaps, personal transformation (Goodman, 2000). Contrary to a seemingly reasonable and long-held link between emotions and impaired logic, current perspectives in
psychology, neurosciences and associated fields, have begun to consistently link emotions with important and beneficial roles in cognitive decision-making (Blanchette and Richards, 2004).

The complex relationship between emotion and reason seems inherent to effective analysis, and rational thought and behaviour (Slovic et al., 2004). For example, research studying links between emotions and cognition has found that people who have full range of cognitive skills but who are unable to experience emotions may be severely hampered with respect to certain decision making (Damasio, 1995). Recent work in the fields of neurobiology, evolutionary biology, developmental psychology and neuroscience strongly suggests that there is no such thing as a capacity for pure reasoning; rather, that moral cognition and reasoning are intrinsically based on emotions and socialization (Casebeer and Churchland, 2003). The explicit inclusion of emotions in learning models may therefore promote sound thinking, and not obstruct those pathways (Blanchette and Richards, 2004).

In reflecting on sustainability education and its transformative capacities, it seems evident that an articulated emotional piece based on a hearts-in connection is necessary to engage students rationally, practically and personally. Learning must encompass cognitive and emotional components at a personal level in order to create opportunities for transformations and/or restorations (Lange, 2004). Education, therefore, should encompass and nurture emotional learning and the

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8 Moral cognition: the mental processes involved in dealing with social norms (as opposed to facts) (Casebeer and Churchland, 2003)
development of creativity to enable new sustainable solutions and realities (Siebenhüner, 2000). The role of developing a "hearts-on" connection in TSL, along with the "heads-on" and "hands-on" components, aims to articulate that need in a straightforward and accessible manner. The organizing principle proposed in this paper, Head, Hands and Heart, is a helpful tool for educators (as teachers, researchers, doctors, citizens, etc.) to plan learning processes and outcomes that more fully engage participants emotionally and thus better serve the quality of their lives (Skolimowski, 1991). This approach increases the likelihood that the materials and experiences will be ‘taken home’ in personally transformative ways.

TSL emerges at this synergy of Head, Hands and Heart, (see Figure 2.1 for a detailed Venn diagram). This pedagogical model is shaped by educators including Paulo Freire, John Dewey, Rudolf Steiner, and Johann Heinrich Pestalozzi who have deeply explored dialogism, reflective practice, critical analysis, transformative education, and a focus on true democracy in the motivation and inspiration in learners. Various contemporary organizations use some combination of head, hands, heart, health, feet and souls to express learning processes and praxes. Community education 4-H Clubs are based on the four-leafed clover of head, hands, heart and health; service leadership, Christian education and the Waldorf School system (which grew from Rudolf Steiner’s education philosophy) use the union of head, heart and hand to depict learning. Dr Benjamin Bloom, author of the well-established “Bloom’s Taxonomy,” (Bloom et al., 1964) identified three learning foci: 1) cognitive engagement (i.e. head), 2) affective growth in feelings or emotional areas (i.e. heart), and 3) psychomotor, manual or physical
skills (i.e. hands) (Clark, 1999). The positioning of Head, Hands and Heart as the organizing principle for TSL therefore contributes to a growing pedagogical literature that addresses place, space and race on a case-by-case basis. TSL is a unique pedagogy in that it is born from both transformative and sustainability educations; it has emerged from action research conducted at an institution of higher learning (UBC); and it is easily accessible due to its simple and intuitive organizing principle, Head, Hands and Heart.

2.4 Related pedagogies: what they are and what they share

TSL is related to and builds upon established pedagogies that fall within sustainability education and cover such foci as place-based education, inter/transdisciplinarity and experiential education. Some such established educational models are listed in Table 2.1, with a short overview of intended learning outcomes.
Figure 2.1: A Venn diagram depicting constituents (in boxes) and synergies (in spheres) of the TSL pedagogy wherein the principle of Head, Hands and Hearts engages, enacts and enables participants. There are 7 combinations that can emerge; an example of how each combination may be actualized is provided in the text boxes.
Table 2.1: An overview of some established pedagogies that may be considered within sustainability education

<table>
<thead>
<tr>
<th>Pedagogical Model</th>
<th>Overview of intended learning outcomes</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental education; eco-literacy</td>
<td>Provides people with experience and knowledge to care for our environments</td>
<td>Gruenewald, 2004; Or 1994</td>
</tr>
<tr>
<td>Environmental ethics; eco-psychology; deep ecology</td>
<td>Recognizes and places importance on global spiritual and ethical traditions that challenge traditional Western views of humans in the ecosystem</td>
<td>Berkes, 2004; see <a href="http://www.ecopsychology.org">www.ecopsychology.org</a> <a href="http://www.deepecology.org">www.deepecology.org</a></td>
</tr>
<tr>
<td>Traditional ecological knowledge</td>
<td>Refers to knowledge bases built by local or traditional resource users, as opposed to &quot;experts&quot;; argues for acknowledgement of more diverse forms of knowledge (as opposed to simply expert Western science)</td>
<td>Berkes, 2004; Turner et al., 2000</td>
</tr>
<tr>
<td>Critical emancipatory pedagogy</td>
<td>Arises from an emancipatory tradition that focuses on equity amongst classes, races and genders</td>
<td>Freire, 1986</td>
</tr>
<tr>
<td>Political ecology</td>
<td>Acknowledges political agendas in decision-making; examines power relationships, how these affect the way decisions are made, and who benefits.</td>
<td>Berkes, 2004</td>
</tr>
<tr>
<td>Pedagogy for eco-justice and community</td>
<td>Acknowledges and finds tensions in the &quot;industrial mindset&quot;; works to replace attitudes with metaphor of ecology</td>
<td>Bowers, 2001</td>
</tr>
<tr>
<td>Ecological economics</td>
<td>Promotes an integrated view of economics embedded within the broader socio-ecological system and a longer time frame</td>
<td>Berkes, 2004; Wackernagel and Rees, 1996</td>
</tr>
<tr>
<td>Outdoor education (including leadership and adventure training)</td>
<td>Hands-on interaction with the outdoors for team strengthening, skill building and/or adventure</td>
<td>Lund, 2002, e.g. Outward Bound program</td>
</tr>
<tr>
<td>Community Service Learning</td>
<td>Participants learn and develop through service conducted in and meeting the needs of a community, in coordination with an institution of higher education. Helps foster civic responsibility and includes structured time for students to reflect on service experience.</td>
<td>American Association for Higher Education, 1993</td>
</tr>
<tr>
<td>Problem-Based Learning</td>
<td>Learning that is focused, experiential and organized around investigation of real-world problems. Authentic experiences foster active learning, support knowledge construction and integrate school learning and real life.</td>
<td>Association for Supervision and Curriculum Development, 2005</td>
</tr>
<tr>
<td>Participatory Action Research</td>
<td>Summary of terms in social science that refer to involvement of participants in the research process, commitment to social change, and that include aspects of social learning. There are many ways to define true participation, action and exactly what constitutes true research.</td>
<td>Moore, 2004; Coghlan and Brannick, 2001</td>
</tr>
</tbody>
</table>
2.5 Mapping the pedagogical landscape

We grouped the pedagogies listed in Table 2.1 according to Head, Hands and Heart, creating a three-sided “pedagogical landscape.” Based on the three foci, a ternary diagram was the most functional way of mapping the pedagogies, thereby depicting Head, Hands and Heart as an organizing principle; as well as the relation amongst learning models to the organizing principle, each other and TSL. See Figure 2.2.

2.6 TSL learning objectives

TSL learning objectives evolved from study of other pedagogical models, methods and outcomes. Learning outcomes encompass both specific and general knowledge, skills and values acquired through participation in an educational activity (British Columbia Standing Committee on Evaluation and Accountability, 2001), and generally refer to explicit expectations of what a student will be able to do as a result of a learning activity (Jenkins and Unwin, 1996). Dr. Benjamin Bloom, author of the well-established “Bloom’s Taxonomy” (Bloom et al., 1964), offers an alternative to learning outcomes by way of learning domains (Clark, 1999); Bloom’s model proved helpful in laying foundation for developing the learning objectives of TSL. We compiled the TSL learning objectives as a means of mapping learning goals, strategies, and outcomes, using the educational models noted above for guideline. We categorized the learning objectives according to Head, Hands and Heart to emphasize the simplicity and accessibility of TSL, though many of the objectives arose from the combined effects of more than one of these categories. See Table 2.2.
Figure 2.2: A ternary diagram of the "pedagogical landscape" of sustainability education based on the organizing principle of Head, Hands and Heart. This ternary diagram graphs the relatedness amongst sustainability educations to each other and to the foci of Head, Hands and Heart. TSL is situated in the foreground to indicate its scope.
Table 2.2: Learning objectives of TSL, identified within the categories of Head, Hands and Heart, developed from analysis of other established pedagogies. Note that some of these learning objectives apply to more than one category.

