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Integrating Sustainability into the Curriculum: The Case for Experiential Learning and Applied Student Research at McGill University

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Introduction

According to the Association for the Advancement of Sustainability in Higher Education (AASHE), sustainability involves meeting the needs of current generations without hindering the ability of future generations to meet their needs (AASHE 2010). Particularly, sustainability can be considered to encompass environmental, economic and social concerns. The environmental or ecological concern arises as the Earth is a closed system with finite resources; the economic or techno-centric concern arises due to limits to human abilities in technology and in the economic system in which it is deployed; and the social or socio-centric concern arises due to society's need to improve the quality of life of current and future generations (Clift 2007). Understanding sustainability and its tenets is becoming increasingly important as many of the systems that have traditionally been viewed as resilient (e.g. financial markets, fish stocks, climate regimes, etc.) are beginning to fail with social, environmental and economic repercussions. Thus, sustainability and sustainable development have become popular discourses, seen as viable solutions to the failure of these systems. To that extent, sustainability is no longer a niche term relegated to the environmental sector. It has become a crucial concept in economic and social spheres, both of which are intrinsically linked to the environment (Brown et al. 1987).

Over the past two decades, campus sustainability has become an important topic of discussion and has led universities around the world to take a second look at their institutions' ecological footprints. In 1990, 300 university administrators in 40 countries signed the Talloires Declaration, which outlined a 10-point action plan to include sustainability in the teaching and operations of colleges and universities (Alshuwaikhat & Abubakar 2008). Further, in 2000 the United States Environmental Protection Agency declared that it was going to hold colleges and universities to the same standards as the industrial sector with regards to the environment, as part of the increasing understanding that universities' activities have a significant impact on the environment (Alshuwaikhat & Abubakar 2008).

In addition, the incorporation of sustainability into the higher education curriculum is gaining momentum for a variety of reasons, including a demand from both students and companies (Boyle 1999). It is part of a university's mission and, according to some (Davis et al. 2003; Moore 2005), its responsibility to educate the leaders of tomorrow in service to the betterment of society (Alshuwaikhat

& Abubakar 2008). As sustainability becomes more widely regarded as the answer to many problems society faces today, the systematic integration of sustainability within higher education becomes imperative. Given that universities train professionals who will be the future constituents of organizations around the globe, these institutions can promote the communication of principles of sustainability into multiple arenas (Alshuwaikhat & Abubakar 2008). It has been found that an increased understanding of sustainability results in its greater acceptance (Filho 1999, cited in Davis et al. 2003). Hence, incorporating sustainability into the teaching of a variety of disciplines can lead to the large-scale dissemination of sustainability values (Alshuwaikhat & Abubakar 2008). The resources that a university has at its disposal include: the capacity to gain both publicity and funding for sustainability enterprises (Karol 2006); an ecological knowledge of the state of the planet (Moore 2005); an environment that fosters learning (Segalas 2010) and that should nurture creativity, freedom of expression and the questioning of the status quo (Moore 2005); the potential for various domains of research (Stephens & Graham 2010); the congregation of thousands of people in one space and potential access to millions of others (Waheed et al. 2011) through networking. As microcosms that, in their activities, affect the environment, universities and other higher education institutes can act as models for the wider community at the forefront of sustainability (Davis et al. 2003; Moore 2005; Lozano-Garcia 2006; Alshuwaikhat & Abubakar 2008; Evangelinos 2009).

Nevertheless, many institutions in North America do not adequately provide graduates with the skills, background, knowledge, and habits that will prepare them to meet sustainability-related challenges (AASHE 2010). In 2010, McGill University approved a Sustainability Policy that states that it "aspires to achieve the highest possible standards of sustainability on its campuses and in its day-to-day activities through its academic practices, in its facilities and operations, and by its outreach to the broader community" (McGill University 2010). Even so, a lack of sustainability teaching has been recognized at McGill – in 2010, students identified a desire for sustainability to be a greater part of the curriculum (Gray-Donald unpublished data). The results of the survey suggest that students are ill-prepared for tackling sustainability issues that they deem important. Thus, in the midst of a global movement towards sustainability curricula in higher education, McGill is an institution of higher learning in which a gap in sustainability teaching has been identified. Incorporating the concept into curriculum would be another important step towards fostering a culture of sustainability at the university.

In order to better understand how to integrate sustainability into McGill's curriculum, a group of students set out in fall 2011 to develop a "toolkit" that could be used by anyone in the McGill community to implement strategies for the integration of sustainability into the curriculum (Luke et al. unpublished report). The report that they produced, titled "Sustainability and Curriculum at McGill University: A Toolkit for Effective Strategy Building" was based on interviews with nearly 30 individuals in the McGill community (departmental chairs, faculty deans, faculty members, and non-academic staff) and 10 individuals at McGill's peer institutions. The report contains the following types of information: sustainability-focused curriculum models at other universities that have potential applicability at McGill; an analysis of the various "drivers" of sustainability-related institutional change at other universities; a description of historical sustainability milestones at McGill; an analysis of some of the barriers (and respective solutions) to the integration of sustainability at McGill; and an analysis of McGill department- and faculty-specific interest in sustainability-related concepts.

One of the key findings of the 2011 report was that the incorporation of sustainability into the curriculum through applied student research should be investigated. While there are many barriers to the integration of sustainability into McGill's formal curriculum (including, for example, the fact that some departments do not find sustainability intellectually relevant, or the fact that accredited faculties have stringent curriculum requirements), giving students the opportunity to engage in sustainability-focused applied research is more feasible. This report attempts to make a case for experiential learning and applied student research at McGill University. It begins with a brief discussion about the benefits of experiential learning in higher education, followed by a short explanation of applied student research. Section 3 of the report looks at examples where other universities have created sustainability-focused applied student research programs. The fourth section of the report, titled 'Institutionalizing Applied Student Research at McGill', puts forward a model for the creation of two new courses that would allow students to engage more easily in sustainability-focused applied student research at McGill. After some introductory remarks about applied student research at McGill University, the section describes the mechanics and rationale for the two new courses, drawing from conversations with members of the McGill community that were conducted during academic year 2011/2012.

