



Student Benchmark Survey on Ecological Literacy Research Project

Dalhousie University
SUST/ENVS 3502 The Campus As A Living Laboratory

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Executive Summary

The following research study investigates the level of ecological literacy of fourth year and above students at Dalhousie University. Ecological literacy, or eco-literacy, refers to the capacity of an individual to perceive, interpret and alter the relative health of the natural environment (Roth, 1992). Specifically, the eco-literacy of students in their fourth year and or above with the intention of graduating in the environment-related disciplines of Environment, Sustainability & Society and Environmental Science is examined. An accredited survey conducted by Anna Elizabeth McGinn (2014) was administered to 91 students these respective programs. Probabilistic and non-probabilistic sampling methods were used in the administration of the survey.

The survey prompted students to answer environment-related questions in the areas of *Caring*, *Practical Competency* and *Knowledge* in order to test their competence in eco-literacy. A student must have a high enough combination of *Caring*, *Practical Competency* and *Knowledge* towards the environment in order to be considered ecologically literate (McGinn, 2014). Following a thorough analysis of the results, the researchers determined eco-literacy levels for each sample population. For the Environment, Sustainability & Society population, 85% were considered ecologically literate while 15% were considered illiterate. Moreover, for the Environmental Science sampling frame of 19 students, 79% were considered ecologically literate while 21% were considered illiterate. The statistics demonstrate that students in their fourth year or higher at Dalhousie University have a high eco-literacy comprehension. It is noted, however, that there is room for improvement in each program with respect to eco-literacy. Further research is recommended by the researchers in order to advance efforts in the field of eco-literacy at the institution.

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1.0 Introduction

Ecological literacy, or eco-literacy, refers to the capacity of an individual to perceive, interpret and alter the relative health of the natural environment (Roth, 1992). Building on a similarly designed North American research study of campus-based sustainability education, the following study investigates the level of eco-literacy of fourth year and above students in environment-related disciplines at Dalhousie University. Specifically, we examine the eco-literacy of students in two environment-related disciplines at the institution: Environment, Sustainability and Society (ESS) and Environmental Science (ENVS). A survey created in 2014 by Anna Elizabeth McGinn was administered to these students. Each survey questionnaire prompted the students to answer questions related to the three major components of eco-literacy: attitude, behavior and knowledge (McGinn, 2014). A thorough analysis determined the level of eco-literacy of students in each respective program.

The studies related to eco-literacy in North America thus far have neglected the opportunity to observe students in environment-related disciplines (Morrone et al., 2001; McBride, 2011; McGinn, 2014). Thus, the ultimate goal of the study is to establish a baseline of data by assessing the eco-literacy of students in fourth year or above in two environment-related disciplines at the university level. The study provides preliminary data for institutes of higher education to assess the literacy of their students and may provide impetus for these institutions to address the gap in the education system with respect to eco-literacy.

2.0 Background

Defining Ecological Literacy

Following the United Nations Conference on the Human Environment in 1972, a widespread concern grew over the lack of environmental education present in institutes of higher learning (Kibert, 2000). Environmental education is the incorporation of environmental themes into educational institutions (Lynch & Hutchinson, 1991). A steady development of national and international declarations related to higher education has since emerged (See Table 1). The importance of environmental education has been regularly affirmed in conferences over the last 43 years (Roth, 1992). Each conference has placed a special emphasis on the three major components of eco-literacy: attitude, behavior and knowledge (Roth, 1992).

Table 1. International Declarations on Sustainability (adapted from Wright, 2002).

Year	International Declaration
1972	The Stockholm Declaration on the Human Environment
1977	The Tbilisi Declaration
1990	University Presidents for a Sustainable Future: The Talloires Declaration
1991	The Halifax Declaration
1992	Report of the United Nations Conference on Environment and Development
1993	Ninth International Association of Universities Round Table: The Kyoto Declaration
1993	The Swansea Declaration
1994	CRE-Copernicus Charter

Eco-literacy is a component of environmental education (Orr, 2002). Eco-literacy acts to slow the pace of environmental change until the consequences can be scientifically, psychologically or socially determined (Roth, 1992). The concept emerged at the forefront of academia in the 1990's and is now recognized as the primary goal of contemporary environmental education (Roth, 1992). The ultimate goal of eco-literacy is to form an environmentally educated society that is capable of solving environmental problems (Orr, 2002).

The relevant literature states that eco-literacy is defined by the ability of an individual to transform knowledge into action (Roth, 1992; Orr, 2002). That is, the degree to which an individual is ecologically literate is measured in terms of their observable behavior. An individual must demonstrate an observable form of literacy through, for example, their knowledge of concepts, skills or disposition towards issues (Disinger & Roth, 1992). He or she must also have an adequate understanding of the biophysical world - the natural environment and the anthropogenic environment - and its role in contemporary human society (Roth, 1992). Thus, an ecologically literate individual is one that is motivated to work toward the resolution of environmental problems and develop the highest quality of life for all members of its society.

Eco-literacy precipitates pressure on part of the general public to maintain, restore or improve the health of the natural environment (Roth, 1992). The public, as identified in these definitions of eco-literacy, includes individuals from all sectors of society. However, the citizenry identified as most capable of effecting environmental change are those that are taught through formal education programs, particularly post-secondary students (EETAP, 1997).

There is a range in the degree of eco-literacy across disciplines of study in post-secondary institutions, which varies from "total ignorance or unawareness" to "deep, thorough understanding and concern" (Roth, 1992, pg. 21). Post-secondary students that are enrolled in specialized environmental courses are provided a range of educational opportunities associated with the environment. Conversely, the students that are enrolled in traditional disciplinary studies have less opportunity to participate in environmental education (Hollweg et Al., 2011). For example, in 1999, the University of Florida created

a college “dedicated to the study of issues related to ecological literacy” (Kibert, 2000, pg. 8). However, the remaining 40,000 students who were not taking classes at the new institution received no formal eco-literacy education (Kibert, 2000). Thus, despite agreement as to the importance of ecological literacy in formal education systems, it has not, as of yet, been achieved on a campus-wide scale.

Past Studies in Ecological Literacy

Following the popularization of the concept in the 1990s, an interest in testing eco-literacy emerged in academia. These research studies aim to identify and assess the strengths, weaknesses and opportunities with respect to eco-literacy education in contemporary society. Specifically, the survey-based studies issued by Morrone et al. (2001) and McBride (2011) predominantly inform the content and structure of McGinn (2014) upon which our research study is based.

Morrone et al. (2001) developed a survey instrument to test four components of eco-literacy. The four components include knowledge, attitudes, sensitivities and personal beliefs (Morrone et al., 2001). The survey was administered to four sample groups in the state of Ohio (Morrone et al., 2001). Each sample group represented different demographic categories. Morrone et al. (2001) concluded that ideologies concerning the environment needed to be altered in order to increase eco-literacy. Furthermore, the research conducted by McBride (2011) proposed a framework for eco-literacy that acts as a mechanism for creating a greater synergy between formal and informal education systems. She analyzed pre- and post-fellowship surveys completed by participants in an ecologically focused K-12 outreach program at the University of Montana (McBride, 2011). Her research recognized five means through which people achieve ecological literacy: informal education, formal education, financial incentives, exposure to nature and outreach (McBride, 2011).

Morrone et al. (2001) and McBride (2011) provided a basis for the study by Anna Elizabeth McGinn (2014). The research study by McGinn (2014) examined eco-literacy of first year Liberal Arts students at eight colleges in Pennsylvania. The resulting data was processed to quantify the number of students who were considered ecologically literate in the areas of *Caring*, *Practical Competency* and *Knowledge* (McGinn, 2014). McGinn (2014) proved that there is a definite gap in the college educational system with respect to eco-literacy.

The recognized institutes of higher education in North America have certainly made progress within the currents of eco-literacy for over four decades. However, improvements can be made in order to effectively engage students in eco-literacy. These improvements must expand on the approaches demonstrated by Morrone et al. (2001), McBride (2011) and McGinn (2014). An understanding of how to properly integrate eco-literacy into the post-secondary education system will play an important role in shaping the minds of the future and beyond.

Achieving Ecological Literacy

Dalhousie University has a student base of approximately 15,500 students and offers 3,600 undergraduate, graduate and professional courses. Specifically, it offers courses in the faculties of: architecture and planning, arts and social sciences, computer science, dentistry, engineering, graduate studies, health professions, law management, medicine and science and agriculture (Dalhousie University, 2015). The institution attracts high achieving students from around the globe.

Dalhousie University announced its decision to “develop a new generation of leaders for whom sustainability is second nature” in 2008 (“Dalhousie University inspires minds”, 2009, A-16 as cited in Mitchell, 2011). The institution has since issued an environmental education program, formally known as the ESS program, which aims to educate students across the campuses and across undergraduate degree programs about the effects of human-nature interaction; to develop knowledge, attitudes and behaviors to solve complex environmental problems; and to motivate students to involve themselves in sustainability related issues beyond the classroom (Dalhousie University, 2015). The program focuses on ideas that continually challenge and work to improve our natural and built environments through the operations of the university. As of present, the College of Sustainability offers an ESS major in five faculties. Other environment-related disciplines such as Environmental Science are also practiced at the university.