<table>
<thead>
<tr>
<th>HEAD</th>
<th>Learning objective</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cognitive engagement</td>
<td>Observable sustained, engaged attention during a task requiring mental effort (Corno and Mandinach, 1983).</td>
<td></td>
</tr>
<tr>
<td>2. Understanding of sustainability</td>
<td>Sustainability is understood as a complex, interdisciplinary challenge that must reconcile competing interests in socio-economics, socio-cultural and biophysical and ecological goals (Grimm, 2004).</td>
<td></td>
</tr>
<tr>
<td>3. Understanding of global citizenship</td>
<td>An appreciation of how to assume and fulfill responsibilities as citizens of the world (UBC President Martha Piper, 2005).</td>
<td></td>
</tr>
<tr>
<td>4. Critical analysis</td>
<td>Considering various claims from theorists, governments and other authorities, taking into account what they are based on and whether or not they apply in a given situation. Critical analysis involves splitting categories into and studying component parts (du Boulay, 1998).</td>
<td></td>
</tr>
<tr>
<td>5. Systems thinking</td>
<td>Using complexity theories and an ‘ecosystem approach’ (Kay and Schneider, 1994; Holling, 2001) to recognize that seemingly discrete activities are in fact a part of many interdependent social, ecological, and economic systems that together form one complex global system. Such thinking encourages us to critically assess the boundaries we assume our activities lie within, and to expand or modify those boundaries where appropriate (Sustainability Now, 2003).</td>
<td></td>
</tr>
<tr>
<td>6. Transdisciplinary curriculum</td>
<td>An inter/transdisciplinary curriculum integrates knowledge from different disciplines, embedding streams of knowledge into one another (Somerville, 2000).</td>
<td></td>
</tr>
<tr>
<td>7. Conflict resolution</td>
<td>Creative and effective ways to avoid, transform and resolve conflict (Kaner et al., 2001).</td>
<td></td>
</tr>
<tr>
<td>8. Problem-Based Learning</td>
<td>Learning that is focused, experiential and organized around investigation of real-world problems. Authentic experiences foster active learning, support knowledge construction and integrate school learning and real life (Association for Supervision and Curriculum Development 2005).</td>
<td></td>
</tr>
<tr>
<td>9. Participatory Action Research</td>
<td>Involvement of participants in the research process, commitment to social change, and aspects of social learning (Moore, 2004).</td>
<td></td>
</tr>
<tr>
<td>HANDS</td>
<td>10. Experiential learning</td>
<td>Actively engaging students in experiences with real consequences so that participants make discoveries and experiment with knowledge in a personal way. Reflection plays an important role in experiential learning, and aids in the development of new skills, new attitudes and even new theories and attitudes (Kraft and Sakofs, 1988). John Dewey (1938) was an early promoter of the idea of learning through direct experience, by action and reflection.</td>
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<tr>
<td>11. Applied Learning</td>
<td>Contextualizes learning in a way that empowers and motivates students, while assisting them in developing skills and knowledge required for employment, further education and active participation in their communities (State of Victoria, 2004)</td>
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<tr>
<td>12. Collaborative</td>
<td>Working together with the greater community (Princeton University, 2003)</td>
<td></td>
</tr>
<tr>
<td>13. Community service</td>
<td>Participants learn and develop through service conducted in and meeting the needs of a community, in coordination with an institution of higher education. Helps foster civic responsibility and includes structured time for students to reflect on service experience (American Association for Higher Education, 1993)</td>
<td></td>
</tr>
<tr>
<td>14. Cooperative</td>
<td>Concerted and united action for a common purpose or benefit; also accommodative, willing to adjust differences in order to obtain agreement (Princeton University, 2003)</td>
<td></td>
</tr>
<tr>
<td>15. Ecological-footprinting</td>
<td>A measure of the area of productive land and water ecosystems required to produce the resources that a designated population produces, wherever on Earth the land and water is located (Wackernagel and Rees, 1996).</td>
<td></td>
</tr>
<tr>
<td>17. Participatory decision-making</td>
<td>Participants own the process and therefore the solutions (e.g. Kaner et al., 2001)</td>
<td></td>
</tr>
<tr>
<td>18. Democratic classroom</td>
<td>Shared notion, access to and enactment of leadership and justice (Giroux and McLaren, 1996; Thayer-Bacon, 1996)</td>
<td></td>
</tr>
<tr>
<td>HEART</td>
<td>19. Transformative</td>
<td>A marked change, as in character or appearance, usually for the better (Princeton University, 2003). Also a radical and instrumental change in the structure of society, such as from existing social arrangements (Harper and Leicht, 2002)</td>
</tr>
<tr>
<td>20. Reflective</td>
<td>Reflection is an activity in which people “recapture their experience, think about it, mull it over and evaluate it.” (Boud et al., 1985)</td>
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<tr>
<td>22. Creative</td>
<td>A process that brings into being (Princeton University, 2003)</td>
<td></td>
</tr>
<tr>
<td>23. Fun</td>
<td>Amusing or enjoyable (Princeton University, 2003)</td>
<td></td>
</tr>
<tr>
<td>24. Values-focused thinking</td>
<td>Developing alternative solutions to problems based on human needs and values by enabling subjective judgment about beliefs and/or emotional judgments (Sustainability Now, 03). Values-focused thinking is easily accessible and enables comparison of several alternatives in traceable and robust ways (Keeney, 1992)</td>
<td></td>
</tr>
<tr>
<td>25. Inclusivity</td>
<td>Ensuring equal access for involvement in educational, social and cultural activities (Equal Opportunity Office, 2001)</td>
<td></td>
</tr>
<tr>
<td>26. Equitable</td>
<td>Implying justice dictated by reason, conscience, and a natural sense of what is fair to all (Princeton University, 2003)</td>
<td></td>
</tr>
<tr>
<td>27. Place-based</td>
<td>Engaging learners through the positioning of a curriculum within the context of participants' own lives, communities, and regions, thereby taking advantage of students' and communities' natural interest in the local (Smith, 2002).</td>
<td></td>
</tr>
</tbody>
</table>
2.7 Methods

This research has been conducted in the form of a pedagogical inquiry, where the focus has been on process as opposed to product. Within this framework, learning is regarded as an active, constructive process (as opposed to receptive) and teaching is based on what is best for the whole student (as opposed to what is the best way to cover prescribed course content) (Darling-Hammond, 1990). This pedagogical inquiry enables the emergence of action research, comprised of iterative learning cycles of reflection, innovation and implementation.

2.7.1 TSL case studies

The concept and criteria of TSL and its learning objectives evolved from a series of recent initiatives undertaken at UBC to explore and expand sustainability education. The educational programs that influenced this research constitute case studies, and are used to apply, demonstrate and evaluate the TSL learning objectives.

Case studies are helpful in serving as an intensive detailed description and analysis of a single project, program, or instructional material in the context of its environment (Frechtling and Sharp, 1997). The case studies used in this research focus on participants' interaction with materials and opportunities presented to enhance understanding and connection with the concepts of sustainability and the related concept of global citizenship.

Three case studies, undertaken through UBC and mainly at the UBC Farm, explored the definition and application of TSL in the context of action research,
utilizing models of Community Service Learning, Problem-Based Learning and Experiential Education. Each of these integrated case studies drew on related pedagogical models, and utilized place-based integrated teaching, learning and fieldwork. In each case study, semi-qualitative observations were recorded throughout the process.

These three case studies are:

1. The first offering of the new UBC transdisciplinary course: The Science and Practice of Sustainability (TSAPOS) (2003);
2. The second offering of TSAPOS (2004);
3. A newly developed Community Service Learning reading week project, developed in conjunction with the UBC Farm and the Learning Exchange, Edibility and Awareness: Sustainable Food Systems (2004).