Experiential Learning and Applied Student Research

What is experiential learning and why is it important?

Experiential learning is a type of learning whereby the learner is engaged in a process, interacting directly with the real world, and employing a range of learning "modes": thinking, feeling, perceiving, and behaving (Fielding 1994, Zull 2002, Kolb and Kolb 2005). In contrast to many traditional styles of learning whereby students "absorb" a set of pre-determined information and are expected to achieve specific outcomes, experiential learning is a process whereby learning occurs through reflection and adaptation to a system that the student is interacting with. Kolb (1984: 41) defines experiential learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience". Moreover, the process of experiential learning is portrayed as a learning "cycle" where the learner touches all four bases: feeling/experiencing, perceiving/reflecting, thinking and behaving/acting. James Zull, a biologist and founder of CWRU's University Center for Innovation in Teaching and Education (UCITE), draws a link between neurobiology and experiential learning, describing the learning "cycle" from a neurobiological standpoint (Figure 1). In his book *The Art of Changing the Brain: Enriching Teaching by Exploring the Biology of Learning*, Zull writes, "concrete experiences come through the sensory cortex, reflective observation involves the integrative cortex at the back, creating new abstract concepts occurs in the frontal integrative cortex, and active testing involves the motor brain. In other words, the learning cycle arises from the structure of the brain" (Zull 2002: 18-19).

Theoretical arguments about the benefit of experiential learning date back to the early and mid-20th Century. Several scholars of this time – including John Dewey, Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire, Carl Rogers and others – gave experience a central role in their theories of human learning and development (Kolb 1984). Six principles about learning emerge from the theories developed by these 20th Century scholars, all pointing to the necessity of experience in the learning process (Kolb and Kolb 2005):

1. Learning is a process, not an outcome, and learning in higher education should engage students in processes rather than factual absorption;
2. All learning is relearning, and therefore should be facilitated by processes which force students' to examine their assumptions and beliefs;

3. Learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world;
4. Learning is a holistic process of adaptation to the world involving four distinct modes: thinking, feeling, perceiving, and behaving;
5. Learning results from synergetic transactions between the person and the environment;
6. Learning is the process of creating knowledge.

Each of these principles lay in contrast to "transmission"-based modes of learning whereby knowledge is pre-determined, examination of one's implicit assumptions is not questioned, adaptation is not necessary, and there is no interaction with the real world.

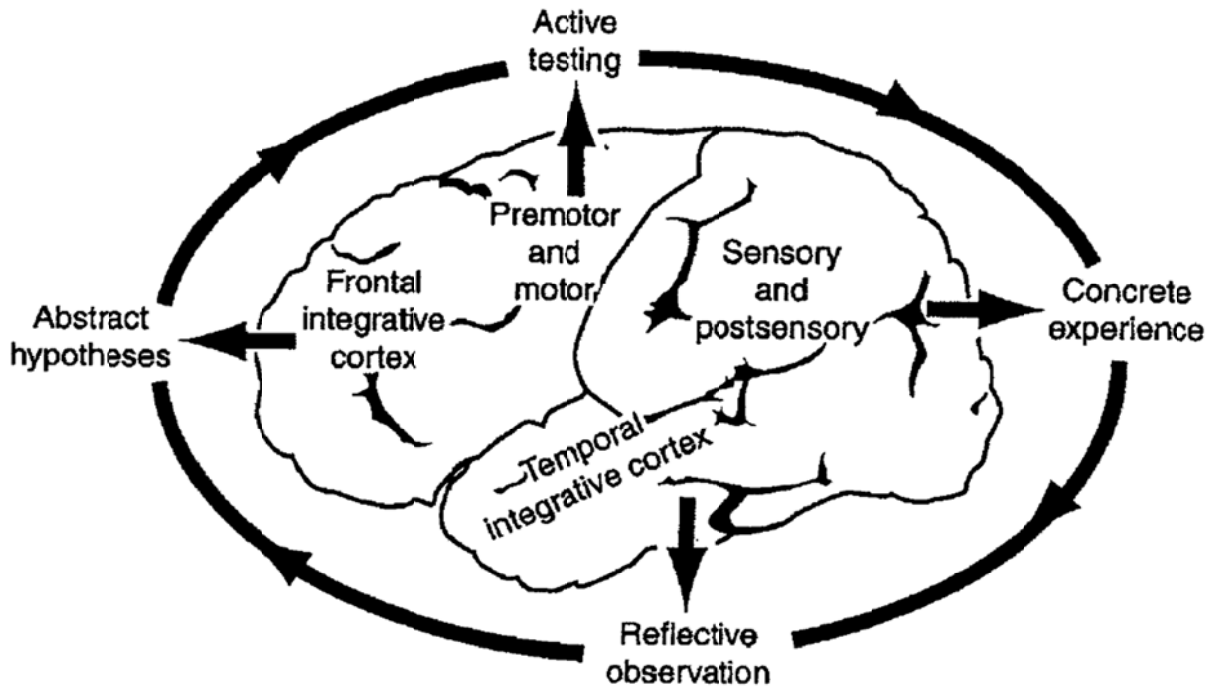

Figure 1. The Experiential Learning Cycle and Regions of the Cerebral Cortex. Taken from Zull (2002).

Moreover, experiential learning is seen as an important component of university education because it equips students with the tools to navigate within an increasingly complex society. In a report called *Experiential Learning in Higher Education: Linking Classroom and Community*, Jeffrey Cantor suggests that experiential learning is a necessary component of post-secondary education because of the need for well-trained and adaptable graduates (Cantor 1995). Cantor suggests that experiential learning is increasingly important as competition among graduates grows more intense in most

professional fields. Experiential learning in higher education provides students with tools and skills that make them more marketable in various professional arenas. Moreover Cantor suggests that experiential learning gives students the opportunity to engage in deeper analysis than is possible in traditional styles of learning.