The Dalhousie community continually strives to participate in environmental and sustainable efforts through many campus initiatives and actions. The university has asserted itself as one of the major post-secondary institutions participating in the on-going sustainability movement in North America (Dalhousie University, 2015). Thus, Dalhousie University has shown its commitment to improving eco-literacy on a campus-wide scale.

We believe that our research is important and timely to aid in the shift towards a more sustainable campus. The relevant post-secondary studies related to eco-literacy in North America thus far have neglected the opportunity to observe studies in environment-related disciplines (Morrone et al., 2001; McBride, 2011; McGinn, 2014). However, each study has referenced to the gap in eco-literacy across disciplines of study (Morrone et al., 2001; McBride, 2011; McGinn, 2014). Therefore, the driving purpose behind our research study has been to advance the relevant literature by assessing the eco-literacy of students in fourth year or above in two environment-related disciplines at Dalhousie University: ESS and ENVS.

3.0 Methodology

An in-person survey was chosen for data collection. A survey is defined as any data collection operation that gathers information from human respondents by means of a standardized questionnaire (Creswell, 2014). The purpose of conducting survey research is to generalize from a sample population in order to make inferences regarding a characteristic, attribute or behavior of a larger population (Creswell, 2014). As such, a survey was a favorable form of data collection for our study to analyze specific attributes from a selected sample of individuals.

3.1 Description of Study Design and Justification

In order to collect baseline data on the eco-literacy of fourth year students at Dalhousie University, a three-part survey was issued (Appendix 2). The survey tested the ecological literacy of students in three specific areas: *Caring*, *Practical Competency* and *Knowledge*. The survey questions for these three categories were drawn directly from a study conducted by Anna Elizabeth McGinn in 2014. The study was adapted to include demographic information, such as gender, discipline of study and declared major or minor of Dalhousie University students. Altogether, the survey consisted of 35 questions.

Section One, *Caring*, provided twelve statements asking students to rate their agreement with each statement on a Likert scale. The major areas covered by the statements include: a personal responsibility to the environment; views of rules and regulations to protect the environment; and perceptions of waste (McGinn, 2014). The Likert scale ranged from strongly disagree (1) to strongly agree (5), which gauged the level of care in environment-related issues. A person who received a low score in *Caring* does not feel the desire to and responsibility for reducing their personal and communal impact on ecological systems (McGinn, 2014). The *Caring* section was placed foremost due to the fact that there are no right or wrong answers to these questions, which ensures that the respondents are comfortable taking the survey from the outset (McGinn, 2014).

Section Two, *Practical Competency*, contained nine statements regarding environmental issues. The responses correlate with the practical competency of the student. For instance, a student with a low practical competency does not take action to reduce their ecological impact on the environment (McGinn, 2014). Conversely, a person with a high practical competency has embedded sustainable actions in his or her daily life (McGinn, 2014). The students were asked to rank their commitment to each action on a Likert scale ranging from strongly disagree (1) to strongly agree (5). Similar to *Caring*, this section was placed second as there are no right or wrong answers (McGinn, 2014).

Section Three, *Knowledge*, asked questions pertaining to ecological literacy. McGinn (2014) devised a compilation of questions based on eight principles employed by Morrone et al. (2001) and Orr (2002). The following is a list of principles employed by Morrone et al. (2001) and Orr (2002) used to create the questions:

1. Biogeography;
2. The earth as a biosphere;
3. Ecological energetics;
4. Carrying capacity;
5. Ecosystem succession;
6. Biotic interactions;
7. Biodiversity and the threats to biodiversity; and
8. Material cycling.

Each of these areas of ecology is explicit or implicit in at least one of the ten multiple-choice *Knowledge* questions (McGinn, 2014). Only one answer was correct for each question. The questions also ranged in difficulty (Table 2) (McGinn, 2014). The *Knowledge* section was placed last on the survey to ensure that students were able to answer questions that were external to their personal beliefs and behaviors (McGinn, 2014).

Table 2. Range of difficulty for each question in *Section Three: Knowledge* (adapted from McGinn, 2014).

Level of Difficulty	Necessary Knowledge	Question No.
1	Ability to reason, but little previous knowledge of ecological systems	22
2	Slight knowledge of ecological systems	28, 32 and 33
3	Must understand basic ecological principles	24, 27 and 29
4	Must understand more advanced ecological principles	26, 30 and 31
5	Requires significant awareness of current environmental issues	23 and 25

3.2 Procedure

We conducted research on two disciplinary populations at Dalhousie University: ESS and ENVS. Only students enrolled in fourth year or above with the intention of graduating in each discipline were asked to participate in the survey. We targeted specific third and fourth year environmental classes in an attempt to reach our sample population (Table 3). The surveys were administered by the researchers with the permission of the instructor prior to the beginning of class and collected from the instructor at end of class. The estimated time to complete the survey was approximately five to seven minutes. However, the participants were given two to three hours to complete the survey due to our method of data collection. Additionally, a few students were surveyed outside of the classroom at the Masquerade Biology Ball and Green Gala events.

Table 3. List of classes targeted for research.

Course Code	Class	Year
SUST 4000Y	Capstone	4
SUST 3502	The Campus As a Living Laboratory	3
ENVS 4003	Coral Reef Ecology	4
ENVS 4002	Science of Wetlands	4
SUST 4950	Advanced Debate	4
ENVS 3400	Human Health	3
ENVS 3200	Environmental Law	3

The first population is fourth year and above ESS students. 88 individuals were enrolled in ESS for the year of 2015. In order to obtain a probabilistic sampling population with a confidence level (CL) of 95% and confidence interval (CI) of 5%, we had to sample 72 of 88 individuals.

The second population is fourth year and above ENVS students. 41 students were enrolled in ENVS for the year of 2015. In order to obtain a probabilistic sampling population with a CL of 95% and CI of 5%, we had to sample 37 of 41 individuals.

Our survey was cross sectional and was administered during the Winter 2015 semester. Data was collected over a 3-week period in the respective classes identified in Table 2. The participating classes ranged significantly in environment-related subject matter.

Probabilistic simple random sampling techniques were employed on both the ESS population and the ENVS population. Simple random techniques were used to generalize attributes from a subset of individuals to a larger set (Creswell, 2014). We also employed non-probabilistic snowball sampling techniques in an attempt to reach our CL for ENVS. Snowball techniques were used to identify potential respondents from those who had already participated in the survey (Creswell, 2014).

3.3 Reliability and Validity

Validity in quantitative research refers to whether one can draw meaningful and useful inferences from scores on particular instruments (Creswell, 2014). McGinn pilot tested her survey on a first year seminar class at Dickinson College to test the length of the survey and clarity of the statements and questions (McGinn, 2014). She had made several minor changes to the survey following reassessment (McGinn, 2014). The pilot test and reassessment conducted by McGinn at Dickinson College ensures validity of the survey. Additionally, we pilot tested the survey ourselves to ensure validity.

Reliability refers to whether scores to items on an instrument are internally consistent, stable over time and whether there was consistency in test administration and scoring (Creswell, 2014). Following McGinn's (2014) reassessment, the survey was implemented in environmental studies courses at eight external North American universities in 2013. The previous implementation of the survey at accredited universities in North America

demonstrates reliability. To ensure reliability in our own implementation, all researchers administered the exact same survey and used the same approach to administration. Upon collection of the survey, all surveys were placed directly in sealed envelopes.

3.4 Limitations

A major limitation to our research study was the restricted time frame. Due to the time of year that we conducted our research, the majority of ESS and ENVS classes that we targeted were not in full attendance. Another major limitation was the ability to obtain a representative sample for each program.

3.5 Delimitations

The purpose of our research study was to analyze the success of environmental education efforts at Dalhousie University in these two programs. We chose to specifically target fourth year students in ESS and ENVS to narrow the scope of our research. These students have completed four years of education or more in environment-related disciplines at the university. Thus, the target population was appropriate for our research. Moreover, though a research study inclusive of 95% of the total population for both ESS and ENVS programs was idealistic, it was proven to be unrealistic. Additionally, our targeted population was inclusive of only ESS and ENVS students, which excludes the eco-literacy of other programs.

3.6 Analysis and Interpretation

Our analytical process is identical to the process used by McGinn (2014). Following the implementation phase of our research, the surveys were first segregated based on whether the respondents were eligible to participate in the study. Our target audience was fourth year and above students in ESS and ENVS. However, a few respondents participated in the study that were not in fourth year or above ESS or ENVS. Seven surveys were discarded as a result.

The eligible respondents were then separated based on their discipline of study; that is, whether they responded as ESS or ENVS students. Microsoft Excel spreadsheets were created for each program. Each student was assigned a unique number and his or her results were entered into the Excel spreadsheet. In the event that a student left a *Caring* or *Practical Competency* question blank, we minused a score of one percent from their total score in the relevant section (McGinn, 2014). In the event that a student left a *Knowledge* question blank, their question was marked incorrect (McGinn, 2014). We assumed that the students that left a *Knowledge* question blank simply did not know the answer (McGinn, 2014).