A short description of each case study:

1. **The Science and Practice of Sustainability 2003 (TSAPOS I);**

   **Northern Inner Coast Pod, August 6-30 2003**

   TSAPOS 2003 was the first offering of this new, transdisciplinary UBC learning experiment. TSAPOS is a collaborative course initiated by Dr. Kurt Grimm, co-developed with faculty, staff, student and community participants, and funded by UBC Teaching and Learning Enhancement Fund. TSAPOS 2003 was home to 45 students from nine UBC faculties, enrolled in the six-credit UBC Department of Earth and Ocean Sciences course (EOSC 448; GEOG 447). This learning experiment was a collaborative effort of six co-instructors from different academic backgrounds: Kurt Grimm, UBC
Department of Earth and Ocean Sciences; Janet Moore, UBC Department of Curriculum Studies; UBC Rob Van Wynsberghe, Institute of Health Promotion; Jim Merkel, Founder of the Global Living Project (www.globallivingproject.org); Derek Masselink, initiator and former coordinator of UBC Farm; and Yona Sipos Randor, UBC Centre for Applied Conservation Research, Faculty of Forestry. The nature and curriculum of the course were transdisciplinary, including collaborative group work, community service, experiential education, ecological-footprinting, reflective practice and participatory decision-making. Of the month-long course, all participants were at UBC for the first and last week, with approximately half of the students and instructors living at UBC Farm in the first permutation of an on-site pilot ecovillage. This case study focuses on one of the three collaborative, yet autonomous learning 'pods' of TSAPoS, comprised of two instructors (Kurt Grimm and Yona Sipos Randor) and twelve students who traveled to the Northern Inner Coast of Vancouver Island for the middle two weeks of the four week course. This group explored the interfaces of biophysical, personal and social sustainability, alongside members of First Nations, governments, NGOs and industry, and numerous community educators and organizations. Some of the collaborators include: the 'Namgis community members, First Nation Treaty Office, U'Mista Cultural Centre, Alert Bay mayor's office, Nimpkish Resource Management Board, Weyerhaeuser and Gwa’ni Hatchery. Refer to Grimm (2004) for further details.
The two other pods were comprised of:

a) The Slocan Pod, led by Jim Merkel and Derek Masselink, focused on permaculture, ecological-footprinting and deep ecology through experiences in homestead environments through the Slocan Valley.

b) The Urban Pod, led by Janet Moore and Rob Van Wynsberghe, focused on the broad engagement of stakeholders to advance the GVRD Central Valley Greenway Project, an urban trail for active transportation from New Westminster to downtown Vancouver. The Urban Pod became an independent course in June 2004, entitled *Action and Awareness: Focus on Urban Sustainability* (UBC ASTU 400P), and will continue in the summer of 2005 through the Great Northern Way Campus, an inter-institutional (University of British Columbia, Simon Fraser University, Emily Carr Institute of Design, British Columbia Institute of Technology) collaboration to create a downtown Vancouver campus. For more details, refer to: www.basinfutures.net/urbancourse

2. *The Science and Practice of Sustainability 2004 (TSAPOS II)*;

   **August 13-28 2004**

   The second year of TSAPOS, the course was held entirely at UBC Farm and efforts were focused on the further development of the ecovillage, initiated the previous year. The course was shortened to two weeks and three credits (EOSC 448), there were two instructors (Kurt Grimm and Yona Sipos Randor), two kitchen coordinators, and 20 students in total. The course curriculum of TSAPOS II included non-formal education, participatory decision-making, collaborative group work, guest presenters and
participants, and focused on personal sustainability and practical skill building. Refer to Appendix 1 for a concept map of TSAPOS 2004.

3. Edibility and Awareness: Sustainable Food Systems; Feb 16-19 2004

The UBC Learning Exchange sponsored a Community Service Learning project that ran at UBC Farm for four days over reading week of 2004. This program was open to UBC students and UBC Learning Exchange patrons from the Downtown Eastside; GVRD educators and activists were invited to share presentations and participate in some of the activities. There were four leaders (Yona Sipos Randor as Project Leader, two Student Leaders, and Mark Bomford, UBC Farm Program Coordinator, as Community Leader) and 18 participants. Some of the participants were enrolled in UBC courses, namely BIO 345 and HECO 200. The curriculum focused on global citizenship, agroecology, food systems and local economic systems; reflective practice was utilized as the bridge between the theory and practice of the curriculum.

This project continued in 2005 but was not included as part of this research.

2.7.2 Analyzing sustainability programs

To determine whether a sustainability program meets the learning objectives of TSL, we have created a simple assessment matrix specifically based on the learning objectives of TSL (as seen in Table 2.2). By evaluating how the program scores on the matrix (and potentially how it ranks relative to other programs), educators can modify their curricula and objectives, as needed.
Decision matrices are design tools used in an array of fields to aid in decision-making. The assessment matrix herein is based on a decision matrix pattern, arranged in a grid with decision criteria (i.e. learning objectives) forming the rows, and decision options (i.e. learning programs) forming the columns. The learning programs, which are all valid or potentially successful options, are scored against the TSL criteria of learning objectives. The goal of 'scoring' learning programs is to see where each is strong and where there is room for improvement. Learning programs may be compared against one another based on the objectives that may or may not also include different weighting factors to account for constraints or significance of the variables at hand (Anderson, 2000). Various methods for assigning values can be utilized, but each is semi-qualitative and subjective to some degree. The objective in utilizing a modified decision matrix for the case studies was not to identify the "best" learning program; rather, the goal was to determine how different programs were meeting which objectives. The decision matrix therefore compared each learning program against a common set of learning objectives and assigned each a score of 1 – 4. A mark of 4 indicates that the program met a certain objective to the best of its ability while a mark of 1 indicates that the program has the most room for improvement in that area. More detail on the criteria of this rubric is provided in Table 2.3.
Table 2.3: This rubric can be applied to the TSL learning objectives as listed in Table 2.2 and evaluated in Table 2.4. This scale of 1-4 provides a guideline for evaluating a stated objective.

<table>
<thead>
<tr>
<th>RANK</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Beginning</td>
<td>The stated objective is beginning to be addressed and achieved; lots of room for growth and development in this area.</td>
</tr>
<tr>
<td>(2) Developing</td>
<td>The stated objective is developing into an important and well addressed aspect of the curriculum.</td>
</tr>
<tr>
<td>(3) Accomplished</td>
<td>The stated objective is well established and forms a fundamental aspect of the curriculum</td>
</tr>
<tr>
<td>(4) Exemplary</td>
<td>The stated objective has been addressed and achieved within the curriculum at the highest recognizable level of accomplishment</td>
</tr>
</tbody>
</table>
We employed value-focused thinking\(^9\) as the technique to define score functions for the purpose of comparing alternatives. Value-focused thinking was suitable for this comparison because it enabled subjective judgment to be accommodated in the evaluations. Additionally, this tool is easily accessible and enables comparison of several alternatives in traceable and robust ways (Keeney, 1992). For the purposes of identifying strengths and weaknesses of each learning programs, we used value-focused thinking to rank each case study. Assigning values as part of the decision-making process is "constraint-free thinking" (Keeney, 1992), enabling creativity to thrive while innovative answers are sought. This methodology is therefore useful in evaluating qualitative research due to its transparency and inclusivity.

Often, objectives are weighted in a manner that indicates their hierarchy within the decision-making process. In this case, weights were not assigned as it was determined that each criterion was equally important within the TSL framework (i.e. "cognitive engagement" and "transdisciplinary curriculum" are equally important as "fun" as an objective). Refer to Table 2.4 for the evaluation of the three case studies on a decision matrix.

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\(^9\) Value-focused thinking enables decision-making to be based on values, as opposed to alternatives. Value-focused thinking was introduced by Keeney (1992) as a means of placing greater importance on fundamental values, often enabling greater creativity to thrive, as participants look beyond what is available to what could be.
Table 2.4: An assessment matrix to rank 'learning programs' with TSL 'learning objectives' (as defined in Table 2.2). The criteria have been identified as Head, Hands and Heart to further develop TSL as a holistic learning model that incorporates those elements, as well as provide a practical planning and evaluating mechanism for educators interested in creating TSL programs. We have ranked three recent learning programs on a scale of 1-4, with 4 being the most successful and 1 needing the most improvement. See the rubric in Table 2.3 for more details. These programs act as examples for other educators, and so are considered as case studies in the text. The assignment of values within this ranking system is subjective; as such the goal in 'scoring' programs is for educators to determine where improvements can be made within each criterion.
<table>
<thead>
<tr>
<th>LEARNING OBJECTIVES</th>
<th>TSAPOS I</th>
<th>TSAPOS II</th>
<th>Edibility &amp; Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HEAD</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Cognitive engagement</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2. Understanding of sustainability</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3. Understanding of global citizenship</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. Critical analysis</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>5. Systems thinking</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>6. Transdisciplinary curriculum</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7. Conflict resolution</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>8. Problem-Based Learning</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>9. Participatory Action Research</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Subtotals (/36)</td>
<td>30</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td><strong>HANDS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Experiential learning</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>11. Applied learning</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>12. Collaborative, larger community</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>13. Community service</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>14. Cooperative, amongst participants</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>15. Ecological-footprinting</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>16. Creativity</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>17. Participatory decision making</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>18. Democratic classroom</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Subtotals (/36)</td>
<td>24</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td><strong>HEART</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Transformative</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>20. Reflective</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>21. Empowering</td>
<td>3</td>
<td>3</td>
<td>4</td>
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<td>22. Creative</td>
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<td>23. Fun</td>
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<td>24. Values focused</td>
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<td>25. Inclusivity</td>
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<td>26. Equitable</td>
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<tr>
<td>27. Place-based</td>
<td>2</td>
<td>2</td>
<td>4</td>
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<tr>
<td>Subtotals (/36)</td>
<td>25</td>
<td>24</td>
<td>31</td>
</tr>
</tbody>
</table>
2.7.3 Examples to improve sustainability programs using the TSL model

In Table 2.4, two items are of note:

a. Each program ranks highest in a different category; and

b. The opportunity exists to explore how missing elements could be incorporated to raise the TSL ‘score’ of each case study. For each learning objective, we give specific examples of what was included in a program that scored 3 or 4 in that condition. These examples are intended to be helpful for educators or facilitators wishing to design or implement TSL programs. See Table 2.5.