The bridge between experiential learning and sustainability: Applied student research (ASR)

The introductory section of this report suggests that the integration of sustainability into higher education curriculum is imperative due to universities' responsibility to educate future leaders for the benefit of society, while the previous section suggests that experiential learning is a vital component of higher education for similar reasons. Is it possible, then, to link sustainability education with experiential learning? One way to link the two is through applied student research (ASR), which can be defined as "research that (a) is conducted… with the goal of informing and affecting school, community, and/or global problems and issues and (b) contributes to the positive development of a variety of academic, social, and civic skills [in students]" (Rubin and Jones 2007). A more specific way of thinking about ASR is as "a collaborative approach to inquiry or investigation that provides people with the means to take systematic action to resolve specific problems" (Stringer 2007: 8). Already a popular model in pockets of many universities (e.g. Medicine, Social Work, Engineering, Environment, etc.), ASR allows students to gain academic credit by interacting directly with their environment and working toward solutions to complex problems in their environment and communities.

ASR presents an exciting opportunity to link sustainability to experiential learning on campus and in communities. Several models linking sustainability to student research already exist, and many universities show increasing interest in creating new sustainability-focused ASR programs or models. The next section of the report investigates a handful of programs at some of McGill's peer institutions that have succeeded in linking sustainability to experiential learning through formal academic programs and applied student research.

Sustainability-Focused Applied Student Research at Other Universities

This section explores various models that have been employed by some of McGill's peer institutions to integrate sustainability-focused applied student research into the university's academic fabric. These examples were selected from an examination of McGill's American and Canadian peer institutions (McGill has 18 American Association of Universities "comparator" universities and 14 Canadian comparator universities). Although you can find examples of sustainability-focused ASR in most universities, very few institutions have formalized programs or Offices that support ASR. These examples were selected because they were some of the few examples found among McGill's comparators (and, indeed, in North America) that have institutionalized ASR through programs or through other forms of institutional support (e.g. an Office of Sustainability). The information about University of California's Education for Sustainable Living Program (ESLP) was obtained online and through phone conversations and email correspondence with the ESLP program director at University of California – Los Angeles. Information about University of Oregon's Leadership in Sustainability Program was obtained online. Information about University of Toronto's Office of Sustainability and University of British Columbia's SEEDS program was obtained online and through examination of former McGill student Dana Lahey's 2009 ASR report.

University of California Education for Sustainable Living Program (ESLP)

History

In 2003 the UC Regents (the 26-member board that governs University of California) unanimously passed System-wide Policy for Green Building and Clean Energy (UCOP 2003). This policy is designed to guide the UC campuses toward more sustainable building practices and energy consumption. In light of this movement toward sustainability, the California Student Sustainability Coalition created the Education for Sustainable Living Program to serve as an educational forum for campuses and surrounding communities to discuss the concept of sustainability and how to apply its guiding principles in the campus community (ESLP 2003). As the UC's sustainability movement has grown, the Education for Sustainable Living Program has developed into an accredited, student coordinated course and in 2005 received international recognition through the Oikos Foundation for Economy and Ecology's Award for Student Entrepreneurship in Higher Education.

UC Davis

Program Summary

At UC Davis the ESLP consists of a two unit (credit) seminar series hosted by renowned educators, authors, environmentalists, and progressive thinkers. Lectures are open to the public to encourage collaboration between the campus and local community. The course encourages reflection upon and analysis of the principles of sustainability, and is designed to encourage dialogue between students, faculty, staff, administration, local community, and the entire UC system. For two additional units (credits), students have the option to participate in Action Research Teams. These groups focus on campus specific issues such as sustainable transportation, socially & environmentally preferable purchasing, energy consumption reduction, waste reduction and prevention, and green building.

Action Research Teams

Action Research Teams (ARTs) are action-oriented research groups which involve students in a process of experiential learning by collaborating with faculty, staff, administration, students, and community members to implement tangible change at UC Davis. In 2011 there were five ARTs and projects included a community-supported agriculture pilot program, the development of a game for alternative fuel and vehicle transition policy, and a campus waste-reduction campaign.

UC Davis has an online registration tool for individuals who are interested in leading Action Research Teams. Individuals can be anyone in the university community (faculty members, staff, or students) who are involved with a sustainability-related project.

UC Los Angeles.

Overview

UCLA was one of the first campuses to start ESLP after its inauguration at UC Santa Barbara in 2003. After its inception at UCLA in 2004, ESLP is now in its 6th successful year (UCLA IES 2011). The program consists of three parts: a Lecture Series, a Documentary Series, and the Action Research Teams.

Lecture and documentary series

The lecture and documentary series' are held in the fall. The lecture series brings guest speakers from across the U.S. to speak on various sustainability topics including green economy, environmental health, sustainable living, green building, food systems, green chemistry, biodiversity, and water accessibility issues as well as sustainability projects in Los Angeles. The documentary series visually connects students to sustainability issues. It is an effective way of introducing students to global and large-scale sustainability-related topics.

Action Research Teams

The Action Research Teams (ART) program is a sub-division of the Education for Sustainable Living Program (ESLP). Through the Action Research Team component of the program, students form research teams to tackle issues of campus sustainability including energy efficiency, transportation, waste stream management, sustainable food practices and more. The goal of Action Research Teams is to generate a coalition of student researchers that, together with faculty members and UCLA staff, strive to make UCLA a model campus and national leader in sustainability. Each Action Research Team is comprised of 1 or 2 team leaders, 3-6 team members, and a UCLA faculty or staff member that serves as the project stakeholder. The stakeholder is responsible for helping students target their research by serving as a mentor, while acting as a liaison to their respective Action Research Team by offering logistical support and advice on behalf of the University's interests.

Over the course of two quarters, the students are expected to frame their research topic, develop a hypothesis and research plan, compile and analyze data, and finish with a 15 to 20 page group report on their findings. During the entire process, students meet with their stakeholders to continually refine their research and identify targets of possible change through new information gained from action research. The two-quarter time frame allows for an in-depth journey that enables a thorough analysis of the research project. The Action Research projects also provide stakeholders with invaluable information that is used to make UCLA more sustainable.