The survey questions and statements or answers were also reassessed to ensure that each question accurately measured the objective of the research. For this reason, we had to eliminate two questions from the survey. For example, Question 7 in *Caring* asked the respondent to indicate their agreement or disagreement with the following statement: *One*

person's actions do not make a difference when it comes to environmental issues. According to McGinn's (2014) data analysis method, the respondents that chose strongly disagree (1) on the Likert scale would be considered ecologically illiterate. However, it can be argued by an ecologically literate individual that one person's actions *do* make a difference when it comes to environmental issues. Based on the results of the analysis, Question 7 was too opinion-based in terms of the respondent and had to be removed. Additionally, Question 36 was removed in *Knowledge*. Question 36 asked the respondent: *Where does most of the garbage in the United States end up?* According to Kulpinski (2015), landfills retain 55% of waste in the United States. The correct answer, landfills, was not listed as one of three multiple-choice options and the question was removed as a result.

The ecological literacy of the study participants was measured as per the scale used by McGinn (2014) (Table 4). The scale ranged from *illiterate* to *high*. McGinn (2014) describes an ecologically literate individual as one who receives a score of 60 percent or over in all three sections of *Caring*, *Practical Competency* and *Knowledge*. Those scoring 59.9 percent and below in at least one of the areas are not considered ecologically literate by these standards (McGinn, 2014).

Table 4. Level of ecological literacy by score (adapted from McGinn, 2014).

Level of Ecological Literacy	Score
Illiterate	Below 60%
Low	60-69.9%
Basic	70-79.9%
Standard	80-89.9%
High	90-100%

The demographic information was first compiled in the Excel spreadsheet. The Likert scales used in the *Caring* and *Practical Competency* sections were assigned percentage values (McGinn, 2014). The percentage values best described the level of care or action of the respondent (McGinn, 2014). Tables 5 and 6 display the values assigned to the Likert scales and provide justifications for their associated values. The Likert scales were converted to the percentage assigned prior to analysis (McGinn, 2014). Table 7 displays the percent values assigned to the number of correct answers in the *Knowledge* section.

Table 5. Likert scale justification for *Section One: Caring* (adapted from McGinn, 2014).

Likert Scale	Description	Percent	Justification
1	Strongly Disagree	0	The student does not care and is considered <i>ecologically illiterate</i> .
2	Disagree	15	The student does not care, but does not disagree passionately.
3	Neither Agree nor Disagree	60	The student does not have an opinion, which places he or she at the minimum score necessary to be considered literate.
4	Agree	85	The student agrees, but not passionately, which indicates that the student meets <i>standard</i> ecological literacy.
5	Strongly Agree	100	The student cares passionately.

Table 6. Likert scale justification for *Section Two: Practical Competency* (adapted from McGinn, 2014).

Likert Scale	Description	Percent	Justification
1	Strongly Disagree	0	The student takes no action and is considered <i>ecologically illiterate</i> .
2	Disagree	15	The student takes very little action, which places he or she at the minimum score necessary to be considered literate.
3	Neither Agree nor Disagree	60	The student takes action on occasion, which places her or she at the top threshold of <i>basic</i> ecological literacy.
4	Agree	85	The student takes action, which places he or she at the top threshold of <i>standard</i> ecological literacy.
5	Strongly Agree	100	The student exhibits exemplary action and has a high level of ecological literacy.

Table 7. Scoring justification for *Section Three: Knowledge* (adapted from McGinn, 2014).

Number Correct	Percent	Justification
0-2	0	The student correctly answered only the most basic questions. The student is considered <i>ecologically illiterate</i> .
3-4	40	The student incorrectly answered majority of the questions. The student is considered <i>ecologically illiterate</i> .
5-6	60	The student incorrectly answered some of the questions. The student is considered <i>ecologically literate</i> .
7-8	80	The student incorrectly answered some of the questions. The student is placed at the minimum level of knowledge necessary to meet the <i>standard</i> level.
9	90	The student answered most of the questions correctly. The student is placed at the maximum level of knowledge necessary to meet the <i>standard</i> level.
10-11	100	The student answered all questions correctly or answered one question incorrectly. The student has a high level of ecological literacy.

4.0 Results

4.1 ESS Results

A total of 72 out of 88 ESS students were surveyed, therefore reaching the 95% CL of the sample population for ESS. Figure 1 shows the overall percentage of literate to illiterate students in the ESS program (85% to 15%, respectively). Figure 2 deconstructs these literacy levels into the categories outlined in Table 3. The majority of the ESS sample, or 70%, falls into either the *high* or *standard* sub-categories of literacy. Less than one fourth of ESS students are considered *illiterate*. In general, these statistics indicate that ESS students have extensive knowledge on the subject matter and are considered ecologically literate (McGinn, 2014).

Figure 1. Percentage of ecologically literate versus ecologically illiterate for ESS.

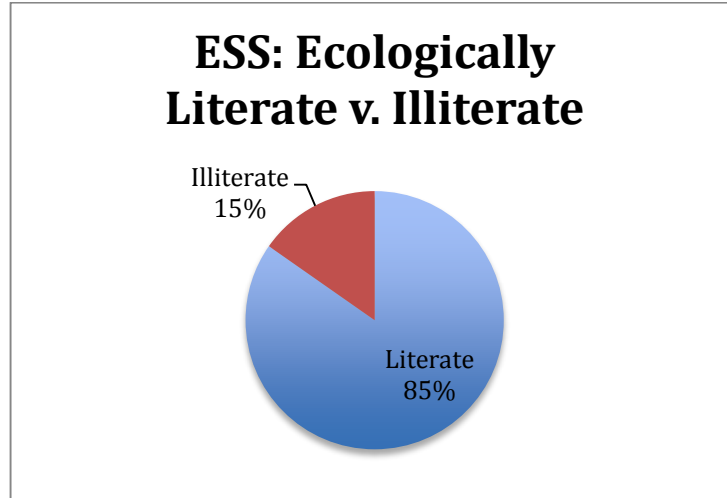
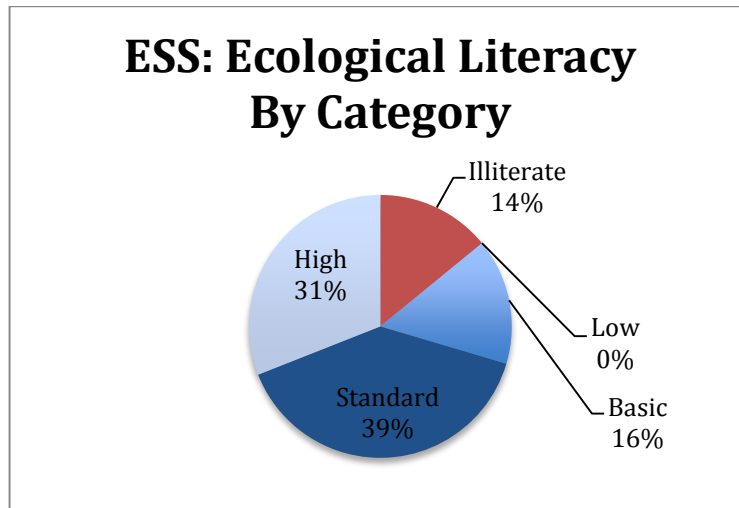
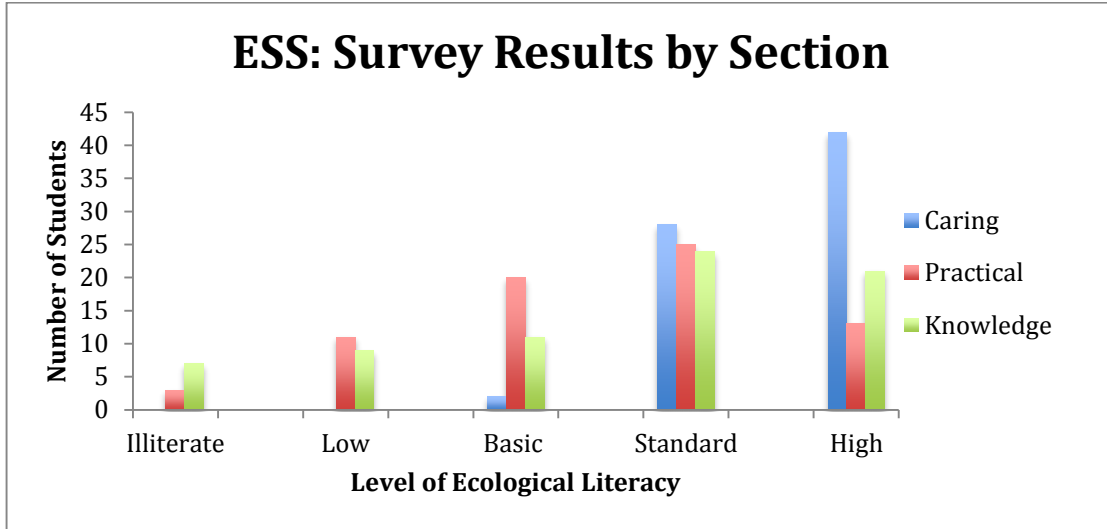


Figure 2. Percentage of ecologically literate versus ecologically illiterate by category for ESS.