Overall, each case study demonstrated both high marks as well as areas for improvements. The goal of Table 2.5 is to provide concrete examples for other educators and facilitators wishing to engage in TSL as a means of teaching and learning.
Table 2.5: Examples from the case studies of TSL criteria that were either scored with a 3 (stated objective is well established and forms a fundamental aspect of the curriculum) or 4 (stated objective has been addressed and achieved within the curriculum at the highest recognizable level of accomplishment)

<table>
<thead>
<tr>
<th>HEAD</th>
<th>1. Cognitive engagement</th>
<th>e.g. TSAPOS I: The main outcome of this course was in the form of a proposal to initiate a sustainability-related project. For this assignment, students were required to integrate knowledge of associated research fields with community perspectives and stated needs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Understanding of sustainability</td>
<td>e.g. TSAPOS II: Students were asked the question, “What is sustainability?” on the first and last day of the course. In this way, facilitators may be able to evaluate understanding pre-and post-course.</td>
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<tr>
<td>3. Understanding of global citizenship</td>
<td>e.g. Edibility &amp; Awareness (E&amp;A): Global citizenship is a major focus of the UBC Learning Exchange. As such, the concept was discussed in several reflection sessions and with various guest presenters.</td>
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<td>4. Critical analysis</td>
<td>e.g. TSAPOS I: Over the month-long course, students were introduced to concepts such as sustainability and were encouraged to engage in critical analysis as to definitions and applications.</td>
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<tr>
<td>5. Systems thinking</td>
<td>e.g. E&amp;A: Participants were encouraged to make connections between local/regional food production, and more global food systems; participants also discussed questions such as “Who eats what? And why?”</td>
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<tr>
<td>6. Transdisciplinary curriculum</td>
<td>e.g. TSAPOS I: A total of six instructors from four academic departments at UBC (Earth and Ocean Sciences, Institute for Health Promotion Research, Curriculum Studies, Centre for Applied Conservation Research) and two organizations (UBC Farm and Global Living Project) compiled and delivered learning materials to 45 students. The course was designed and implemented with transdisciplinarity as a specific goal, and students met, learned from and worked with First Nations groups, community educators, organizations, NGOs, industries and government.</td>
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<tr>
<td>7. Conflict resolution</td>
<td>e.g. E&amp;A: The project leader met with the UBC Farm staff as an initial and integral part of the planning process; during that first meeting, expectations were clarified, limitations were explained, and goals were decided. In this way, very little conflict resolution was required as mostly conflict was effectively avoided.</td>
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<tr>
<td>8. Problem-Based Learning</td>
<td>e.g. TSAPOS II: The course was designed to incorporate learning that was both experiential and that investigated real-world problems. At a fundamental level, these authentic experiences manifested in the students building a covered outdoor kitchen and a functioning sawdust toilet system. Additionally, one of the guest presenters in the course, Dr Shannon Binns, specifically employed Problem-Based Learning in her activity.</td>
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<tr>
<td>9. Participatory Action Research</td>
<td>e.g. TSAPOS I: For their research projects, students involved participants (namely 'Namgis community members in Alert Bay) in the actual research process, taking direction from community members, combining community service with participatory research.</td>
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<tr>
<td>HANDS</td>
<td>10. Experiential learning</td>
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<td></td>
<td>e.g. TSAPOS II: Major assignments took the form of actual projects and all students took part in a creative process, learning as they engaged with the outdoor kitchen, sawdust toilets, interpretive ecology trail, and information gathering and sharing. Additionally, all students had a chance to &quot;skill-share&quot; with and from each other. Topics included: cheese and jam making, environmental design, Capoeira, and outdoor skills.</td>
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<tr>
<td>11. Applied Learning</td>
<td>E&amp;A: The program was designed to articulate connections between what was discussed and what was physically done. The goal was really to motivate participants, to empower them while they developed skills and knowledge that can be further used within their communities.</td>
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<tr>
<td>12. Collaborative Community service</td>
<td>E&amp;A: The program involved and took direction from the local community (namely the UBC Farm) in consultation and follow-through.</td>
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<td>13. Community service</td>
<td>TSAPOS I: The student proposals in this course were framed by the following questions: &quot;Who is our community?&quot; &quot;What is their identified need?&quot; &quot;How can we help them meet that need?&quot; (Grimm, 2004). E&amp;A: The work accomplished in this project was based directly upon community identified needs.</td>
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<tr>
<td>14. Cooperative, amongst participants</td>
<td>TSAPOS II: The instructors ran a workshop early on in the course on participatory decision-making and effective group dynamics. Students decided their own groups and topics for their projects, and each student was given the opportunity to participate as both learner and teacher (e.g. through skill sharing). Additionally, students had the opportunity to work with classmates outside of their projects on kitchen or bathroom duty. It seems that as a result of being trained with useful tools and empowered to take responsibility, the students bonded very quickly, and in general worked very well together. Where there was some internal conflict amongst the students, effective resolution was employed.</td>
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<tr>
<td>15. Ecological-footprinting</td>
<td>TSAPOS I: All students were engaged in analyzing the ecological-footprint associated with living at the eco-village and engaging in the course. One of the instructors, Jim Merkel, is a well-respected expert in ecological-footprinting, and his resources and experience proved to be invaluable. The material that was collected from the students has the potential to be published.</td>
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<tr>
<td>16. Creativity</td>
<td>TSAPOS II: The projects that the students engaged with entailed creativity with respect to both the topics they chose (including humanure; building a functional camp kitchen; interpretive ecology; and outreach), and finding supplies in order to create something that was functional, durable and beautiful.</td>
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<td>17. Participatory decision-making</td>
<td>TSAPOS II: After students were introduced to the UBC Farm and the eco­village site, the instructors ran a workshop on group dynamics, participatory and consensus decision-making, and conflict resolution. The students took the identified areas of need and, with their newly learned skills, engaged in a student-directed discussion and decision-making process to decide which projects they would take on, and who would be in which working group. As such, there was a keen sense of 'ownership' over decisions made.</td>
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<tr>
<td>18. Democratic classroom</td>
<td>TSAPOS II: Students were empowered to participate actively in decisions that affected their 'classroom' experience. Many decisions were decided upon by the large group, and the students influenced the marking scheme that was employed.</td>
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<tr>
<td>HEART 19. Transformative</td>
<td>E&amp;A: Many of the participants commented in our closing circle, wrote in their evaluations, or emailed me after the project ended to speak of the changes that they felt in confidence, interest, and even capabilities. Reflecting on the program, I believe that it was transformative due to the combination of hard work (both thinking and doing), relaxed and respectful atmosphere (some get-to-know-one-another games, group guidelines on respect and inclusivity) and opportunities for reflection (space created in which to share ideas, expertise and ask questions at the end of each day and at home in their journals). Additionally, participants had the opportunity to play the parts of both learners and teachers, as well as try out new skills and ideas in an accepting and safe environment.</td>
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<td>20. Reflective</td>
<td>TSAPOS II: A great deal of time and attention was given to the act of reflection, both in group discussions and through individual journaling. Setting aside time and asking guiding questions that are specific without being limiting aided effective reflection.</td>
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<tr>
<td>21. Empowering</td>
<td>TSAPOS I: Although I have not engaged in a formal census, I know that since the course, many of the students have embarked in sustainability related work and travel (e.g. through coordinating UBC Food Co-op (Sprouts); cob building at Stanley Park; leading First Nations Summer Science camp). I take this as an indication of empowerment. How did this happen? I believe through the shared experiences, the positive encouragements from instructors and colleagues, and the opportunities to develop and practice new skills all contributed to the students' empowerment.</td>
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<td>22. Creative</td>
<td>TSAPOS II: A picture of &quot;before and after&quot; of the eco-village site at the UBC Farm would help in depicting the creative nature of the course. The altered physical landscape (and associated signage around the site) fused function with public art, and indicates what was created (e.g. outdoor kitchen, interpretive trail).</td>
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<td>23. Fun</td>
<td>TSAPOS I: The course was designed to engage students academically, practically and personally; the successful strategy employed was one that focused specifically on 'fun' as an outcome. The cognitive pieces of the course were conducted in beautiful areas (the northern inner coast of Vancouver Island), students were encouraged to participate</td>
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in community events (including the annual Alert Bay *Sea Fest* and *Music Festival*). Sightseeing, volunteering, community engagement, cooking and eating communally, joking, and dancing together all contributed to the course’s success at being enjoyable and fun.