UC Santa Cruz

Sustainable Living Class

The ESLP at UC Santa Cruz consists of a 2 unit (credit) "Sustainable Living Class" where students build "Creative Rethinking and Foundational Tools" (CRAFT). These discussion sessions are designed and

facilitated by 1-2 students. The topics and projects in this section fluctuate depending on the interests of the student organizers (UCSC ESL 2011).

Action Research Groups

For an extra 3 units (credits), students from the Sustainable Living Class have the option to pursue a specific sustainability topic in Action Research Teams (ARTs). ARTs are designed and facilitated by students with the guidance of a winter training seminar. The seminar enables participants to develop facilitation skills, curriculum development skills, and other leadership skills. ARTs explore a specific sustainability topic in depth, and topics are decided by the student facilitators.

Oregon Leadership in Sustainability (OLIS)

Oregon Leadership in Sustainability (OLIS) is an intensive year-long graduate certificate program that trains students in the concepts and skills of sustainability (OLIS 2011). "It is designed for students from diverse backgrounds who want to prepare for emerging sustainability careers in the public, private, and non-profit sector". There is a strong emphasis on experiential learning, and the goal of the program is to equip students with the tools to understand and address pressing environmental issues like climate change, ecosystem services, green infrastructure, and social justice.

In addition to interdisciplinary course work offered by a wide range of academic units at University of Oregon, OLIS includes a year-long practicum in which students work with a campus or community stakeholder to implement a sustainability-focused project. The practicum emphasizes leadership, analysis tools, and implementation.

University of Toronto Office of Sustainability

The mandate of University of Toronto's Office of Sustainability – established in 2004 - is to increase the environmental, social, and economic sustainability of the university and create a "culture of sustainability" on campus (Lahey 2009, based on conversations with two administrators from U of T's Office of Sustainability).

A core component of this mandate is to enable students to contribute to campus sustainability through applied student research and involvement in some of the university's key sustainability projects. The Office considers itself to have a research focus however it does not have the internal capacity to engage in research; instead it relies on students to conduct research with direct applicability to the

university's sustainability goals. Since its opening in 2004 the Office has involved over 400 students in sustainability-focused ASR through course work, independent studies, undergraduate and graduate theses, work-study positions, and volunteer work. The Office considers the university as a "living and learning laboratory" in which students can engage in experiential learning while contributing to sustainability goals. Likewise, the Office is well connected to many of the stakeholders involved in the management of the university's operations, thereby positioning it to work with campus stakeholders and students to create interesting sustainability projects. One of the elements that has allowed the Office to succeed in providing students with sustainability-focused ASR experiences is its academic-operations co-chair model. The Office operates with two Directors, one the Director of Utilities and Building Operations and the other the Sustainability Director. While the Director of Utilities and Building Operations is knowledgeable about the university's Facilities, Operations, and Services, the Sustainability Director, herself an academic, is well-connected in the academic realm of the university. The co-chair model has allowed the Office to establish very strong links between students, the university's operational sustainability, and applied student research (see Lahey 2009 for an in-depth review of U of T's co-chair model and more information about how the Office of Sustainability has facilitated ASR).

University of British Columbia Social, Ecological, Economic Development Studies Program (SEEDS)

University of British Columbia's Office of Sustainability (established in 1998) coordinates sustainability-focused ASR through its Social, Ecological, Economic Development Studies Program (SEEDS). Launched in 2001, SEEDS aims to bring campus stakeholders (faculty and administrative staff) together to provide opportunities for students to engage in sustainability leadership (Lahey 2009, based on interviews with two administrators and one student from UBC). In 2006 alone the program involved nearly 400 students, administrative staff, and faculty, and in its eight-year history the program has involved more than 2,000 participants. SEEDS projects focus on meeting the university's operational sustainability goals, but one of the hallmark projects is the UBC Food Systems Project. SEEDS typically coordinates 10 group projects under the umbrella of the Food Systems Projects, involving numerous academic stakeholders (e.g. agricultural science, land and field studies, chemical and biological engineering, business and commerce). SEEDS records all of its projects in an online database, available at: http://www.sustain.ubc.ca/seeds-library. The SEEDS program provides a very interesting model with

potential applicability at McGill University (for more information about the SEEDS program, visit http://www.sustain.ubc.ca/seeds or see Lahey 2009).

Institutionalizing Applied Student Research at McGill

The McGill context: The need for a formal link between student initiative and academic credit

Student interest in campus sustainability has increased in recent years, reflected by the exponential growth in sustainability-related student groups, student-involvement in large-scale sustainability projects (including the creation of the Office of Sustainability and the Sustainability Project Fund in 2007 and 2009, respectively), and the emergence of student-university partnerships in the areas of food, waste, energy systems, and others. Student groups have emerged with the express purpose of increasing campus sustainability. Some of the more research-oriented projects include McGill Food Systems Project (http://mfsp.wordpress.com/) and the McGill Energy Project. Others that are less research-oriented include the Gardner Hall Green Living Learning Community (http://www.mcgill.ca/students/housing/downtown-undergrad/life/communities/), the Sustainability Case Competition (http://ssmu.mcgill.ca/blog/2011/11/sustainability-case-competition/), and numerous collaborative student projects that have been funded through the Sustainability Project Fund (http://www.mcgill.ca/sustainability/get-involved/sustainability-projects-fund/current). It is clear that there is no shortage of student energy to implement sustainability projects and build collaborative relationships on campus.

While most of the sustainability initiatives on campus have been extracurricular, an increasing number of students have been finding "ad-hoc" ways to contribute to campus sustainability through research by seeking out interested professors and enrolling in independent research courses. Indeed, this model has become the hallmark of a handful of campus initiatives including the McGill Food Systems Projects and the Macdonald Campus Ecological Garden, and is growing in popularity as students begin to make the connection between activism and academics. However a large majority of students are still hindered in their ability to engage in applied student research because they are unaware that the possibility exists or because their programs are not flexible enough to allow for sustainability-related applied research projects. Moreover, there is currently no formal course or program whereby students work within the McGill community to research, design, and implement sustainability-focused research

projects. The unfortunate result is that ASR is largely limited to upper-year students with relatively flexible degrees who have a good understanding of McGill's academic system.