As previously stated, an ecologically literate individual is one who scores 60% or over in all three sections of *Caring*, *Practical Competency* and *Knowledge* (McGinn, 2014). Figure 3 displays the levels of eco-literacy of ESS students by category (i.e. *illiterate*, *low*, *basic*, *standard* and *high*) for each section (i.e. *Caring*, *Practical Competency* and *Knowledge*). The graph demonstrates the number of ESS students who met the level of literacy for each section.

Figure 3. Survey results by section for ESS students.



Figures 4, 5 and 6 display the raw data results of each section for ESS. The x-axis represents the number assigned to each question in the survey (Appendix 2). In general, the *Caring* section in Figure 4 demonstrates that students in ESS have a high level of care with respect to the environment. Figure 5 demonstrates that these students also agreed (4) or strongly agreed (5) with the statements in the *Practical Competency*. Question 4 and Question 7 in *Practical Competency* are exceptions to this trend. For instance, Question 4 produced relatively the same results for each Likert category and Question 7 saw a high level of disagreement. Overall, the students scored a high level of eco-literacy in *Caring* and *Practical Competency*.

Figure 4. Raw survey results from *Section One: Caring* for ESS students.

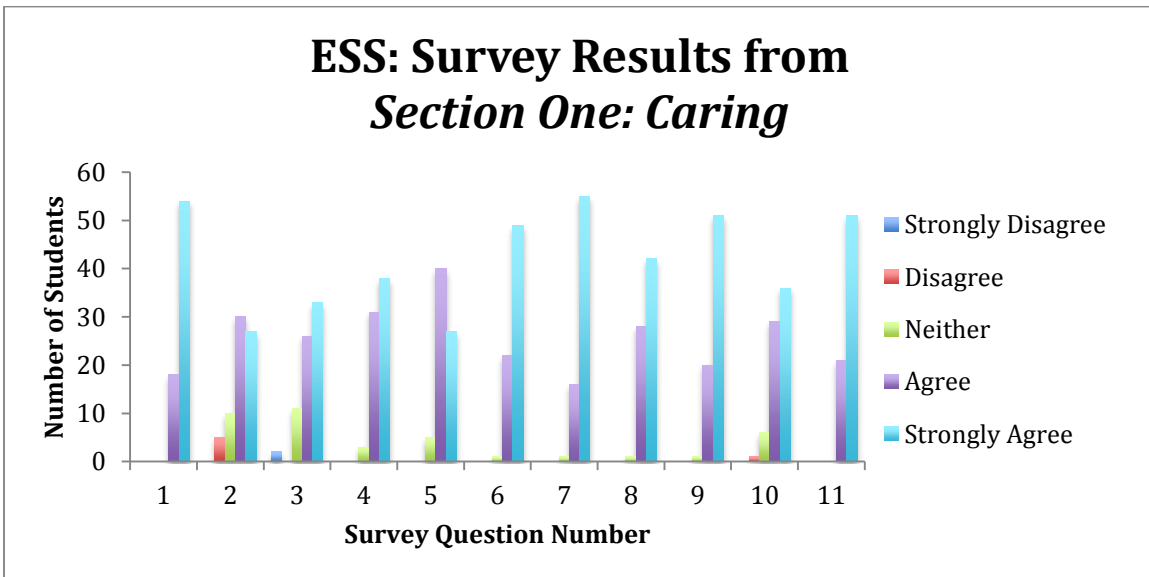
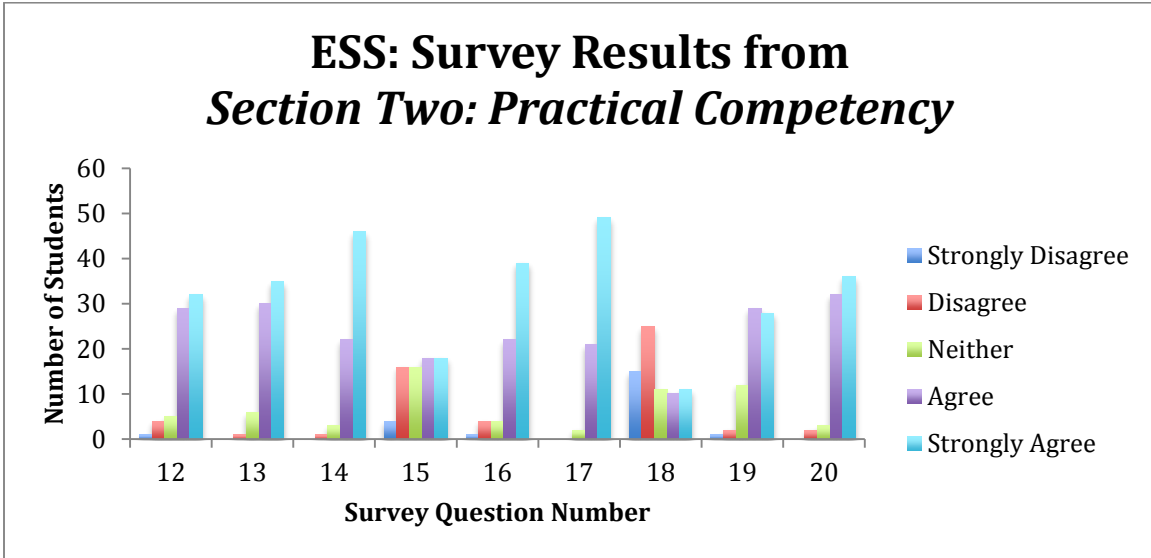
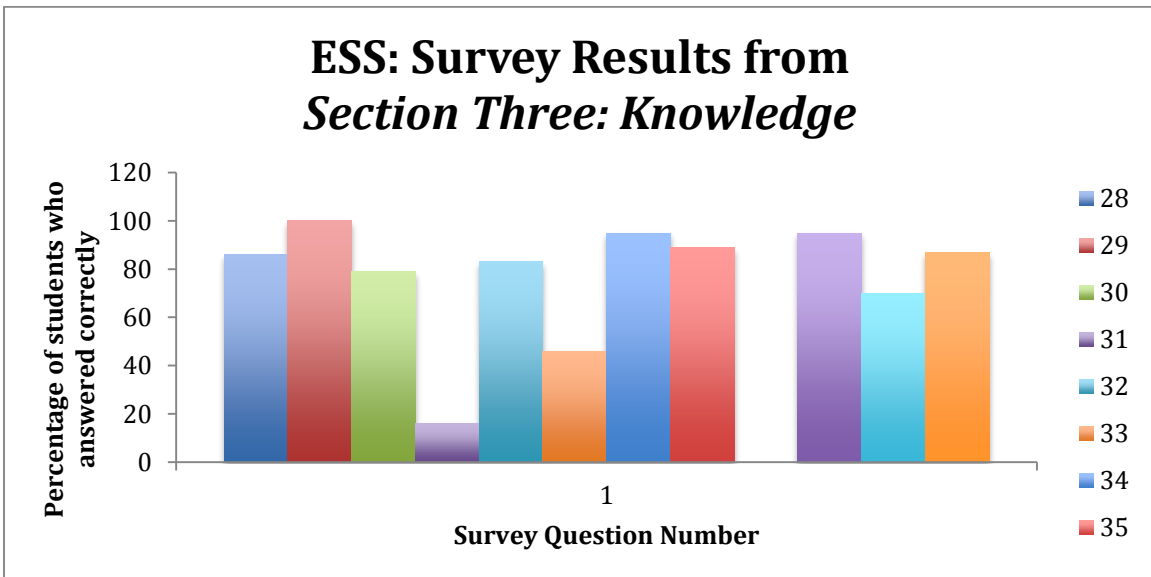


Figure 5. Raw survey results from *Section Two: Practical Competency* for ESS students.



ESS students scored above 60% on all questions in *Section Three: Knowledge* except for two: Question 31 and 33. Only 16% of students answered Question 31 correctly and only 46% of students answered Question 33 correctly. All students in the sampling frame answered Question 29 correctly. The average number of questions answered correctly is 8.63 out of 11, or 78%.

Figure 6. Raw survey results from *Section Three: Knowledge* for ESS students.



4.2 ENVS Results

Due to the fact that we did not obtain a representative sample of the population, we are unable to make generalizations for the entire ENVS population at Dalhousie University. A total of 19 of 41 ENVS students were surveyed whereas the probabilistic sample size for ENVS needed to exceed 33 students. Therefore, the following data is based on the results of 19 ENVS participants in the research study. It is important to note that these results do not reflect the entire ENVS population at the institution.

Based on the results of the 19 ENVS surveys, the overall percentage of literate to illiterate students is 79% to 21%, respectively (Figure 7). Figure 8 deconstructs literacy levels into the categories outlined in Table 3. Only 21% of the population is considered *illiterate*. An approximate 79% of the sampling frame is categorized as having a *basic*, *standard* or *high* level of eco-literacy. These statistics indicate that the majority of students in the ENVS sample frame have considerable knowledge on the subject matter and are ecologically literate (McGinn, 2014).

Figure 7. Percentage of ecologically literate versus ecologically illiterate for ENVS.