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<tr>
<th>24. Values-focused thinking</th>
<th>TSAPOS II: In one of the skill-sharing sessions, a student shared background and usage of values focused thinking (specifically employing the decision-making matrix weighing “alternatives” against “objectives” (values)). Students were encouraged to employ this skill as part of their group processes.</th>
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<tr>
<td>25. Inclusivity</td>
<td>E&amp;A: Participation was open to UBC students and Learning Exchange patrons from the Downtown Eastside. The project also included other community members and educators, including the UBC Farm.</td>
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<td>26. Equitable</td>
<td>E&amp;A: Decision-making, planning and implementing functioned within just and fair conditions.</td>
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<tr>
<td>27. Place-based</td>
<td>E&amp;A: The format for this project was based around locating the curriculum within the context of participants’ own lives and communities. The project functioned at the UBC Farm, a place that will remain accessible to the participants post-project.</td>
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2.8 Summary

This chapter elaborated the development of TSL, a novel and useful pedagogy that engages and enables learners to enact principles, values and goals of sustainability for personal, and thus societal, transformation. While other teaching and learning models cover aspects of cognitive engagement, practical application and emotional connection, TSL offers the organizing model Head, Hands and Heart, to explicitly unite and embody the theories, practices and heartbeats of sustainability within academic and applied fields.

We have created an innovative ‘pedagogical landscape,’ and mapped some established inter/transdisciplinary, practical, and place-based sustainability- oriented pedagogies according to their relation with each other and TSL, via the simple and effective organizing principle of Head, Hands and Heart. This cognitive landscape clarifies TSL as a valuable bridge amongst sustainability pedagogies. TSL learning objectives were developed through study of these related pedagogies, and organized according to the principles of Head, Hands and Heart.

Three case studies were introduced and evaluated using the TSL learning objectives to provide further insight and examples to those interested in planning, implementing and evaluating TSL in various learning environments. An assessment matrix, developed to compare learning programs with TSL learning objectives, assessed the strengths and areas for improvement of each case study using a simple ranking rubric, with a scale from 1-4.
The explicit TSL model presented herein may better enable transformations to sustainability through more effective planning, implementation and evaluation of collaborative sustainability pedagogies, particularly when paired with iterative processes of reflection, innovation and implementation. In sum, TSL is a useful pedagogical model in that it provides an organizing principle that is simple and effective as a means of engaging and enabling participants in order to enact sustainability; further, TSL may clarify, elevate and further unify sustainability-oriented pedagogies while strengthening their transformative potential.
2.9 References

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Association for Supervision and Curriculum Development. 2005. The Definition of Problem-Based Learning. Washington, DC Available on-line: http://www.ascd.org/portal/site/ascd/menuitem.a4befa0de1b8d1fddeb3ffdb62108a0c/


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Chapter 3

Sowing seeds of sustainability at the University of British Columbia
Overview of Chapter 3

This chapter focuses on sustainability at the University of British Columbia (UBC). I discuss conceptual perspectives of sustainability, and then focus specifically on the UBC commitment to sustainability. In answering the question of how UBC will meet its TREK 2010 sustainability-oriented goals, I introduce UBC Farm as a centre that helps to advance the university foci of People, Place and Process. I propose the newly developed learning model of Transformative Sustainability Learning UBC as a means to journey through teaching and learning sustainability.

3.1 Back to the future: Sustainability at UBC

You are invited on a visioning journey: the year is 2015. The University of British Columbia (UBC) has grown into its TREK 2010 goals of preparing students to become "exceptional global citizens who promote the values of a civil and sustainable society, and conduct outstanding research to serve the people of British Columbia, Canada and the world" (UBC, 2004c). At the university's heart is a fully functioning centre for local organic food production, resource recovery and processing, and participatory community planning and development. UBC Farm, at the centre of this active inquiry into sustainable agroecology\(^{10}\), has grown into its mission by developing "in a manner that benefits past, present and future community members, be they citizens, planners, designers, developers, managers, leaders, foresters or farmers" (UBC Farm, 2001). Community service learning, transformative sustainability learning, experiential education, place-based learning, and personal and community growth all transpire in accordance

\(^{10}\) Agroecology is defined as an integrative discipline that includes elements from agronomy, ecology, sociology and economics (Dalgaard et al., 2003) in order to facilitate the design and management of sustainable food production systems (Gliessman, 1998).
with educational and research opportunities that are integrated with the university and community processes and productions.

How can this happen?

Throughout this paper, back in the current year of 2005, I explore potential answers to the question of how such a transformation at UBC can occur by focusing on teaching, learning and research at the university, and specifically at UBC Farm, the last working farmland in the Vancouver environs (Quayle et al., 2000). Refer to Figure 3.1 for a map of UBC that highlights UBC Farm.
Figure 3.1: Map of UBC Point Grey Campus, with the addition of UBC Farm circled in red. Available online: http://www.maps.ubc.ca/PROD/index.php
3.2 The sustainable context for the development of UBC

Developing a sustainable community implies enhancement of existing features and fabrics of that community, as opposed to unlimited growth; development therefore means "to bring out the capabilities or possibilities of, to bring to a more advanced or effective state" (Sustainable Measures, 1998). Within the numerous factors that contribute to the topic of sustainability, ultimately discussion of this topic centres on basic requirements for survival: energy use (and its consequences), water consumption and pollution, air quality, climate and food (Holland Barrs Planning Group, 2002).

Sustainability has become entrenched in the language of governments, universities and NGOs, since the World Commission on Environment and Development (1987, pg. 8) (also known as the Brundtland Commission) defined sustainable development as that which "meets the needs of the present without compromising the ability of future generations to meet their own needs". The term sustainability and this ambiguous definition have since been used liberally across North America and much of the world, though rarely in a uniform way (Meppem and Gill, 1998), giving rise to understandable skepticism as to whether it actually means anything at all. The widely-used "three legged stool" of sustainability is a variation of a Venn diagram that presents sustainability as a balancing act, depicting the "environment", economics and society as separate but related entities, presuming that each segment of the stool can act independently of the others to a certain extent (Lowe, 2004). But can there be any economic or social activity without a functioning ecosphere? A more realistic depiction may be to integrate rather than balance the three entities, and use more descriptive
terms, such as: ecological and biophysical systems, socio-cultural systems and socio-economic systems. In a more integrative depiction, ecological and biophysical systems beget cultural societies, which in turn beget socio-economic systems. Social and economic systems are important – but not fundamental – subsets of natural ecological systems upon which we depend (e.g. see Orr, 1991; Skolimowski, 1991; Kay and Schneider, 1994). Humans are embedded within our ecosystems and thus rely on ecological integrity and ecosystem health to cope with stresses to our environment(s) (Kay and Schneider, 1994). Further, these conditions result in the production of ecosystem goods and services that function as the life-support system for the constituent ecosystems of planet Earth (Lubchenco, 1998). Thus, the pictorial of sustainability moves away from the fictitious balancing act of the Venn diagram to a more truthful integrated view of the holarchy\(^{11}\) of sustainability, where the three entities are arranged in concentric circles and the limiting factor, the outer sphere, acknowledges the naturally existing ecological and biophysical limitations, including their associated areas of uncertainty. This portrayal of sustainability is based on a "deep green" view of the "inevitable relationship between human cultures and the biosphere" (Gibson, 2001). See Figure 3.2 for two depictions of sustainability.

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\(^{11}\) Holarchy: Holons are basic, identifiable units of organization in systems that are further composed of subordinate parts. A holarchy can be defined as an integration of holons that exist contextually in a nested network of other holons (Kay et al. 1999) that are interacting, interrelated, interdependent, and linked together by some form of regular action. The term holon was first applied to biological and social systems by Arthur Koestler in the late 1960s. The Greek word holos means whole and the suffix on means part or particle; in sum, holons form a complex whole, known as a system or holarchy, which is greater than the sum of its parts (Kusumi et al. 1998).
Figure 3.2: The familiar Venn diagram of sustainability (3.2a), where social, economic and ecological concerns are presented as a balancing act, is better represented by the integrated holarchy of sustainability (3.2b), a more useful representation of reality. Naturally existing ecological and biophysical limits form the outermost boundaries for socio-cultural and socio-economic systems; anything from the inner circles that undermines the outer circles is inherently self-weakening (Gibson, 2001). The outermost limit is an area of uncertainty, an acknowledgement of what we do not know.
Since its relatively vague inception, sustainability and its parent term, sustainable development, have both been excessively used in mainstream culture and academic literature, making definition difficult (Meppem and Gill, 1998). More recent definitions than that offered by the World Commission on Environment and Development address sustainability as a multifaceted concept, practice and movement intended to bring about positive social change while restructuring viable and just economic systems within the capacity of bioregional and eco-biophysical limitations. A few examples of these sustainability definitions:

*Sustainability is living abundantly by meeting basic needs while defending and nurturing the health of bioregional cultures and the life-support systems of planet Earth* (Grimm, 2002).

*For the concept [of sustainability] to be viable, sustainability must address our material, as well as our non-material, needs; both are essential. Realizing this imperative has also compelled me to recognize that, as much as the world we live in is empirical, it is spiritual. Ecological sustainability is as much about our spiritual life as it is about our biophysical survival* (Lertzman, 2002).

*Sustainability is a concept, a strategy, and a goal. The concept speaks to the reconciliation of social justice, ecological integrity and the well being of all living systems on the planet. The goal is to create an ecologically and socially just world within the means of nature without compromising future generations* (Moore and Van Wynsberghe, 2004)

*Sustainability entails maintenance of (1) a sustainable scale of the economy relative to its ecological life support system; (2) a fair distribution of resources and opportunities between present and future generations, as well as between agents in the current generation, and (3) an efficient allocation of resources that adequately accounts for natural capital* (Costanza, 1994)

*If sustainability means anything, it has to do with the small set of critical self-organized variables and the transformations that can occur in them during the evolutionary process of societal development* (Holling, 2001).
Each of the above definitions integrates rather than balances fundamental components of sustainability, rooting socio-ecological systems within the naturally existing ecological limits. What they do not address explicitly, though, is a formula that can transform knowledge about sustainability into functional practice:

*Rethinking our organisational learning processes is critical to society's transition to sustainability - a transition toward living respectfully with one another on a planet with finite resources. In order to make the transition to sustainability, what must we learn and who will teach us?* (Gudz 2004; bold added).

### 3.3 Supporting Strategic Planning Documents

#### 3.3.1 International Documents and Organizations Calling for Change

Various international documents, such as the Talloires Declaration of University Presidents for a Sustainable Future (1990), the Halifax Declaration "Creating a common future: an action plan for universities" (1991), and Agenda 21 of the 1992 UN Rio Earth Summit (United Nations, 1992), highlight education’s central role in promoting a more just, peaceful and sustainable future. University administrators officially acknowledged this relationship and, with respect to institutions of higher learning, formally accepted responsibility for this profound process with the shaping of the Talloires Declaration in 1990. This document, presented as an action plan, outlines the means and methods of incorporating sustainability and environmental literacy into teaching, research, operations and outreach at colleges and universities. As of August 2004, 310 university presidents and chancellors in more than 40 countries have signed this declaration (University Leaders for a Sustainable Future, 2004). The signing of The Halifax Declaration in 1991 was another important stage in accepting the social responsibility of universities in particular to promote teaching, learning and
research that benefit society while working towards a sustainable, equitable and secure world:

*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)

Since the UN Rio Summit in 1992, much has been discussed and published on the extensive transdiscipline of sustainability at various levels of government, planning, policy (see Leal Filho, 1999), science (Kates et al., 2001) and education (Leal Filho, 2000). The latter category has culminated in several landmark documents and programs that underscore the essentiality of higher education in bringing sustainability to the forefront of educational and thus social praxis. The UN declared 2005-2014 as the UN Decade of Education for Sustainable Development, to be led by UNESCO (UN Educational, Scientific and Cultural Organization). The US National Council for Science and the Environment focused their third annual national conference of Science, Policy and the Environment on “Education for a Sustainable and Secure Future” (National Council for Science and the Environment, 2003). Many of the presenters at this conference spoke about the need to bridge academia with community needs, as well as the need to enact sustainability in higher education in manners that positively affect the larger society and biosphere (e.g. Cortese and McDonough, 2003).

Calls for profound changes in higher education are becoming commonplace as both critics and visionaries lay out a context for sustainability education (Bowers, 2001; Bogotch, 2002; Furman and Gruenewald, 2004). Against this backdrop, I
offer the recently developed, novel pedagogy of Transformative Sustainability Learning (TSL) and the organizing principle of Head, Hands and Heart (see Chapter 2 of this thesis) to universities, as a methodology and process to actualize commitment to sustainability.

3.3.2 UBC Sustainable Development Policy & Campus Sustainability Office

UBC has taken bold steps to embrace the responsibility to advance sustainability through its Sustainable Development Policy #5:

...as a signatory to both the Halifax Declaration and the Talloires Declaration ... UBC provides leadership by demonstrating the means to a sustainable community on campus... UBC recognizes that just as the university contributes to a healthy society and economy through education to build up social capital, we also need to invest in maintaining the ecological services and resources, our natural capital, upon which society depends. UBC seeks to become a centre for teaching and learning about the skills and actions needed to manage ourselves in a sustainable way (UBC, 1997).

By enacting this policy, UBC has made a public commitment to work towards a sustainable society via teaching and learning about sustainability, and through its mandates and actions. What has been done on campus to progress towards this goal? UBC created Canada's first Campus Sustainability Office (CSO) in 1998 with a primary mandate to focus on operational changes through waste reduction, alternative transportation, energy management, and green buildings (see www.sustain.ubc.ca). The placement of the CSO within the Department of Land and Building Services highlights this focus, though the CSO also promotes academic engagement with sustainability via their SENSE website (Student Electronic Network for Sustainability Education); their SEEDS program (Social, Ecological and Economic Development Studies); and the Sustainability Pledge program. The vision statement of the CSO, “To earn the respect of future
generations for the ecological, social and economic legacy we create," coupled with their visual aid of a modified Venn diagram of society, ecology and economy, speak to the CSO's close alignment with the Brundtland Commission's relatively ambiguous definition of sustainability. More details on sustainability education initiatives at UBC are highlighted in the recent review and collaborative inquiry by Moore et al. (2005).

3.3.3 UBC TREK 2000, TREK 2010

TREK 2000 (UBC, 1998) functioned as the university’s strategic planning document for the 21st century, placing a balanced emphasis on People, Place and Processes, through the categories of People, Learning, Research, Community and Internationalization. Within the category of Learning, one of the strategies articulated was to: “Develop learner-centred undergraduate curricula that incorporate research, international, interactive and interdisciplinary components.” A specific approach to meeting this goal was to expose students to learning that is “interactive in process, facilitating two-way dialogue and ‘hands-on’ experiences.” Six years later, the guiding document for UBC was reviewed through community consultation, the development of a discussion paper (UBC, 2003), and the creation of TREK 2010: A Global Journey, Green Paper (UBC, 2004a), TREK 2010: A Global Journey, White Paper (UBC, 2004b) and TREK 2010: A Global Journey (UBC, 2004c). The evolution of TREK 2010 sees the development of a strong vision statement for UBC:

The University of British Columbia, aspiring to be one of the world’s best universities, will prepare students to become exceptional global citizens, promote the values of a civil and sustainable society, and conduct outstanding research to serve the people of British Columbia, Canada, and the world. (bold added)
In this document, UBC president Dr. Martha Piper, echoes the goal of the Talloires Declaration (among others) by recognizing the role of universities in societies “not only as educators of our future leaders, but also as active participants in the search for solutions to the political, economic, and environmental problems of our time.” Through this guiding document that is organized within the same categories as TREK 2000 (stated above), UBC has furthered its commitment to advancing educated citizenry with the aim of providing “the best possible environment for all members of the campus communities” (within the category People). A specific strategy to meet this goal is to: “Ensure that the principles of sustainability as expressed in UBC Policy #5 ("Sustainable Development") are incorporated into all levels of strategic planning and university operations.” The working Green Paper of TREK 2010 had also stated the goal of developing a “Code of Conduct to document the values UBC seeks to instill through the educational experiences it provides” (UBC 2004a). Although not included in the final draft of TREK 2010, the concept of such a code is helpful in determining strategies to aid in the incorporation of the principles of sustainability. The development of TSL and particularly the organizing model of Head, Hands and Heart, may prove very useful in specifically addressing how to translate the values of the university through its educational practices (Lange, 2004; Gudz, 2004). Further, by incorporating TSL and using Head, Hands and Heart to plan, implement and evaluate sustainability policies and programs, UBC may increase its potential as an international leader in higher education and serve as an example of how to create the desired connections between study, practice and life.
3.4 Sowing seeds of sustainability at UBC

UBC, as a public institution developing into a University Town, has a unique opportunity to promote progressive learning opportunities that create connections between classroom theory and “real world” practices by designing complementary curricula and landscapes. If campus architecture and development is correctly interpreted as “crystallized pedagogy” (Orr, 1991), then the practice of growing food and processing waste as resource within the campus system is key to advancing the pedagogy of sustainability. The impending development of UBC South Campus, for example, can grow into its goals of a complete community and an “urban village in the woods” (Greater Vancouver Regional District (GVRD) Strategic Planning Department, 1997; UBC 2000a) by integrating the neighbouring UBC Farm, which “provides a unique opportunity to integrate a working research farm within a newly planned community development” (UBC Farm, 2005a). The development of a more complete “learning community” (see Gibbs et al., 2004) enables participants to more fully engage in university-associated life-long learning.

3.5 “Design is the first sign of intention”

The UBC journey towards 2015 begins today, as we ask the question: What key elements must be in place so that UBC and its constituents will be able to proudly declare that the goals of TREK 2010 have been realized? How can UBC design its development to reflect intentions documented in strategic planning documents? In answering this question, I look to one of the university’s guiding documents,

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Inspirations and Aspirations: UBC Sustainability (CSO, 2003), within the categories of People, Place and Process for design principles.

3.5.1 People

UBC is a publicly funded institution that rests on traditional Musqueam territory. Inclusion of the Musqueam community, the UBC community, and local and international stakeholders, in the planning and development of UBC will contribute to its longevity; in this way, stakeholders can observe and critique the system while participating in the creation of real solutions to real problems (Orr, 1991). UBC has demonstrated commitment to such processes with, for example, the South Campus Working Group, which included varied representatives from UBC and associates. The South Campus Working Group Consensus Report (2004), a document that emerged from the stakeholder working group, highlights the retention and integration of UBC Farm, and complements the AMS UBC Farm Policy, which states: "Be it resolved that the AMS endorse the UBC Farm as an educational and community focused asset of the University; Be it further resolved that the AMS lobby the University to ensure that the Farm remains an integral learning and community component of the South Campus neighbourhood." The full text of the AMS UBC Farm Policy is included in Appendix 2. As is detailed in Table 3.1, the development of UBC, and specifically South Campus as a "village in the woods" (UBC, 2000a), will be greatly enhanced by concurrent development of UBC Farm into a community amenity with green space, community gardens, teaching and learning opportunities, and contributions to local food security.¹³

¹³ Food security refers to a situation where all residents can access a culturally acceptable and nutritionally adequate diet through self-reliance and a socially just, sustainable food system (Hamm and Bellows, 2003).
### Contributions of UBC Farm to UBC

<table>
<thead>
<tr>
<th>Direct Value</th>
<th>Indirect Value</th>
<th>Option Value</th>
<th>Existence Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Sustainable, local, organic agroecology, through market; community; teaching &amp; learning gardens</td>
<td>- Decrease fossil fueled transport of food</td>
<td>- Future users access to direct, indirect and existence values of UBC Farm</td>
<td>- Agroecosystem and forest as objects of intrinsic value, as a bequest; as a gift to others; as responsibility (stewardship)</td>
</tr>
<tr>
<td>- Contribution to local food security</td>
<td>- Increase UBC self-sufficiency and “close the loop”</td>
<td></td>
<td>- Green space &amp; open space contributes to community well-being</td>
</tr>
<tr>
<td>- Sustainable timber (onsite use)</td>
<td>- Filter air pollution</td>
<td></td>
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<tr>
<td>- Non-timber forest products</td>
<td>- Watershed protection (e.g. storm water management)</td>
<td></td>
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<tr>
<td>- Local farm market: residents can interact with farmland and farmers</td>
<td>- Microclimates</td>
<td></td>
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<tr>
<td>- Community engagement</td>
<td>- Testament to importance of agroecological processes and sustainable management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Conventional and non-traditional research</td>
<td></td>
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<td>- Educational opportunities</td>
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<tr>
<td>- Connections between classroom theory and applied practice</td>
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<td>- Contribution to human health</td>
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<td>- Recreation</td>
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<td>- Reservoir for plant genetics; Habitat for wildlife</td>
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Table 3.1: Some contributions of UBC Farm to the most important resource of UBC, people (CSO, 2003) (modified from Pearce, 1992, additions from Quayle et al., 2000)
3.5.2 Place

As part of the UBC commitment to sustainability (UBC, 1997) and aspiration of becoming one of the world’s best universities (UBC, 2004c), it is essential to keep the planning principles that inform campus development at the forefront of decision-making. The introduction to such planning principles states: “The University lands at Point Grey... link the past to the present and provide a legacy of incalculable value for future generations. Although new communications technologies may extend the influence and reach of UBC, the University lands will remain an asset of great value and lasting significance” (UBC, 1999). As Agricultural Sciences was one of the founding faculties of UBC and farming on UBC initially took place throughout Main Campus (Quayle et al., 2000), the retention and development of UBC South Campus Farm contributes to a legacy started over 100 years ago. The growth and development of this legacy both supports and is supported by the goals of TREK 2010.

UBC Farm is a living laboratory, with a myriad of research and education questions that can be investigated within an integrated farmland, forest and community resource. UBC Farm is a unique place to address holistic research processes that integrate ecological, economic and social issues in an ideal environment for transdisciplinary, practical and community-directed inquiries for effective collaboration on complex sustainability science and research questions. An excellent example is the Intergenerational Landed Learning project, which partners retired farmers and elementary school children, creates opportunities for socio-educational research, and asks questions about how learning occurs.
Complementing classroom learning with practical applications provides opportunities for UBC students and community members to connect over issues such as traditional ecological knowledge, agroforestry, intergenerational learning, community gardens, landscape ecology and ethnobotany. The South Campus Working Group Consensus Report (2004) highlights the educational opportunities affiliated with UBC Farm, stating: ""Fingers" of the Farm should extend into the community and residential development, and the community should extend into the Farm by way of community gardens, school programs, urban farming programs, and sustainability education." These opportunities can transpire through educational practice such as TSL, a novel pedagogy integrates place-based, practical and transdisciplinary learning through engagement of Head, Hands and Heart (Sipos Randor, 2005; Sipos Randor and Grimm, in preparation). TSL emerged in large part from experiences at UBC Farm, a place where learning happens by way of head, hands and heart.

UBC Farm is an exceptional environment to test "real-world" problems (Cortese and McDonough, 2003); UBC, through the on-campus Farm, can therefore demonstrate how working landscapes can benefit and sustain their surrounding communities (Masselink and Bomke, 2002), as well as investigate issues related to sustainable agriculture, agroforestry, urban development, bio-resource engineering, and food systems (UBC Farm, 2004). The development of UBC Farm as a distinctive centre for sustainability-related research will greatly enhance the learning community environment of UBC, and particularly South Campus. The
first UBC Farm Research and Education Symposium\textsuperscript{14} held April 1 2005 contributed to the documentation of such work by highlighting current projects and providing fora to develop new partnerships and collaborations in research and education.

3.5.3 Process

Humans are embedded members of our ecosystems and thus rely on ecological integrity and ecosystem health to cope with stresses (Kay and Schneider, 1994). Such conditions result in the production of ecosystem goods and services\textsuperscript{15} that function as the life-support system for Earth and its constituent parts (Lubchenco, 1998). Development of UBC in conjunction with UBC Farm will aid in the retention and enhancement of ecological goods and services in an agroecosystem that produces local, organic food; and contributes to soil conservation, habitat retention, biological filtration of stormwater, and resource flow accounting. UBC Farm demonstrates profound resilience via biophysical, ecological and social regeneration within a highly impacted site. Through land-based and social sustainability practices, a sense of place and an ecological worldview can be nurtured in community members, accompanied by the necessary skills to ecologically balance the resource flows of human ecology.

\textsuperscript{14} For details on the UBC Farm Research and Education Symposium, check UBC Farm website \url{http://www.agsci.ubc.ca/ubcfarm}. The schedule of the day, talk abstracts and symposium proceedings are available at: \url{http://www.agsci.ubc.ca/ubcfarm/documents/symposium_details.pdf}

\textsuperscript{15} Ecological services are defined as the processes and conditions of ecosystems that support human activity and sustain human life, e.g. soil fertility, natural pest control, climate regulation. Ecological goods are those derived from ecosystem services, e.g. food, timber, fresh water (Chapin III et al., 2000). In combination, these can be referred to as “natural capital” (Costanza et al., 1998)
3.6 Growth and development at UBC

The growth of UBC into a University Town will be greatly strengthened by the development of UBC Farm; the retention of which incorporates both conservation and development, such that these goals need not be viewed separately (Berkes, 2004). The development of UBC Farm can jointly appeal to the principles of sustainability to which UBC has committed (i.e. as a signatory to the Talloires Declaration of University Presidents for a Sustainable Future (1990) and the Halifax Declaration: "Creating a common future: an action plan for universities" (1991); with the enactment of UBC Sustainable Development Policy #5 (1997); with the creation of Canada's first Campus Sustainability Office (1998); and within UBC TREK 2010 (UBC, 2004c)). The UBC Farm initiative contributes to the development of UBC, and particularly South Campus such that the required residential units (as per the Official Community Plan (OCP) (GVRD, 1997)) can be realized while maximizing the retention of agroecological lands, in a manner that supports local and international academic, ecological, social and economic interests and commitments (see Masselink, 2001). The UBC Farm initiative has grown and developed from a forward-thinking vision (see Quayle et al. 2000; Masselink, 2001) to a functioning research and educational community farm. In 2004, its fourth year of operation, UBC Farm was host to: thirty-eight UBC credit courses; research and educational projects from the Faculties of Agricultural Sciences, Forestry, Science, and Education, the School of Community and Regional Planning, UBC Learning Exchange, and BC Ministry of Agriculture, Food and Fisheries; several programs from two First Nations Summer Science Camps; gardening projects from the Musqueam community and the Mayan Educational Society; and over eight thousand off-campus community members (UBC Farm,
2005b). These lands are designated in the joint GVRD-UBC Official Community Plan as Future Housing and Academic Reserve that "will be the subject of an area planning process prior to approval of non-institutional development" (GVRD, 1997, section 4.1.16). Official discussion on the land use of UBC Farm is slated for the year 2012 but will probably actually occur later than that (J. Redmond, pers. comm.). The next ten years are therefore crucial to the development of this unique agroecosystem, both as a centre for sustainability research and education, and as a working farmland integrated within UBC, the associated University Town, Vancouver, and local and international communities.

The GVRD-UBC OCP follows a five-year review cycle; the next review is scheduled for 2007 (UBC Campus and Community Planning, 2005). At this time, it will be appropriate to propose an official bylaw amendment to the OCP and CCP to redesignate and consistently label “UBC Farm” as such on area planning maps that currently include that site in “Future Housing and Academic Reserve.” The South Campus Working Group has stated its official support for such an amendment in its Consensus Report.
3.7 Conclusion

The academic and sustainability mandates of UBC (UBC, 2000b; CSO, 2003; UBC, 2004c) are well established; as the university community journeys into the future, now is the time to identify and enact key elements that must be practiced so that UBC and its constituents will be able to proudly declare that the goals of TREK 2010 have been realized.

This chapter serves to illustrate two elements that may aid UBC in developing in a manner that reflects its documented intentions. First, the incorporation of Transformative Sustainability Learning, a newly developed pedagogy that unites Head, Hands and Heart so as to engage and enable the university community to enact sustainability, now and into the future. Second, UBC University Town, with UBC Farm at its core, can take leadership in accounting for ecosystem integrity and productivity, and for teaching and learning about sustainability, such that human societies can flourish (Folke et al. 1997). The development of UBC Farm, a place that embodies the principles and processes of sustainability in a manner that benefits people – the “most valuable resource” of UBC (CSO, 2003) – begins today, with the planting of seeds for tomorrow.
3.8 References


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Epilogue
In developing the pedagogy of Transformative Sustainability Learning (TSL) and investigating sustainability at UBC, I have become convinced that UBC Farm is the critical link for UBC between “what is” and “what could be.” UBC Farm has enormous potential to lead UBC in its development into a world-renowned centre for sustainability; the organizing principles of TSL may guide this process and enable such a transformation.

UBC Farm is an unrecognized geode located in the South Campus of UBC that encompasses agroecological lands, student and faculty research plots, community project gardens, fallow fields, and is bordered by second-growth forest. UBC Farm is a developing landscape, still with relatively unlimited potential as to its designs and enactments; it is thus a unique teaching and learning environment in that the “chairs are not bolted down,” thereby providing the physical space and flexibility necessary for transformative sustainability learning to thrive. UBC Farm overturns the hegemony of rationalism through its development as a centre for sustainability learning, and thus offers an ideal environment for UBC to enact principles of sustainability in a place-based, transdisciplinary and practical manner.


17 During my defense of this thesis (April 13 2005), Dr. Alejandro Rojas (UBC Agroecology) inquired as to the role of learning environments where the “chairs are not bolted down.”

18 The hegemony of rationalism, i.e. “evidence-based,” “rigorous,” and “scientific” understandings of the world (Lambkin, 1998), over other humanist qualities such as intuition, common sense, creativity, ethics, memory and spirituality, serves to divide knowledge into smaller and smaller elements, leading society from a focus on reason ultimately to the realm of unreason (Saul, 1996).

See:
The pedagogy of TSL, with the organizing principle of Head, Hands and Heart, may enable cohesive development of UBC Farm, and unify teaching and learning process and practice at UBC. TSL, still in its embryonic stage of development, will benefit from future research to enhance its efficacy in planning, implementing and evaluating sustainability programs. The development of a triangulate evaluation system based upon TSL learning objectives, with opportunities for instructors, learners and affiliated community members to constructively critique the model, will enhance the validity of TSL. A critical analysis of the newly developed “pedagogical landscape” will also aid in terms of increasing scope, perspective and understanding of sustainability and transformative learning. Further exploration at UBC and beyond will enable this straightforward and effective pedagogy to grow and develop, and for university communities to benefit from TSL and its organizing principle, Head, Hands and Heart, in transitions to sustainability.
Appendix 1

The concept map developed for TSAPOS 2004 describing course foci, objectives and general organization. This map mimics the architecture of a eukaryotic cell (i.e. that type of cell that possesses internal and structural division of labor), depicting cognitive and experiential activities and goals in functional "organelles" (see Grimm, 2004)
Appendix 2

AMS UBC FARM POLICY

Whereas the University of British Columbia (UBC) farm currently provides a range of research and problem-based learning opportunities for undergraduate and graduate students at UBC; and

Whereas the UBC farm is a model of sustainability and a key innovative educational tool for the only Agroecology degree program in Canada; and

Whereas the UBC farm is a component of the food supply chain at UBC, supplying local produce to the Alma Mater Society, UBC Food Services and several colleges on campus; and

Whereas the farm is a focal point of the South Campus community in which it provides local produce, volunteer opportunities, and activities for students, staff and residents, and retains the potential for expansion in these areas; and

Whereas the South Campus development plan according to the Official Community Plan currently excludes the farm in its vision of future developments;

Therefore, be it resolved that the AMS endorse the UBC farm as an educational and community focused asset of the University;

Be it further resolved that the AMS lobby the University to ensure that the farm remains an integral learning and community component of the South Campus neighbourhood.

http://www.ams.ubc.ca/content.cfm?ID=153
South Campus Working Group Consensus Report (excerpted)

Phase 1 – Northeast Sub-area – South Campus

October 4, 2004

Section 3

Preserve and enhance the "natural" South Campus Neighbourhood

3d) UBC Farm

Designate and consistently label the lands as “the UBC Farm,” as opposed to Future Housing and Academic Reserve. The Working Group supports an OCP amendment, where necessary, that would result in such a re-designation.

It is short-sighted to plan in isolation. South Campus development should therefore be integrated with surrounding lands and land uses, including and particularly, the UBC farm. The plan should address ways to enhance Farm retention and integration, thereby meeting shared objectives of sustainability, community development, leadership and innovation. Although outside the official parameters of the current South Campus plan, the UBC Farm is fundamental to the “village in the woods” that is being developed, and is a large part of what makes the neighbourhood unique.

Recognize the importance of the UBC Farm to the South Campus and other UBC residential communities. “Fingers” of the Farm should extend into the community and residential development, and the community should extend into the Farm by way of community gardens, school programs, urban farming programs, and sustainability education.
Retain and enhance the agricultural capability of the farm lands. Acknowledge and support the socio-ecological roles farmland plays in habitat protection, production of ecological good and services, land conservation, food production, and community education.

**South Campus Working Group signatories to this report:**

UBC Alma Mater Society – Brenda Ogembe  
UBC Graduate Student Society – Darren Peets and Yona Sipos Randor  
Hampton Place Joint Strata Council – Susan Egan  
Pacific Spirit Park Society – Tom Nichols  
Wreck Beach Preservation Society / Fraser River Coalition – Judy Williams  
UEL Ratepayers Association – Shelagh Dodd and Hugh Ho  
UEL Lands Tenant Society – Cal Roskelly  
UBC Faculty – Wyeth Wasserman