Recognizing the need for a formal mechanism that would enable students from across the university to participate in sustainability-focused ASR, the 2011/2012 ASR & Curriculum interns at McGill's Office of Sustainability – Max Luke and Susanna Klassen – explored the idea of creating two new courses that would enable students to participate in ASR. The remainder of the report describes the model that Luke and Klassen have been working on since January 2012. The model is the result of inspirational programs at other universities and countless conversations and brainstorming sessions with faculty members, non-academic staff and interns at the Office of Sustainability.

Creating two new ASR courses

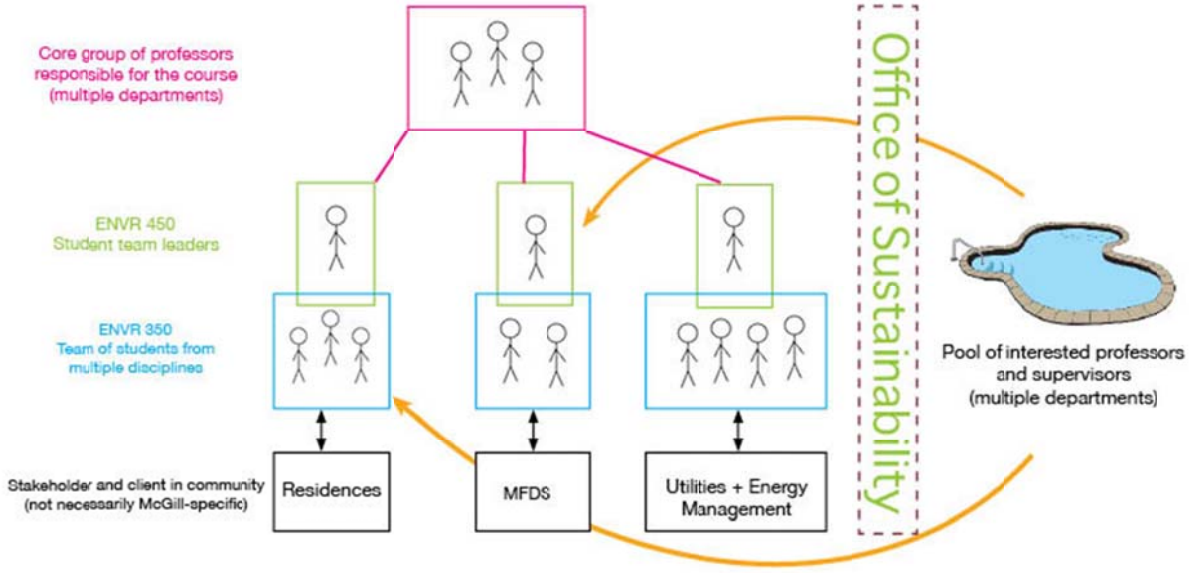

Figure 2. A visual depiction of the structure of two new sustainability-focused ASR courses, ENVR 350 and ENVR 450. Students enrolled in ENVR 450 provide project leadership, meeting with a core group of professors on a regular basis. Project teams (consisting of team leaders and students enrolled in ENVR 350) meet with project stakeholders/clients regularly. A "pool" of professors from the university with interests in sustainability and applied research can be utilized for academic

In January 2012 Office of Sustainability interns Max Luke and Susanna Klassen began exploring ways to formalize sustainability-focused ASR at McGill. One way to do this is the creation of a course or a set of courses that is dedicated for ASR, much like University of California has done with the Education

for Sustainable Living Program and its Action Research Teams. After initial conversations with the McGill School of Environment, the Office of Sustainability, and various faculty members with interests in applied research and sustainability, a few key questions emerged that had to be addressed: 1) What are the mechanics of the courses? 2) How do the courses fit into McGill's academic mission? 3) How do the courses complement the School of Environment? 4) What resources are required for the courses and how will resource requirements be met? 5) What is the timeline for the implementation of the courses?

Course Mechanics

The following sentence summarizes the general structure of the courses: "Students work in teams with a campus or community stakeholder to define a problem or question, design a research methodology, assess the environmental, social, and economic impacts of options, and implement or make recommendations for the implementation of an option that contributes to the overall sustainability of the system". The specific mechanics emerge from this general summary and are described below. Figure 2 visually summarizes the course mechanics.

Akin to UCLA's Action Research Teams (part of the Education for Sustainable Living Program), it was decided that two courses (one 300-level course and one 400-level course) should be created to attract lower-year students and upper-year students. Moreover the two-tier course system was devised to give the 400-level students an opportunity to lead project teams and develop project management skills. Although 300-level and 400-level students would be working together, 300-level students would have no prior ASR experience, whereas 400-level students would have already taken the 300-level course and/or would have prior experience working with a particular campus stakeholder. Additionally, both the 300-level and 400-level course would span two semesters to give students the opportunity to meaningfully engage with the system that they're working in.

One unique feature of the two-tier course system is that it would allow the 400-level students (i.e. "student leaders") to take ownership and help guide the academic trajectory of the project. However there would be a core group of three to four faculty members who would provide the ultimate academic oversight for the projects and help craft each project prior to their start-dates. TAs may also be employed as necessary. In addition to the core group of faculty members who would be ultimately responsible for (and receive academic credit for) the courses, there would be a "pool" of faculty members from across the university's academic departments who could be called upon for additional academic support. For example if a project team was working with Utilities and Energy Management on

analyzing energy use associated with McGill's vehicle fleet, a faculty member in the School of Urban Planning may be interested in working with and providing support to that team for the duration of the project. Appendix A provides information about consultation that was conducted with faculty members between January 2012 and April 2012. Many of these faculty members expressed interested in participating in ENVR 350/450 as voluntary project supervisors or as core faculty members.

Other considerations included whether to link the new courses to an existing department and whether to use an existing subject code (e.g. ENVR) or create a new one (e.g. SUST). Conversations with Kathy Roulet (the academic advisor for the School of Environment) and Marilyn Scott (Director of the School of Environment) led to a conclusion that the courses would need a home academic unit for administrative purposes, and that the creation of a new subject code would be difficult and require a very strong rationale (Kathy Roulet and Marilyn Scott *personal communication*). It was decided that the home academic unit could be the School of the Environment (MSE), recognizing the fact that it would be possible to implement analogous courses in other departments in the future. Although the initial home unit would be the MSE and the courses would have an "ENVR" subject code, the courses would be available to all students at the University (including graduate students). Students outside the MSE would take the courses as electives, whereas MSE students could include the courses as part of their program requirements.

Course projects themselves would entail regular team meetings. Student leaders would be required to meet with the faculty member associated with their project (either a core faculty member or a "pool" faculty member) on a regular basis. Regular assignments, presentations, and reports (including a final report) would be required by all project teams and graded by the core group of faculty members. Peer-based participation evaluations would also factor into the grading scheme. Appendix B, which includes course proposal forms and proposed syllabi for ENVR 350 and ENVR 450, contain detailed information about the proposed grading structure for the courses.

How do the courses fit into McGill's academic mission?

It is argued that by interacting directly with the system that you are studying, you can retain more and engage more deeply with that system than you would by studying it from afar. McGill has embraced the notion of experiential learning, as exemplified by its field study semesters, field courses and research courses that have students interacting directly with communities, environments and issues. As the title implies, *Sustainability Research into Practice* (ENVR 350) seeks to apply theoretical

and conceptual notions of sustainability to a specific system/project, thereby linking experiential learning with the intellectual exploration of sustainability concepts. Likewise, *Applied Student Leadership* (ENVR 450) seeks to train students in team and project management, thereby linking experiential learning with an invaluable set of leadership skills that will have immediate applicability upon graduation.

Student interest in campus sustainability has increased in recent years, reflected by the exponential growth in sustainability-related student groups, student-involvement in large-scale sustainability projects (including the creation of the Office of Sustainability and the Sustainability Projects Fund in 2007 and 2009, respectively), and the emergence of student-university partnerships in the areas of food, waste, energy systems, and others. Furthermore, an increasing number of students have been finding "ad-hoc" ways to contribute to campus sustainability through research by seeking out interested professors and enrolling in independent research courses. However there is currently no formal course or program whereby students work within the McGill community to research, design, and implement sustainability-focused research projects. The creation of ENVR 350/450 will provide a formal mechanism for students to contribute to campus sustainability through research.

Moreover, these courses align with sustainability priorities identified by the University and the Office of Sustainability. The Office of Sustainability has recently embarked on a year-long consultation process titled “Vision 2020”. Under the guidance of a Steering Committee with stakeholders from across the University, the Office of Sustainability and the external Sustainability Solutions Group, Vision 2020 has identified four University areas where sustainability can be applied and improved: teaching, research, university operations, and “culture”. ENVR 350/450 contributes to this goal because of its emphasis on sustainability-related projects that bridge all four areas. ENVR 350/450 projects require students to team up with campus stakeholders (university operations) and undertake academic research projects under the supervision of faculty members (teaching and research). By linking research with operations, publicizing project results, and soliciting student participation from across the university, ENVR 350/450 will contribute to building a “culture” of sustainability at McGill.

Other universities, including some of McGill’s comparators, have adopted similar programs which seek to link intellectual and academic exploration with experiential learning and leadership. For example, recognizing an opportunity to integrate campus sustainability into University of California’s undergraduate research experience, students and faculty members at UC Santa Cruz created the Education for Sustainable Living Program (ESLP) in 2003 to serve as an educational forum for campuses

and surrounding communities to discuss the concept of sustainability and apply its guiding principles in the campus community. Within the ESLP, students form "Action Research Teams" in partnership with campus staff and community members to link academic research with tangible change. After its success at UC Davis, ESLP has moved to UCLA, UC Santa Cruz, and several other of the UC campuses. Other universities have succeeded in linking operational sustainability to experiential learning through their Offices of Sustainability. At University of Toronto the Office of Sustainability has provided oversight for hundreds of sustainability-focused ASR projects. The University of British Columbia Office of Sustainability Coordinates the Social, Ecological, Economic Development Studies Program (SEEDS). Since its conception in 2001, SEEDS has involved thousands of people (students, administrative staff and teaching staff) in academic projects that link operational sustainability to experiential learning. These types of programs and initiatives seek to inspire participants to internalize the concept of sustainability and carry it in practice beyond academia and into a greater society.

How do the courses complement existing courses in the School of Environment (MSE)?

How are ENVR 350 and ENVR 450 different than and complementary to ENVR 401?

- Rather than being limited to Environment majors, ENVR 350/450 is open to all students;
- Unlike ENVR 401 where the administrative and teaching burden falls almost entirely on MSE faculty members and administrative staff, the administration and teaching of ENVR 350/450 is split between the MSE, the Office of Sustainability, faculty members from other departments, non-academic staff, and students involved in the courses (see "ENVR 350&450 Resources" document);
    - The benefit of this distributed approach is that it fosters collaboration and relationship-building between stakeholders on campus. The MSE, the Office of Sustainability, the campus/community stakeholders, and the student participants will be working together on the same projects.
- Whereas in ENVR 401 most of the projects are determined by the MSE faculty members associated with the course, ENVR 350/450 projects are built from the grassroots through student-staff collaboration, and then further developed with the support of the Office of Sustainability and faculty members;
- ENVR 350 and ENVR 450 are both 8 months' in duration (rather than 4). Having students work closely with stakeholders for this length of time gives them an opportunity to develop lasting

relationships and understand a system very well. Additionally, students enrolled in 350 have the opportunity to apply as student leaders the following year, giving them the opportunity to understand the system even better and build even deeper relationships.

- ENVR 350/450 and ENVR 401 are complementary because some of the client-student partnerships developed in 401 could be the basis of 350/450 projects, and vice versa. For example, if a group of 401 students works with Utilities and Energy Management in the fall, a 350/450 might pick up where the 401 team left off the following fall.

How are ENVR 350 and ENVR 450 different than and complementary to ENVR 490?

- Whereas the administrative burden of ENVR 490 falls entirely on MSE administrative staff, the administration of ENVR 350/450 is split between numerous stakeholders and individuals;
- Whereas professors supervising 490 tend not to get teaching credit, 350/450 will have a group of core faculty members (hopefully from different academic departments) who will get teaching credit;
- The distinguishing feature of ENVR 350/450 is its emphasis on *local sustainability-focused experiential learning*. It is limited to projects in the campus/Montreal community so that students can be immersed in the system they are studying, while learning important project management skills. It is intended to be a dedicated avenue for this style of learning. While ENVR 490 can be used for this type of experiential learning, it is not dedicated for that purpose and can be used to various other types of research (e.g. conventional research paper, lab work, etc.).
- ENVR 350/450 will emphasize collaborative group work, whereas ENVR 490 is typically an avenue for independent research.

Resources

This section describes the resources that will be required for the two courses. Stakeholders/individuals responsible for providing the resources are **bolded red**. Figure 3, below, summarizes the resource allocation, while the text below explains Figure 3 in detail. Unlike traditional courses in the MSE where the resource burden falls almost entirely on faculty members and administrative staff in the MSE, the resource distribution for ENVR 350/450 will be much more diffuse.

Administrative Resources

Promotion/Calls for project submission/Leader selection/Registration

- Beginning in winter 2013, calls for project submission will be sent out to students and student groups that are engaged in multi-stakeholder sustainability initiatives (e.g. Edible Campus, Green Living Learning Community, McGill Farmer's Market, McGill Energy Project, McGill Food Systems Project, etc.). Project proposals will be reviewed and a handful will be selected to begin in fall 2013. Project leaders (ENVR 450) will be selected from the applicant pool and projects will be developed over the winter/summer terms (see 3. Project development). The call for project submissions will be orchestrated through the **Office of Sustainability interns**. The project/leader selection process will be overseen by the **Office of Sustainability interns**, the **core professors**, and the **voluntary professors**. The registration process will be handled through the **MSE**.
    - Selected projects must involve student-staff engagement (i.e. students and staff must be working together and there must be some degree of buy-in at the staff level to implement student projects).
    - Ideally leaders will be in the city for all/part of the summer to work on project/workshop development (see 'Project development' and 'Workshop development' below). It may be possible to provide student leaders with a small summer stipend.
- Once projects have been selected and developed, promotion for ENVR 350 will begin. Sustainability-related groups, student activists, residences, lower-year students, and potential student leaders will be targeted. ENVR 350 is intended to appeal to a range of students (i.e. students outside the MSE) and will be publicized as such. Much like for ENVR 401, applicants will be asked to pick their top three project choices and selection will be made on a first-come-first serve basis. If there is an overabundance of interest (i.e. more students than there are spaces on the project teams) there will be some kind of selection process (e.g. based on grades or past experience). The promotion process will be orchestrated by **Office of Sustainability interns**, while the registration process through the **MSE**.

Institutional memory/Project continuity

- The **Office of Sustainability** will house project reports and assignments. Along with up-and-coming **student leaders** and other **non-academic staff**, the Office will also ensure that successful projects are continued with new groups and new leaders.

Funding for professors

- The hope is to have a multidisciplinary core group of professors that would lead ENVR 350/450 (i.e. that would meet with student leaders, provide academic support, and be in charge of most/all of the grading). This core group should get teaching credit, but in order for this to happen it may require the MSE to "buy-out" these faculty members from their respective departments. This funding could potentially come from the **Sustainability Projects Fund** and/or the **MSE**.

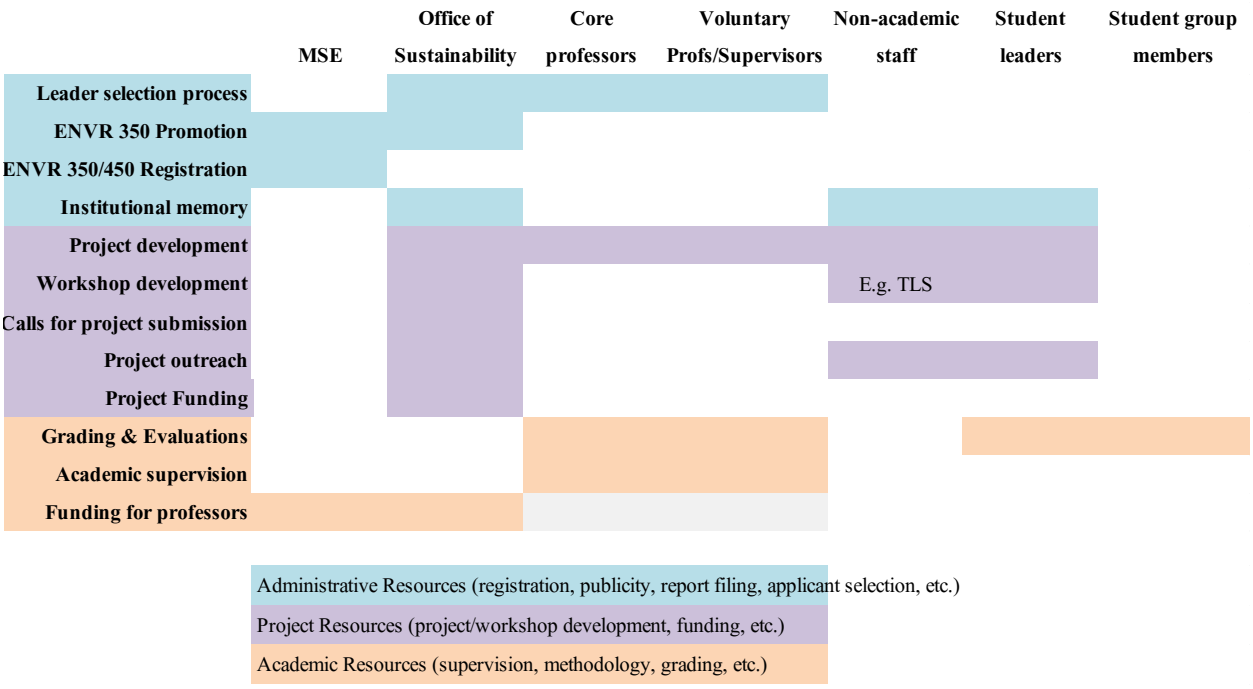

Figure 3. Resource allocation for ENVR 350 and ENVR 450. The stakeholders that will bear the burden of the resource requirements for the courses are listed at the top of the chart, while the resource requirements are listed on the left-hand side. Resource requirements are organized by administrative resources (blue), project resources (purple) and academic resources (pink). Unlike many courses at McGill where a single department is responsible for every aspect of the course, Figure 3 shows that the resource burden for ENVR 350 and ENVR 450 would be shared by many diverse stakeholder groups.

Project Resources

Project development

- Most selected projects will already be at an advanced stage because of student and/or staff leadership. Therefore, **students** and **staff** will drive initial project development. Through the summer, however, **student leaders**, **staff**, the **Office of Sustainability interns**, **core professors**,

and **voluntary professors** will be responsible for refining and developing projects to meet certain academic standards. Project development will include:

- Defining a research objective, methodology, and timeline;
- Liaising with appropriate stakeholder groups to ensure that project results may be implemented;
- Preparing and submitting a budget if any funding is required for project implementation.

Workshop development

- Students enrolled in ENVR 350 are required to attend two workshops/information sessions in September. The first is an overview of the history of sustainability initiatives at McGill, with particular emphasis on the role that students have played in improving campus sustainability, and will be organized and presented by **Office of Sustainability interns**. The second will be project specific and will be organized and facilitated by the **student leaders** enrolled in ENVR 450. Student leaders may want to seek the help of **Teaching & Learning Services (TLS)**, **First-Year Office**, or others who organize leadership workshops on a regular basis.

Project outreach

- The **Office of Sustainability interns**, **student leaders**, and **non-academic staff** will play a role in supporting the development of new student-staff sustainability partnerships (project outreach), which can feed into ENVR 350/450.

Academic Resources

Grading and academic supervision

- Project groups will be required to submit monthly reports, a final report, and peer evaluations. In addition groups will be required to present twice (once in December and once in April), all of which **core professors** and/or **voluntary professors** will be required to mark. Each **project group member** will be required to submit peer evaluations and leader evaluations, while each **student leader** will be required to submit evaluations for each project group member. **Core professors** will take these evaluations into account when assigning final marks.
- **Core professors** and **voluntary professors** will meet with **student leaders** on a regular (e.g. weekly) basis to get progress reports, make sure that things are running smoothly, and provide academic oversight to make sure that the project is systematic and methodological.

Timeline

Figure 4 shows the tentative timeline for the creation of ENVR 350 and 450. Note that the first projects won't begin until fall 2013, giving over a year (from the writing of this document) to acquire the academic support and develop projects. As described in the previous section, most of the tasks listed in Figure 4 will be completed by many stakeholders, including Office of Sustainability interns, the School of Environment, and faculty members involved in projects.

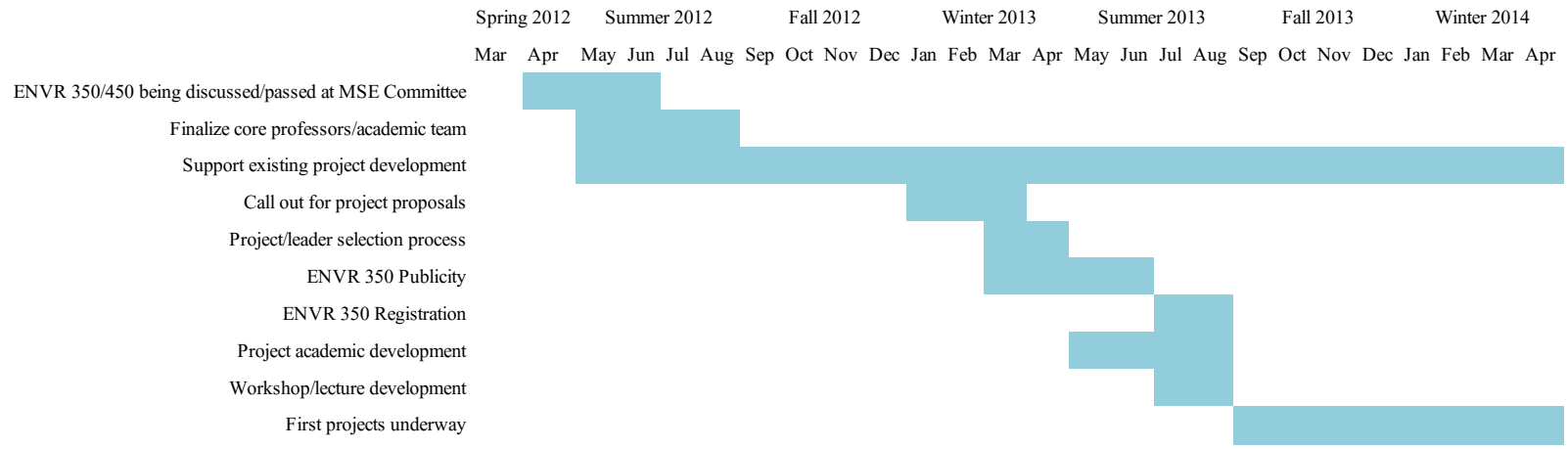

Figure 4. Timeline for the creation and implementation of ENVR 350 and ENVR 450.

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