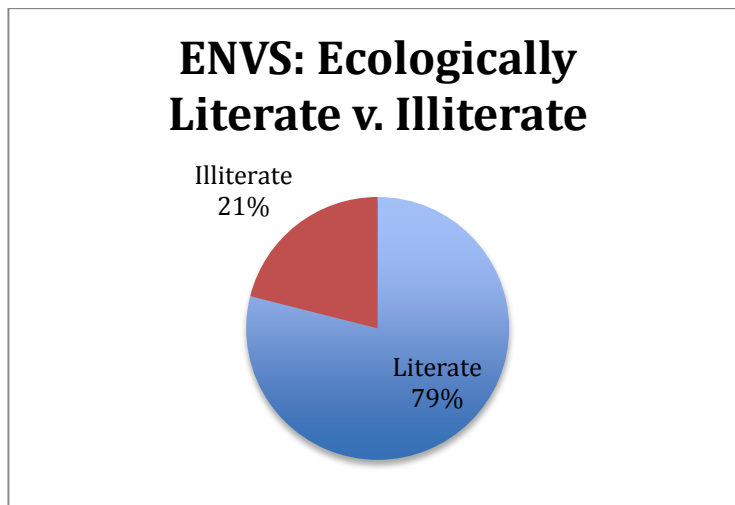


Figure 8. Percentage of ecologically literate versus ecologically illiterate by category for ENVS.

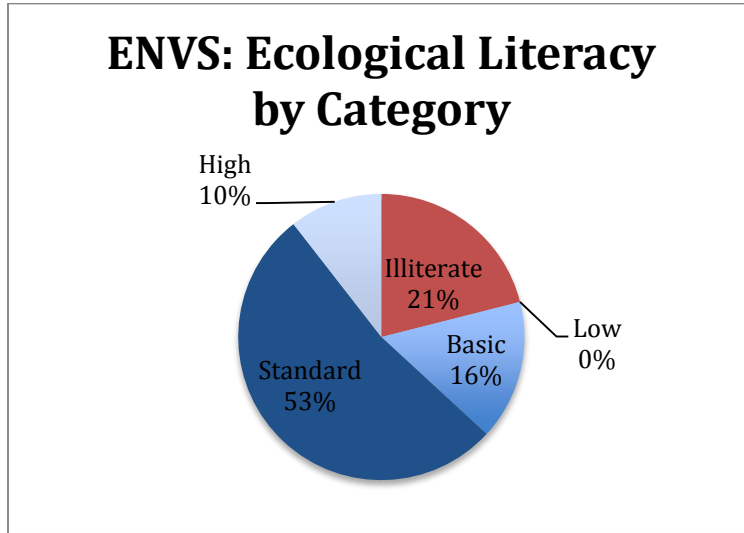
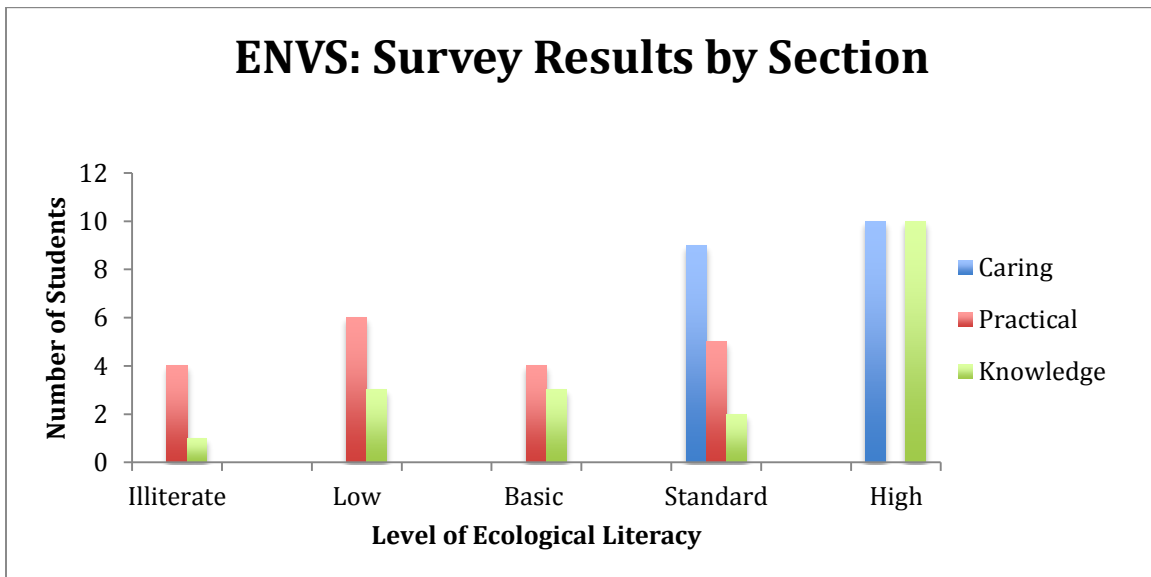


Figure 9 displays the levels of eco-literacy of ENVS students by category (i.e. *illiterate*, *low*, *basic*, *standard* and *high*) for each section (i.e. *Caring*, *Practical Competency* and *Knowledge*). The graph demonstrates the number of ENVS students who met the level of literacy for each section.

Figure 9. Survey results by section for ENVS students.



Figures 10, 11 and 12 display the raw data results of each section for ENVS. The x-axis represents the number assigned to each question in the survey (Appendix 2). The results of *Section One: Caring* (Figure 10) demonstrate that students either strongly agreed or agreed with the questions. Similarly, Figure 11 displays that the majority of ENVS students agree or strongly agree with the questions in the *Practical Competency* section. However, a high number of students disagreed with Question 4 and 7 in *Practical Competency*. Overall, the 19 ENVS students scored a high level of eco-literacy in *Caring* and *Practical Competency*.

Figure 10. Raw survey results from *Section One: Caring* for ENVS students.

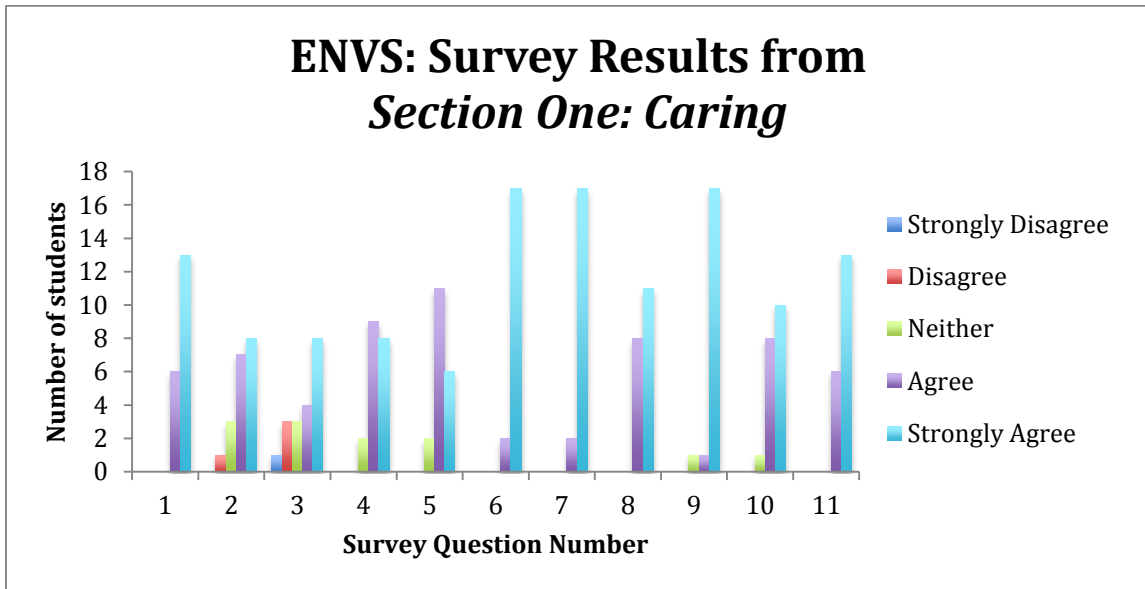
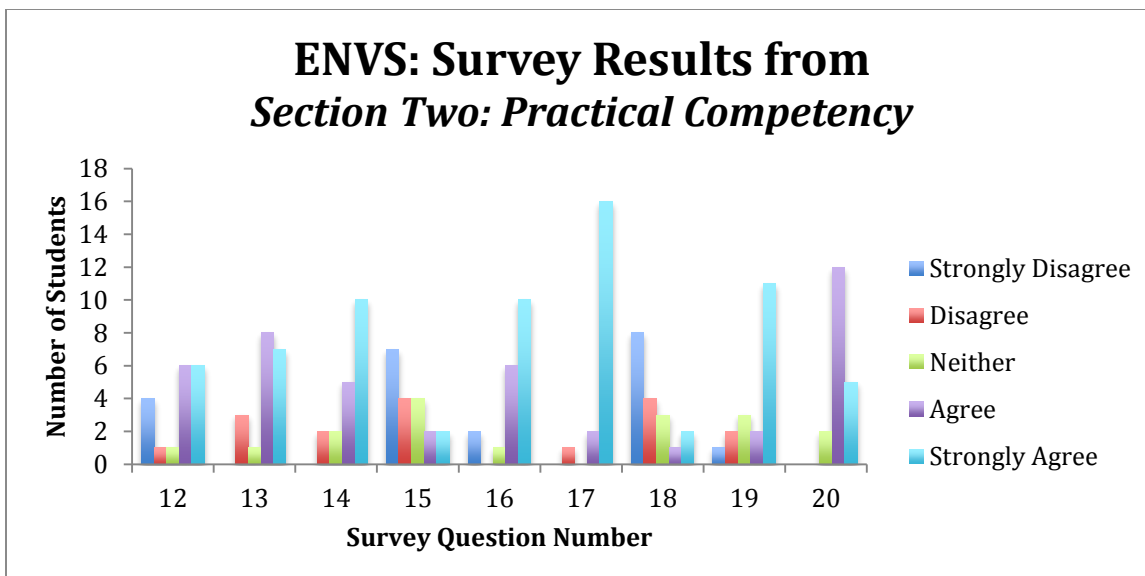
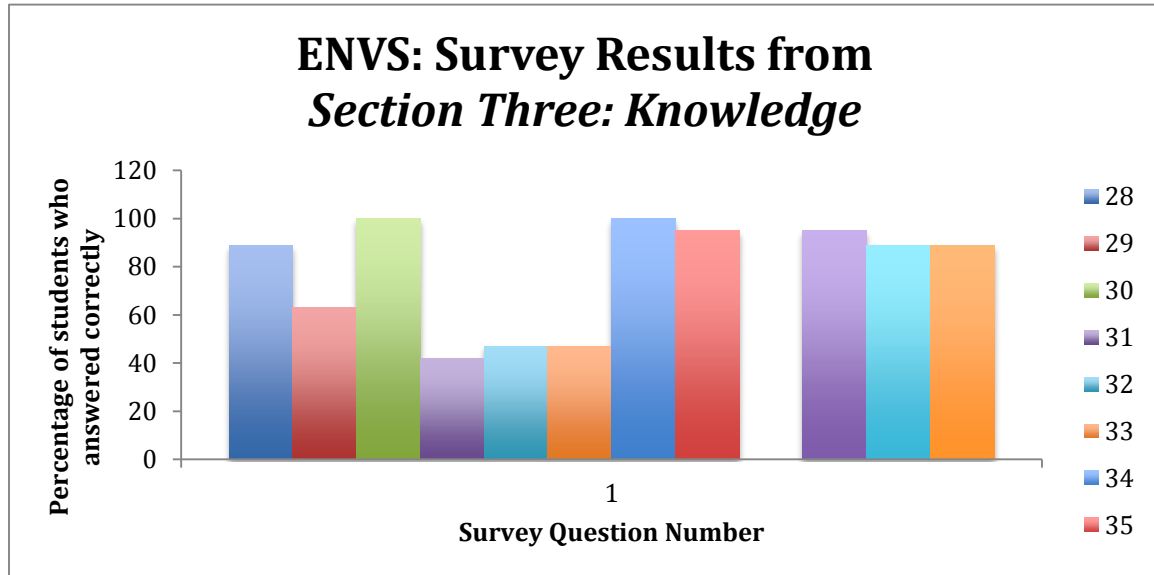


Figure 11. Raw survey results from *Section Two: Practical Competency* for ENVS students.



ENVS students scored above 60% on all questions in *Section Three: Knowledge* except for Questions 31, 32, 33 and 35, which scored below 40%. All students in the sampling frame answered Questions 30 and 34 correctly. The average number of questions answered correctly is 8.79 out of 11, or 80%.

Figure 12. Raw survey results from *Section Three: Knowledge* for ENVS students.



5.0 Discussion

The ultimate goal of the study was to establish a baseline of data by assessing the eco-literacy of students in fourth year or above in two environment-related disciplines at the university level. The study provides preliminary data for institutes of higher education to assess the literacy of their students. The results may provide impetus for these institutions to address the discrepancies in the education system with respect to eco-literacy.

5.1 ESS Discussion

Orr (2002) argues that it is unacceptable for students to graduate from a post-secondary institution without a strong concept of eco-literacy. Based on the results of our research study, more than three fourths of the ESS population has a degree of ecological literacy. Approximately 70% of the population received a *standard* or *high* eco-literacy score. These statistics indicate that the majority of ESS students are considered ecologically literate and possess strong levels of care, practical competency and knowledge for the environment (McGinn, 2014).

Survey Question Analysis

For *Section Two: Practical Competency*, Question 22 asked respondents to state their agreement or disagreement with the following statement on a Likert scale: *I have organized students to work on a campus, local or global environmental issue* (Appendix 2). The question generated a mix of responses. We suspect that this is due to the fact that actively engaging the student community in a campus, local or global event depends on how strong an issue resonates with the individual. The act of participating in an event is equally as important as organizing an event; however, Question 22 did not account for participation. Additionally, Question 25 asked respondents whether they agree or disagree with the statement: *I turn the water off while soaping in the shower* (Appendix 2). The responses had a high rate of disagreement. Question 25 may have received a high rate of disagreement for the reason that is more desirable to have the water running while soaping in the shower.

There were two questions in *Section Three: Knowledge* where ESS students failed to obtain a score above 60%. For instance, only 16% of the sample population answered Question 31 correctly. The question asked participants: *How many degrees has the average surface temperature of the earth warmed since the Industrial Revolution?* (Appendix 2). A total of 51% of the population assumed the correct answer was 2 degrees Celsius. The correct answer is, in fact, 0.85 degrees Celsius (Appendix 3). The high rate of incorrect responses for Question 31 may be due to the fact that scientific research often publishes predictions for implications of warming between 1 and 4 degrees Celsius (IPCC, 2007). Furthermore, Question 33 asked respondents to choose the most correct step in restoring a healthy park ecosystem (Appendix 2). Only 46% of the population answered it correctly. The relevant research states that the most effective way to restore a healthy ecosystem is to remove the deer from the park (Georgia Department of Natural Resources, 2015). However, there are different methods to restoring a healthy park ecosystem. Our assumption for the high rate of failure is that Question 33 was too subjective in nature.

5.2 ENVIS Discussion

Out of the 19 ENVIS students surveyed, 79% have a degree of ecological literacy. Only 63% of these students have a *standard* or *high* level of ecological literacy. These results infer that there is room for improvement to achieve higher literacy scores within the ENVIS sample population.

Survey Question Analysis

For the *Practical Competency* section, all participants agreed or strongly agreed with the questions except for Questions 22 and 25. Question 22 does not account for participation as a form of leadership. Moreover, Question 25 generated a mix of responses based on the preference of having the water running while soaping in the shower.

For the *Knowledge* section, three questions had more than half of the 19 students answer incorrectly. Question 31, 32 and 33 had 57% of the students answer incorrectly. Although these results cannot be generalized for the entire ENVS population at Dalhousie University, it demonstrates that there is still significant room for improvement in the program to ensure all students receive extensive eco-literacy education.

6.0 Conclusion

6.1 Recommendations for Action

Our research study suggests it is imperative that Dalhousie University further investigates their initiatives in eco-literacy. Approximately 15% of the ESS population is considered ecologically illiterate. Moreover, 21% of the 19 ENVS participants are considered illiterate. Yet, it remains uncertain as to why these students in environment-related studies scored below 60% in at least one of three sections.

With this new knowledge of eco-literacy, the university must seek methods of achieving a higher rate of literacy in these respective programs. More specifically, the university could address these discrepancies by implementing a new mandatory course that teaches its students how to effectively transform environment-related knowledge into action (Hsu, 2004). A course specifically designed to increase eco-literacy will add credibility to the university as a participating institution in the on-going sustainability movement in North America.

6.2 Recommendations for Further Research

Our research study provided a baseline of data for the eco-literacy of fourth year and above ESS and ENVS students at Dalhousie University. It is important to note that further research in the field of eco-literacy is necessary to advance efforts in environmental education at the institution. For instance, the study did not provide any insight as to what motivated students in choosing their answers. A study that identifies the motivations of students could help efforts to increase eco-literacy education at the institution. Secondly, our research study only collected short-term data of fourth year and above students in environment-related disciplines. A longitudinal study that follows students in ESS and ENVS from their first to final year could be beneficial to analyze their eco-literacy over the course of their entire undergraduate education. Thirdly, the results are limited to ENVS and ESS disciplinary studies at Dalhousie University. Research into faculties aside from environment-related faculties could identify the discrepancies in eco-literacy across disciplines of study and help to build a more comprehensive environmental education program. Fourthly, it can be determined through additional research if an exposure to nature prior to post-secondary education plays a role in the decision to pursue environment-related studies (McGinn, 2014).

Although the vast majority of students in ESS and the 19 ENVS participants are considered ecologically literate, our research study demonstrated that there is room for improvement in the ESS program, specifically in terms of eco-literacy. It is in the best interest of Dalhousie University to pursue further efforts to increase eco-literacy as a supplement to environmental education. A more holistic environmental education effort on part of the university will equip students with a proper education to make an effective contribution to society post-graduation.

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Recruiting Survey Participants

Hello,

We are conducting research study for a senior level undergraduate class at Dalhousie University. The primary focus of the study is to help determine what students know about the environment and sustainability. Would you be willing to take five minutes to answer our short survey? This is not a test. Your results will be anonymous (i.e. your name will never be known by our research team). The aggregate results from our study will be made publicly available upon completion of the project in April 2015.

Survey Questionnaire

1. What is your gender?
 - a. Male
 - b. Female
 - c. Intersex

 2. Are you in Environment, Sustainability & Society (ESS)? If so, please circle the option that is applicable to you.
 - a. Subject A
 - b. Subject B

 3. Are you in Environmental Science (ENVS)? If so, please circle the option that is applicable to you.
 - a. Minor
 - b. Major

 4. If you are enrolled in a combined degree, what is your second major or minor?
-

Please read the following statements carefully and circle the number that best corresponds with your opinion on the statement.

Sub-section 1: Caring	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
6. I feel a responsibility to reduce the impact I make on the environment.	1	2	3	4	5
7. One person’s actions do not make a difference when it comes to environmental issues.	1	2	3	4	5
8. Fines ought to be charged to people who litter in public places.	1	2	3	4	5
9. It is possible to improve environmental, social and economic problems in the world simultaneously.	1	2	3	4	5
10. Electricity should be produced by renewable energy in order to move away from fossil fuel energy.	1	2	3	4	5
11. Electricity should be produced by renewable energy in order to move away from fossil fuel energy, even if it increases current energy costs.	1	2	3	4	5
12. Industries should be required to prove that they safely dispose of hazardous waste materials.	1	2	3	4	5
13. Factory emissions should be regulated.	1	2	3	4	5
14. Factory emissions should be regulated even if it increases the price of products.	1	2	3	4	5
15. To reduce waste, the use of plastic packaging should be kept to a minimum.	1	2	3	4	5
16. It concerns me when energy is wasted through the unnecessary use of electrical appliances.	1	2	3	4	5
17. It concerns me when people leave the tap water running unnecessarily.	1	2	3	4	5

Please read the following statements carefully and circle the number that best corresponds with your opinion on the statement.

Sub-section 2: Practical Competency	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
19. In the past 4 years, I have worked/volunteered with an organization on an environmental issue.	1	2	3	4	5
20. When I finish using an item that can be recycled, I carry it with me until I find a recycling bin.	1	2	3	4	5
21. I separate recyclable items from items that go to the landfill.	1	2	3	4	5
22. I have organized students to work on a campus, local or global environmental issue.	1	2	3	4	5
23. I walk, bus, bike or carpool instead of driving a personal vehicle when possible.	1	2	3	4	5
24. I shut the lights off when I leave a room.	1	2	3	4	5
25. I turn the water off while soaping in the shower.	1	2	3	4	5
26. I use a reusable water bottle and coffee cup.	1	2	3	4	5
27. I inform myself about local, state, national or global issues related to the environment.	1	2	3	4	5

Please select the best answer for each of the following questions.

Sub-section 3: Knowledge	
28. On a human timescale, which of the following is a renewable resource? a. Coal b. Gasoline c. Iron ore d. Timber	34. What does the ozone layer protect us from? a. Acid rain b. Global warming c. Harmful, cancer-causing solar radiation d. Sudden changes in temperature
29. What is the international agreement that attempted to regulate the amount of greenhouse gasses that nations produce? a. The Kyoto Protocol b. The Montreal Protocol c. The Basel Convention d. I do not know	35. Burning fuel in Pennsylvania to heat homes, operate cars and produce electricity contributes to air pollution: a. Only in the city where it is burned b. Throughout Pennsylvania c. Globally d. Not at all
30. Approximately what percent of the earth's water is available as fresh drinking water? a. More than 90% b. Around 45% c. Around 20% d. Less than 3%	36. Where does most of the garbage in the United States end up? a. In the oceans b. Disposed of through incinerators c. At recycling centers
	37. What is one qualification of USDA certified organic produce? a. It is grown locally b. It is grown in high quality soils c. It is grown without the use of pesticides d. It is grown at a small farm

31. How many degrees has the average surface temperature of the earth warmed since the industrial revolution?

- a. 10°C
- b. 5.5°C
- c. 2°C
- d. 0.85°C

32. For the person to get the most energy out of 100lbs of vegetables and grain, the person should:

- a. Eat vegetables and grains
- b. Feed the vegetables and grain to an animal and eat the meat
- c. Feed the vegetables and grain to a cow to produce milk and drink the milk
- d. Feed the vegetables and grain to a cow to produce milk, feed the milk to an animal and eat the meat

33. Deer have no natural predators in a park and rangers observe deer eating all the same plants in the park. One step to restoring a healthy ecosystem is to:

- a. Decrease the number of deer in the park
- b. Bring in extra food for the deer
- c. Introduce additional plant species
- d. Take no action

38. DDT, a toxic chemical, can be found in very low levels in Great Lake waters. Small shellfish that live in the water consume DDT. Which species will have the highest level of DDT in its body?

- a. The grasses that house the shellfish
- b. The shellfish
- c. The fish that eat the shellfish
- d. Birds that eat the fish

39. What is a watershed?

- a. The area of land where all of the water that is under it or drains off it goes into the same place
- b. A region with a wet climate for the majority of the year
- c. Water that is stored underground
- d. The name for the largest river in the area

Thank you for participating. If you have any questions, please contact hl266668@dal.ca. Additionally, you can contact Professor Tara Wright in the Environmental Science department at Tara.Wright@dal.ca. We appreciate your cooperation.

Answer Key

1. What is your gender?
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14. Factory emissions should be regulated even if it increases the price of products.	1	2	3	4	5
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26. I use a reusable water bottle and coffee cup.	1	2	3	4	5
27. I inform myself about local, state, national or global issues related to the environment.	1	2	3	4	5

Please select the best answer for each of the following questions.

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	37. What is one qualification of USDA certified organic produce? a. It is grown locally b. It is grown in high quality soils c. It is grown without the use of pesticides d. It is grown at a small farm

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- c. 2°C
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- c. Feed the vegetables and grain to a cow to produce milk and drink the milk
- d. Feed the vegetables and grain to a cow to produce milk, feed the milk to an animal and eat the meat

33. Deer have no natural predators in a park and rangers observe deer eating all the same plants in the park. One step to restoring a healthy ecosystem is to:

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- c. Water that is stored underground
- d. The name for the largest river in the area

Thank you for participating. If you have any questions, please contact hl266668@dal.ca. Additionally, you can contact Professor Tara Wright in the Environmental Science department at Tara.Wright@dal.ca. We appreciate your cooperation.

Letter of Appreciation to Survey Participants

Dear Participant,

The Environmental Literacy Research Group would like to thank you for your participation in our environmental literacy research project. We appreciate you taking the time to fill out our survey. Your input is greatly valued.

If you have any questions about the project, please do not hesitate to contact sasha.barnard@dal.ca. We would appreciate your feedback regarding the survey.

Sincerely,

SUST/ENVS 3502 Environmental Literacy Research Group

DSUSO Funding Application A

Applications from Individuals Totaling \$50 or Less



The DSUSO Green Initiatives fund is designed to empower Dalhousie students who pay DSU levy fees to pursue projects and opportunities that benefit the greater Dalhousie Community. While the DSUSO seeks to fund as many projects as possible, priority will be given to applications that prove the greatest overall benefit to the applicant. These benefits include, but are not limited to: personal growth; inclusion of others; environmental and social benefits; and community engagement.

Name of student grant:

Olivia Afergood in collaboration with Sasha Barnard, Hillary DeWildt, Sarah Wight and Le Liu

Student Information:

Student Number: B0056998

Mailing Address: ol411162@dal.ca

Phone Number: 403.680.1164

E-mail Address: ol411162@dal.ca

Total Amount Requested: 50\$

Our research group for ENVS 3502 is requesting 50\$ total which will be divided up into five \$10.00 gift cards for randomly selected participants in our study. The purpose of this is to help incentivize students to participate in our study. We are not requesting any additional funding from any other organization on campus.

Project Description and Reasoning:

Our study aims to gain an understanding of the environmental literacy of undergraduate students at Dalhousie University. In order to complete this task, we will be sampling 200 random undergraduate students and collecting data from them using surveys and interviews. This research was motivated by an evident gap in the existing methods of environmental education at Dalhousie University.

DSUSO seeks to educate students and increase awareness about on-going sustainability issues which is why we feel that our research study fits in with DSUSOs mandate and values. We seek insight into the level of environmental literacy that undergraduates have so that in the future, university curriculums may be improved to include environmental education for a wide range of undergraduates. We believe that DSUSO has many of the same goals and hopes that we do, one of which is for Dalhousie University to be a leader in sustainability and produce more environmentally literate graduates. In order for this to be accomplished, further research must be conducted and for this we need the help of DSUSO through the means of funding.

Additional Benefits:

By participating in the study, undergraduates are contributing to research that could potentially change the methods in which the university educates students. Upon completing the study, undergraduate students may feel compelled to learn more about environmental literacy and seek programs and societies at Dalhousie that practice environmental sustainability. Based on the outcome of the study, the university may need to reevaluate education practices in release graduates with solid foundation in environmental literacy.

Timeline:

Research Start Date: March 5th 2015

March 5-27th conduct research through student surveys

Research End Date: March 31st 2015

**ENVIRONMENTAL PROGRAMMES
FACULTY OF SCIENCE
DALHOUSIE UNIVERSITY**

**APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN
PARTICIPANTS
UNDERGRADUATE THESES AND IN NON-THESIS COURSE PROJECTS**

GENERAL INFORMATION

1. **Title of Project:** Student Body Benchmark Survey on Ecological Literacy

2. **Faculty Supervisor(s):** Tarah Wright
Department: Environmental Science
Ext: N/A
Email: Tarah.Wright@dal.ca

3. **Student Investigator(s):** Olivia Aftergood (Biology)
Sasha Barnard (Sustainability & International Development)
Hillary DeWildt (Community Design)
Sarah Wight (Sustainability & Spanish)
Le Liu (Environmental Science)
Contact Email: sasha.barnard@dal.ca

4. **Level of Project:** Non-thesis
Course Project: Undergraduate
Course and number: ENVS/ SUST 3502

5. **a. Indicate the anticipated commencement date for this project:** March 5th
b. Indicate the anticipated completion date for this project: March 31st

SUMMARY OF PROPOSED RESEARCH

1. Purpose and Rationale for Proposed Research

The purpose and objectives of the study is to determine the degree of ecological literacy of ESS and Environmental Science students in their fourth year at Dalhousie University. We will be conducting an in-person survey to test the degree of eco-literacy of Environmental Science and ESS students. An in-person survey was chosen as a research method to allow the researcher to generalize trends, opinions and attitudes in the population (Creswell, 2014). The target audience for the in-person survey is Dalhousie University student that are enrolled as either a Major or Double Major in ESS or Environmental Science.

2. Methodology/Procedures

a. *Which of the following procedures will be used? Provide a copy of all materials to be used in this study.*

- Survey(s) or questionnaire(s) (mail-back)
- Survey(s) or questionnaire(s) (in person)
- Computer-administered task(s) or survey(s)]
- Interview(s) (in person)
- Interview(s) (by telephone)
- Focus group(s)
- Audio taping
- Videotaping
- Analysis of secondary data (no involvement with human participants)
- Unobtrusive observations
- Other, specify _____

b. *Provide a brief, sequential description of the procedures to be used in this study. For studies involving multiple procedures or sessions, the use of a flow chart is recommended.*

We will be conducting an in-person survey to test the degree of eco-literacy of Environmental Science and ESS students. An in-person survey was chosen as a research method to allow the researcher to generalize trends, opinions and attitudes in the population (Creswell, 2014). The target audience for the in-person survey is Dalhousie University student that are enrolled as either a Major or Double Major in ESS or Environmental Science. The survey will be administered face-to-face to allow the researcher to clarify any questions or misunderstandings posed by the audience (Creswell, 2014). Our study includes probabilistic and snowball sampling.

The survey that will be used in this study has been tested multiple times, the researcher Anna McGinn originally used this survey to test the eco-literacy of first year college students.

3. Participants Involved in the Study

a. *Indicate who will be recruited as potential participants in this study.*

- Dalhousie Participants: Undergraduate students
 Graduate students
 Faculty and/or staff
- Non-Dal Participants: Children
 Adolescents
 Adults
 Seniors
 Persons in Institutional Settings
 Other (specify) _____

b. *Describe the potential participants in this study including group affiliation, gender, age range and any other special characteristics. If only one gender is to be recruited, provide a justification for this.*

Participants for this study will be Dalhousie undergraduate students in their fourth year (major and double major) in ENVS and SUST. Both male and female information will be included in this study.

c. *How many participants are expected to be involved in this study?* 85

4. Recruitment Process and Study Location

a. *From what source(s) will the potential participants be recruited?*

- Dalhousie University undergraduate and/or graduate classes
 Other Dalhousie sources (specify): At events put on by ENVS Societies such as EPSS (Environmental Programs Student Society and YESS (Your Environmental Sustainability Society)
 Local School Boards
 Halifax Community
 Agencies
 Businesses, Industries, Professions
 Health care settings, nursing homes, correctional facilities, etc.
 Other, specify (e.g. mailing lists) _____

b. *Identify who will recruit potential participants and describe the recruitment process.*

Provide a copy of any materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts).

The research team will actively seek out fourth year ESS and Environmental Students by approaching designated classes (Honors Thesis Class, ENVS 3502, ENVS 4003, SUST 4950). Furthermore, snowballing technique of targeting the specific audience will be used to obtain the probabilistic sample. The research team will also attend events held by the environmental societies such as EPSS and YESS in order to gain participants for the study.

5. Compensation of Participants

Will participants receive compensation (financial or otherwise) for participation?

Yes
No

If **Yes**, provide details: Five participants will be selected at random and receive a \$10.00 gift card for their participation in the study. Candy (chocolate bars) will also be given to those who take the survey.

6. Feedback to Participants

Briefly describe the plans for provision of feedback and attach a copy of the feedback letter to be used.

Wherever possible, written feedback should be provided to study participants including a statement of appreciation, details about the purpose and predictions of the study, contact information for the researchers, and the ethics review and clearance statement. If students wish to have a copy of the final report they may put their name on an email list provided and the report will be sent to them at the conclusion of the study.

Students will be thanked in person after they finish filling out the survey and will be given a chocolate bar.

POTENTIAL BENEFITS FROM THE STUDY

- 1. Identify and describe any known or anticipated direct benefits to the participants from their involvement in the project.**

Fourth year students who participate in the study will gain a better understanding of their own eco-literacy. As fourth year students they have had time to fully develop eco-literacy through their studies and can then reflect on the effectiveness of their program in creating ecologically literate students. The personal reflection that this study provokes could have benefits to participants.

- 2. Identify and describe any known or anticipated benefits to society from this study.**

This study does not have any immediately known benefits. All benefits will be a result of the actions of graduated students pursuing actions that support ecological literacy; these benefits cannot be known or sufficiently studied by the researchers.

POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY

- 1. For each procedure used in this study, provide a description of any known or anticipated risks/stressors to the participants. Consider physiological, psychological, emotional, social, economic, legal, etc. risks/stressors**

No known or anticipated risks

Minimal risk

Anonymity of students will be protected. Surveys are low risk and low stress and students can always decide not to fill out the survey. Overall, for most, the study will be low stress and low risk.

Greater than minimal risk

- 2. Describe the procedures or safeguards in place to protect the physical and psychological health of the participants in light of the risks/stresses identified in Question 1.**

Participants will be made aware that they may stop at any time at which they feel uncomfortable. All researchers will be sensitive to the emotions of participants and will ensure participants that their personal information will not be shared publicly.

INFORMED CONSENT PROCESS

Refer to: <http://pre.ethics.gc.ca/english/policystatement/section2.cfm>

1. What process will be used to inform the potential participants about the study details and to obtain their consent for participation?

- Information letter with written consent form; provide a copy
- Information letter with verbal consent; provide a copy
- Information/cover letter; provide a copy
- Other (specify):

2. If written consent cannot be obtained from the potential participants, provide a justification.

ANONYMITY OF PARTICIPANTS AND CONFIDENTIALITY OF DATA

1. Explain the procedures to be used to ensure anonymity of participants and confidentiality of data both during the research and in the release of the findings.

To ensure confidentiality, no names will be given in reference to the study. Furthermore, no individual surveys will be published. Information will instead be analyzed in a frequency table in order to get an overall idea of undergraduate eco-literacy.

2. Describe the procedures for securing written records, questionnaires, video/audio tapes and electronic data, etc.

Information gathered will not be for use outside of this study. Video/audio recordings will not be necessary. Raw electronic and paper data will not be made available to anyone outside the research group.

3. Indicate how long the data will be securely stored, the storage location, and the method to be used for final disposition of the data.

- Paper Records
- Confidential shredding after: **April 2015**
- Data will be retained indefinitely in a secure location
- Data will be retained until completion of specific course.

- Audio/Video Recordings
- Erasing of audio/video tapes after _____ years
- Data will be retained indefinitely in a secure location
- Data will be retained until completion of specific course.

- Electronic Data
- Erasing of electronic data after **April 2015**
- Data will be retained indefinitely in a secure location
- Data will be retained until completion of specific course.

All paper and electronic data will be disposed of following the completion of the study. All information will be held in a secure location and only made available to researchers and group mentors.

Specify storage location: Secure folder on the researcher’s computer.

ATTACHMENTS

Please **check** below all appendices that are attached as part of your application package:

- Recruitment Materials:** A copy of any poster(s), flyer(s), advertisement(s), letter(s), telephone or other verbal script(s) used to recruit/gain access to participants.
- Information Letter and Consent Form(s).** Used in studies involving interaction with participants (e.g. interviews, testing, etc.)
- Information/Cover Letter(s).** Used in studies involving surveys or questionnaires.
- Parent Information Letter and Permission Form for studies involving minors.
- Materials.** A copy of all survey(s), questionnaire(s), interview questions, interview themes/sample questions for open-ended interviews, focus group questions, or any standardized tests used to collect data.

SIGNATURES OF RESEARCHERS	
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date
_____ Signature of Student Investigator(s)	_____ Date

FOR ENVIRONMENTAL PROGRAMMES USE ONLY:

Ethics proposal been checked for eligibility according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans