E-Waste and Battery Recycling at Dalhousie University

Final Report

ENVS/SUST 3502

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Executive Summary

The amount of electronic waste that is disposed of in landfills continues to grow each year. Due to high levels of environmental contamination, the collection and proper recycling of electronic waste is of utmost importance for protecting human health and environmental integrity. Dalhousie University is a large research intensive post-secondary institution in Atlantic Canada with over 17,000 students, most of whom regularly use electronics for communication and learning. While there is currently an electronics recycling program for faculty and staff there is no system in place for students. Based on our research results, there is substantial room for improvements in the areas of student recycling awareness and a desire for an electronics recycling program for students. We recommend that Dalhousie University take action to raise recycling awareness and environmental literacy among the student body, and initiate a more inclusive, convenient, and effective program.

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1.0 Introduction

The production of electronics is the world's largest and fastest growing manufacturing industry, with the most rapidly expanding stream of waste in the industrial world (Wath et al., 2011). Electronic waste (e-waste) includes discarded computers, televisions, cell phones, MP3 players, for the purpose of this research project batteries and cell phones, as well as other forms of electronic appliances considered obsolete, broken or in need of replacement (Wath et al., 2011). E-waste is of environmental and human health concern due to the high composition of heavy metals, plastics, chlorofluorocarbons, flame-retardants, and other hazardous compounds (Srivastava et al., 2011; Wath et al., 2011). Examinations of soil, water, and air in the vicinity of waste-management facilities which handle e-waste have demonstrated extreme cases of harmful pollution including heavy metal contamination and the release of toxic chemicals in the form of persistent organic compounds and polychlorinated biphenyls (PCBs) (Tang et al., 2010).

The amount of e-waste that is disposed of in landfills continues to grow each year. In Canada, a 2008 analysis of e-waste recycling practices show a significant lack of data, with many provinces having only one or no facilities for recycling. A 2010 prediction estimated that Canada would produce 91,000 tonnes of e-waste in that year, with computer and computer monitors accounting for over 70% of that amount (Mitrasinovic et al., 2011). Due to high levels of environmental contamination and the growing amounts of e-waste, the collection and proper recycling of electronic waste is of utmost importance for protecting human health and environmental integrity.

Dalhousie University began collecting discarded batteries in special bins in 1998 and by 2008 over 12 tonnes had been accumulated for recycling (Facilities Management, n.d). In 2012, 22 bin locations were available to students and staff throughout the three campuses in Halifax. Starting in 2008, Facilities Management also began the collection of electronic waste, including computers and monitors, fax machines, and scanners. The Electronics Recycling Program, however, is currently open to faculty and staff only, and requires the submission of a pick-up form (Facilities Management, n.d.). Several student projects in the past have looked at general waste-management practices at Dalhousie University and the level of awareness for recycling possibilities. In 2006, only 35% of the respondents of a student survey were aware of battery

recycling on campus. Only 1% reported to regularly recycle batteries on campus (Brooks et al., 2006).

In 2010, another campus survey found that only about 60% of students believed batteries could be properly recycled, indicating that a substantial 40% of the student population are unaware of the very possibility of recycling their batteries (Heathcote et al., 2010). Although these studies also indicate that awareness of battery recycling is generally increasing within the student body, students and faculty need to be more aware of recycling possibilities on campus.

1.1 Objectives

The objective of this project is to gauge the current level of student awareness and involvement pertaining to e-waste recycling. Survey data was gathered to determine which types of electronics students purchase and how often, students' recycling habits, willingness to recycle, policy awareness, responsibilities, and general knowledge of current programs. The analysis of this information helps to outline the current status of Dalhousie University's e-waste recycling program. The data highlights areas in need of improvement in terms of student awareness and involvement, as well as provides a baseline for new, efficient, and targeted campus recycling initiatives.

2.0 Research Methods

Our research methods included literature and program reviews, a facilities tour at Studley Campus, and in-person interview with Rochelle Owen – Director of the Office of Sustainability, and online and in-person qualitative surveying of the student body. We chose to do a survey of the student body in order to attempt to gather a representative sample of student's electronics usage, knowledge of electronics recycling, and interest in having an e-waste recycling program at Dalhousie University. We decided to use surveys rather than interviews or focus groups because they are the easiest way to collect information on a large group of people.

2.1 Procedure

We began with online research regarding recycling programs in order to form an understanding of the current Dalhousie University e-waste recycling program and to learn about the recycling programs implemented by other North American universities. We searched for information regarding Dalhousie's Facilities Management run e-waste and battery recycling program, and attempted to find out information about the private business that operated e-waste drop boxes on campus. We then searched for information available about the e-waste strategies at eight Canadian universities (Saint Mary's University, McGill University, University of Waterloo, University of Toronto, Queen's University, University of Calgary, University of British Columbia, and University of Victoria) and a one American university (University of Indiana). Using information from their sustainability initiatives, we were able to compare the programs and results in order to make suggestions for Dalhousie University.

After not finding any information concerning the private recycling company at Dalhousie, we went on a campus tour in order to learn about the locations and accessibility of e-waste and battery recycling at Dalhousie. We searched the common areas of the Killam Library, the Goldberg Computer Science Building, the Weldon Law Building, and the Mona Campbell Building, and talked to front desk and custodial staff. A meeting with Rochelle Owen confirmed our online and observational findings. We also learned about the process and structure of the recycling system.

We composed a list of survey questions regarding student's electronics usage and recycling, and knowledge and interest in recycling programs (Appendix B). Surveys were

completed over two in-person surveying periods in three open locations on Studley Campus: the Atrium in the Killam Library, the lobby of the McCain Builidng, and the entrance of the Student Union Building. Students were approached randomly and asked to complete the survey. For the online survey we entered our survey questions into Dalhousie's Opinio program and sent the link to various student groups. We offered an incentive of a $50 prize for completing the survey. We got the most responses from the online surveys because it could reach a wider array of people than our in-person surveys.

2.2 Reliability and Validity

We collected in-person surveys and received online survey submissions in order to try to reach a broad range of students. The surveys were completely anonymously and with simple questions so there was likely no confusion or pressure to lie in order to protect personal information. We reached only a small portion of the student body and our sample was not completely random. Our survey research is most likely valid but not extremely reliable.

2.3 Limitations

There were a number of limitations concerning our research methods. These limitations include: a limited amount of time for surveying students, obtaining data from only a small proportion of the student body, limiting the number of questions on our survey in order to encourage student completion, in-person surveys completed on only one of Dalhousie's three campuses and in only three buildings, advertisements for the online survey reaching mostly students with interests in sustainability or environmental science.

Advertisements for the online survey were posted on Facebook, and sent to student societies and faculties. The information sent to faculties was only forwarded on to students if the faculty was concerned with sustainability or science. Campus wide advertisement for the online survey via Dal Sticky Notes was rejected due to the number of student survey requests that they receive. Due to these factors, the data collected is probably from people who are aware of recycling and sustainability initiatives so may be unrepresentative of the entire student body.

Our temporal limitations were two weeks for the completion of the online surveys, and only a few hours of in-person surveying. With an increased amount of time we may have been

able to obtain a more representative sample. We were limited spatially to the Studley campus and were not able to collect surveys or information from the Carlton or Sexton Campuses. We also limited the number of questions on the survey so that it would take only a few minutes; short enough for students to fully complete without being inconvenienced. Due to the limited amount of time in the semester, we were unable to develop an action plan for improvements to the current e-waste system for our client, the Dean of Law.

3.0 Survey Results

Online and in-person surveys were completed in order to obtain data on student's electronics usage and recycling habits as well as their knowledge and interest in recycling programs. The survey is available in Appendix B and will briefly be summarized in this section.

Questions 1 through 6 asked students about their electronics usage and disposal habits. We asked how often they purchase/replace electronics and batteries in order to understand what amount of electronics waste is likely to be created while a student is at university. We found that most students purchase computers, mobile devices, media devices, and other electronics approximately every 3-5 years (Figure 1). The majority of students recycle their batteries and e-waste, yet high numbers just throw their e-waste in the garbage.

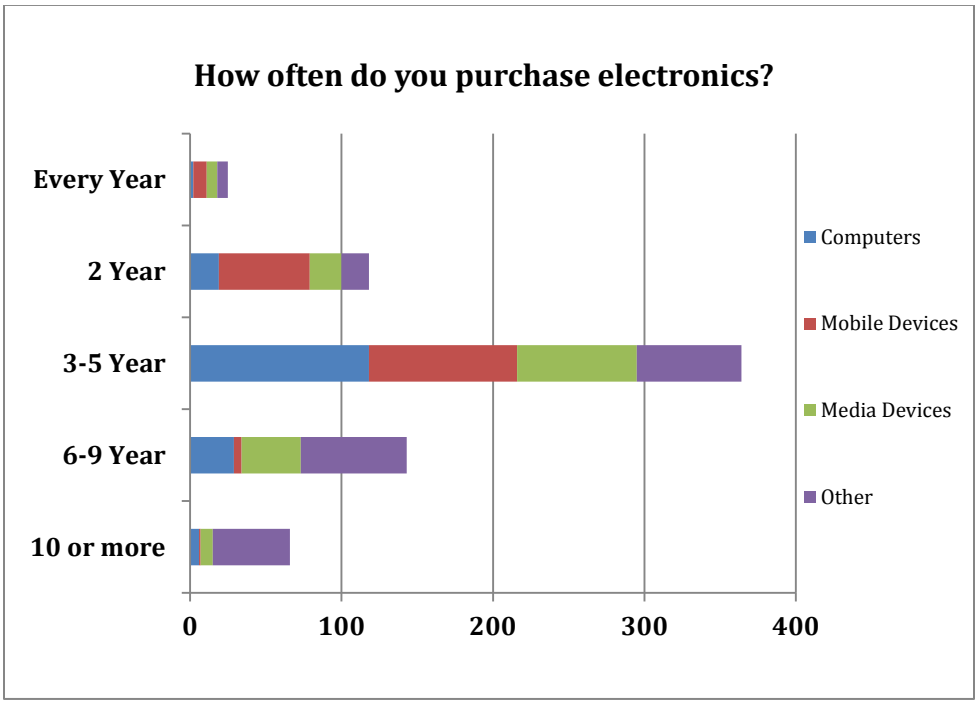

Figure 1: Visual representation of how often students purchase electronic devices.

Questions 7 through 10 asked about students knowledge of recycling programs. As clearly demonstrated below in Figure 2, most students did not know about Nova Scotian electronics recycling laws.

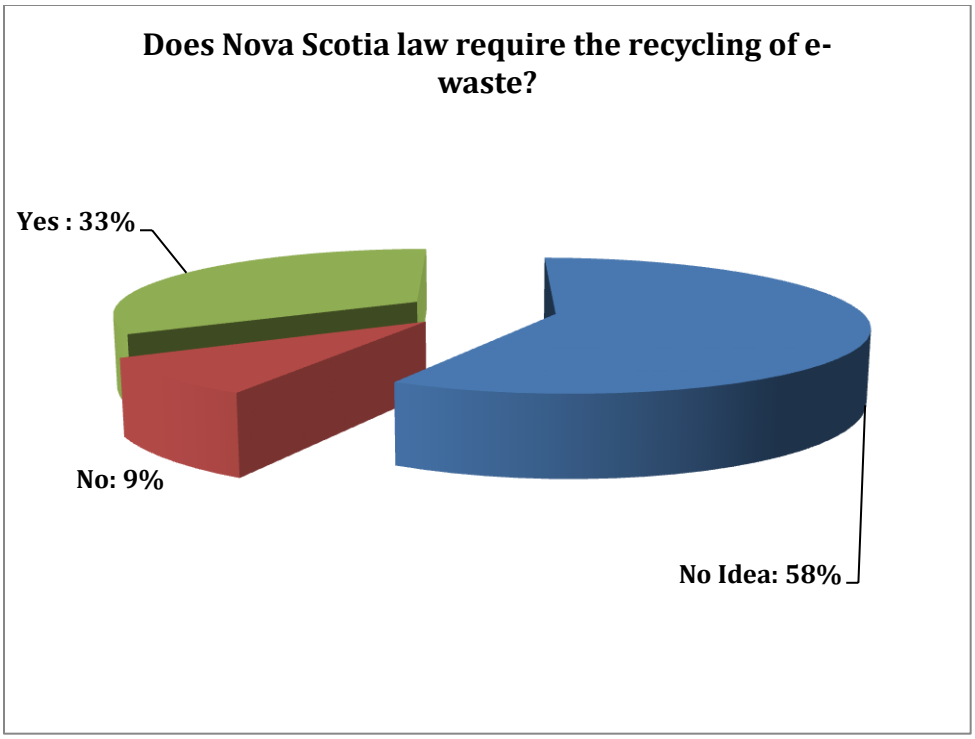

Figure 2: Student knowledge concerning Nova Scotian e-waste recycling laws.

Question 8 asked a very similar question to number 7; does Nova Scotia law require the recycling of batteries. Once again, the answers were almost the exact same as question 8. 57 students said yes, 18 said no and 99 said they had no idea.

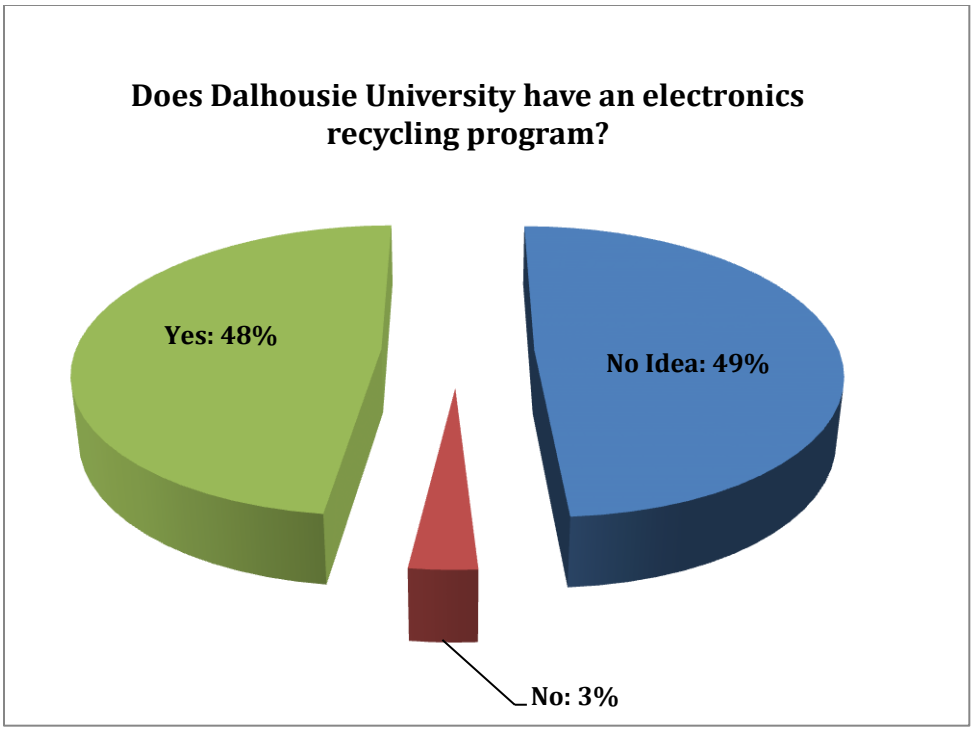

Figure 3: Student knowledge concerning the Dalhousie Facilities Management run electronics recycling program.

Questions 11 through 13 asked about interest in an e-waste recycling program at Dalhousie University. Figure 3 shows how far students would be willing to travel to recycle both their electronic and battery waste. The numbers for both battery and electronics are very similar. The highest majority of indicated they would be willing to travel to campus in order to

recycle their electronics.

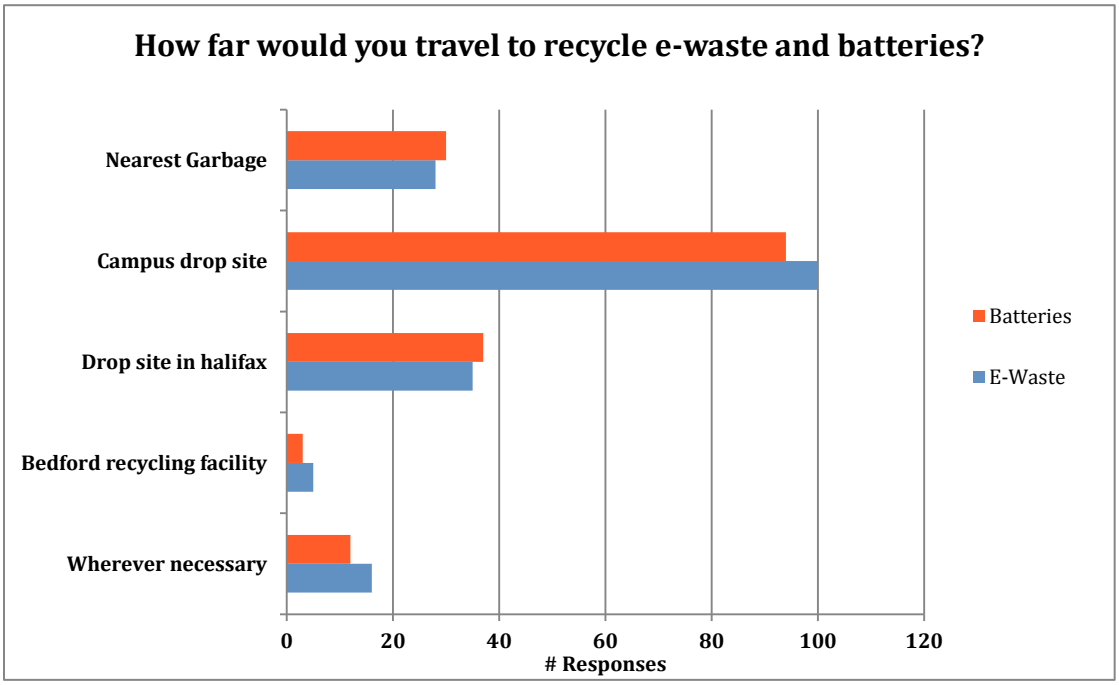

Figure 4: Distance students would be willing to travel in order to recycle e-waste and batteries.

4.0 Discussion

Dalhousie, among other universities is incorporating sustainability initiatives and environmental programs in order to help combat local and global issues. Since 2008, Dalhousie has implemented a program where faculty and staff can bring electronic waste and spent batteries, to a disposal/drop off for recycling. This is incredibly important in diverting waste from landfills. The purpose of this research paper is to understand how conscious students are of sustainable options for e-waste disposal. The Dean of Law at Dalhousie was the Client who decided this issue was worth researching and discussing. Other than understanding the student's consciousness of sustainable options for disposing of batteries and electronic waste, it is important to also research the programs offered at Dalhousie. With the research from Dalhousie's programs or lack there of, research from other Universities and organizations is important for comparison. Dean Brook's also wanted to make recommendations based on our research of students at Dalhousie, other universities, and Dalhousie programs in order to improve/create a program.

4.1 Findings

Our research of students at Dalhousie reached 175 students. Of those 175 students, 66 were conducted in person, and 109 responded online through Opinio (online survey software). As a group, we found that there were trends in the data that followed some of our assumptions. We assumed, that most students would be unaware of programs at Dalhousie based on our own experiences, and whether or not students were knowledgeable of the issue and supporting activities. We asked students how often they purchase new electronics. We thought it would be important to research how often people purchased electronics, as the more often you purchase a new item, the more waste is produced. Majority of the 175 students surveyed stated that they purchased new electronics every 3-5 years. In correlation to how often they purchase new electronics, we asked how they dispose of their e-waste. Surprisingly, majority said they keep old or broken electronics, and in a close second, recycle. The disposal method students used least was trash. As sustainability students, we were glad to see that most students were properly disposing of their e-waste. Our research however, showed that there was not much of a difference between disposal methods for batteries.

As part of our research we decided to also poll students about their knowledge about Nova Scotia e-waste laws and whether or not Dalhousie has an electronic recycling program. Not to our surprise, majority of students (58%) did not know that Nova Scotia law requires you to recycle electronic waste. The next question, whether Dalhousie offered a recycling program, 48% of students said yes and 49% said they had no idea. Not surprising, most students had no idea or felt that Dalhousie had no program. As students ourselves, we also had no idea of a program until conducting research. These findings are important because they directly correlate to the purpose of this research paper. The other two important findings came from the questions we asked about whether or not Dalhousie should have a program, and how far students would be willing to recycle their e-waste. We are glad to see that a huge majority of students felt Dalhousie should be responsible for a recycling program. A large majority also stated that they would be willing to travel to a campus drop off for e-waste. The success of the research shows that students, even though unaware of current programs, laws, or issues feel that a program should be available at Dalhousie.

Researching Dalhousie programs and other University programs was extremely important. We found that Dalhousie has a battery and electronic waste program, but unfortunately it is only for faculty and staff. These drop-off sites are for waste produced on campus and not intended for electronics and batteries from home. This program was enacted in 2008, and every year added more products to the list of acceptable items. Dalhousie also has a battery disposal drop-off for students, but does not include big electronic items. Previous research of students suggests that the program is not being utilized as many had no idea it exists. Other than Dalhousie programs, we researched what other Universities in North America are currently doing. St. Mary's University has set up a designated room for recycling electronic waste and batteries for students and faculty. This ensures that waste gets properly recycled without the added hassle of finding one of Nova Scotia's facilities. At the end of every year SMUES holds a "Dump and Run" where you can drop-off unwanted items keeping them from reaching landfills.

The University of Indiana has a program that accepts student and faculty electronic waste on campus. It is very similar to the other programs that are offered by universities across Canada, accept that it does a lot more to encourage and educate through their website. Indiana

University takes it one step further and sponsors **"**U South Bend E-Waste Recycling Fest". This is a two day event where businesses can come and drop off their unwanted electronics for recycling, and a day that is open for the public. In 2011, they filled 11 trailers with old electronics that weighed approximately 275,000 pounds. ("Centre for a," 2012)

The implications of the research in theory suggest that students want to be able to drop off electronics waste on campus. Even though students are not knowledgeable about current programs, the research suggests a program is wanted. Creating or improving programs at Dalhousie based on this research can have hidden costs. Programs that are expanded will increases costs for infrastructure and employees. However, programs at other universities are successful and are creating community efforts in e-waste recycling. We hypothesized that students would want a campus program that would allow them convenient access to proper disposal methods. There was no research that failed to support our hypothesis. We are extremely pleased with the results; however, the research was limited to a very small proportion of the student body.

5.0 Conclusions

Based on our survey results as outlined in the discussion of this report, we recommend that the responsible administrative divisions and departments representing Dalhousie University (Facilities Management, The Office of Sustainability, The School of Law, and others) incorporate our findings in future designs for a more efficient and accessible e-waste recycling program. The findings indicate substantial rooms for improvements in areas of student recycling awareness and responsibilities. We recommend that Dalhousie University take direct and immediate action to raise recycling awareness and environmental literacy among the student body. We propose that future amendments to the e-waste recycling program take advantage of our findings in designing a more inclusive, convenient, and effective program. Because of the limitations of this research, we recommend that further research be done on a larger scale. In order to fully understand the student body, a bigger sample size needs to be taken for results to be statistically accurate. Further research may investigate possible collaborations with public and private recycling partners, in order to augment and streamline a functional, closed-loop model of electronics material handling. Future research will also have to invest time in constructing an economical model and cost-benefit analysis of such an enhanced program.

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Appendix A – Ethics Proposal

ENVIRONMENTAL SCIENCE PROGRAM
FACULTY OF SCIENCE
DALHOUSIE UNIVERSITY
(version 2010)

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

GENERAL INFORMATION

1. Title of Project: Electronic Waste Management

2. Faculty Supervisor(s) Rochelle Owen
Department: Environmental Science/College of Sustainability
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ph: 1 902 494 7448

3. Student Investigator(s): Marcus Gezelius, Haley Williams, Madeleine Wilson, Colin Hristow, Ashley Childs
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e-mail: cl974117@dal.ca, hwilliams@live.ca, mr859217@dal.ca, md756526@dal.ca
ph: (647)-993-8695, (902)-225-9754, (808)-358-6430, (902)-880-5384, (902)-401-3269

4. Level of Project: Non-thesis Course Project [X] Undergraduate [X] Graduate [ ]
Specify course and number: 3502 ENVS/SUST Campus as a Living Lab

5. a. Indicate the anticipated commencement date for this project:
Preliminary research started in the later stages of January. Full commencement of the project started after our meeting with our client Kim Brooks on February 1st.

b. Indicate the anticipated completion date for this project:
13 April 2012

SUMMARY OF PROPOSED RESEARCH

1. Purpose and Rationale for Proposed Research: *Briefly describe the purpose (objectives) and rationale of the proposed project and include any hypothesis(es)/research questions to be investigated*

The main purpose of the project is to research whether there is a lack of student understanding concerning current e-waste and battery recycling programs at Dalhousie University. The project will also research interest in having e-waste recycling options available to students. This information will be used to make recommendations for improvements to the current e-waste and battery recycling programs. The research question(s) to be investigated are:

- How do students currently dispose of their electronic waste including desktop and laptop computers, printers, monitors, audio players, and non-cellular telephones?

- Are students aware of the Dalhousie University e-waste recycling program?
- How do students dispose of batteries?
- Are students aware of the Dalhousie battery recycling program?
- Would students utilize an on-campus e-waste recycling program?

Dalhousie University began collecting discarded batteries in special bins in 1998, and by 2008 over 12 tons had been accumulated for recycling (Facilities Management). In 2012, 22 bin locations were available to students and staff throughout the three campuses. Several student projects in the past have looked at general waste-management practices at Dalhousie, and the level of awareness for recycling possibilities. In 2006, only 35 % of the respondents of a student survey were aware of battery recycling on campus. Only 1 % reported to regularly recycle batteries on campus (Brooks et al., 2006). Starting in 2008, the Facilities Management also began collecting electronic waste, including computers and monitors, fax machines, and scanners. This "Electronics Recycling Program" however is currently open to faculty only and requires the submission of a pick-up form (Facilities Management). We will be conducting a survey of the student population in order to discover current levels of awareness and whether there is a need for improvements to the current system.

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

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.***

The project will include in-person surveying of the student body and an online survey accessible through Dal Sticky Notes and faculty list serves. The in-person survey will be conducted at various locations across the Dalhousie campuses in order to reach a broad variety of students. Survey locations will be in the main lobbies of the buildings and students will be approached at random to ensure that results are not biased. After completion of the survey, participants will have the opportunity to enter a separate draw for a fifty dollar prize. This incentive will be used to help increase the number of participants involved in the survey. The draw will be conducted separately from the survey in order to ensure the anonymity of data collection. The online survey will use the same questions as the in-person survey. Upon completion of the online survey, a link will be provided so that the participant can choose to enter their contact information for the draw. The data that is collected will be placed into an Excel

spread sheet to so that the data can be clearly organized for peers to review.

3. Participants Involved in the Study: ***Indicate who will be recruited as potential participants in this study***.

Dalhousie Participants:
[X] Undergraduate students
[X] Graduate students
[ ] Faculty and/or staff

Non-Dal Participants:
[ ] Adolescents
[ ] Adults
[ ] Seniors
[ ] Vulnerable population* (e.g. Nursing Homes, Correctional Facilities)

** Applicant will be required to submit ethics application to appropriate Dalhousie Research Ethics Board*

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***.

The potential participants in this study are students of Dalhousie University, both male and female genders, age 17 and older, who are either (a) willing to complete the in-person survey or (b) those who take it upon themselves to complete the online survey. Participants must agree to the use of the information in the research project and will be informed that all data is collected anonymously.

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

We expect to survey two hundred students in person and plan to reach a larger proportion of the student body with the online survey. Incentives to complete the survey should help us to reach our necessary number of participants. The students will be made aware that they are contributing to sustainability initiative on campus in addition to an opportunity to win a fifty dollar prize. As the survey will take approximately five to ten minutes to complete, the opportunity to win fifty dollars may be a good investment of time.

4. Recruitment Process and Study Location
a. ***From what source(s) will the potential participants be recruited?***
[X] Dalhousie University undergraduate and/or graduate classes
[X] Other Dalhousie sources (specify) Dal online
[ ] Local School Boards*
[ ] Halifax Community
[ ] Agencies
[ ] Businesses, Industries, Professions
[ ] Health care settings*
[ ] Other, specify (e.g. mailing lists) _____ *
Applicant may also require ethics approval from relevant authority, e.g. school board, hospital administration, etc.

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 in the appendices section.

The members of the e-waste management project will be the ones recruiting the potential study participants from the Dalhousie student population. For the in person survey, group members will stand at a busy location and ask students to answer some questions. The members who will be administering the survey in person will be Colin Hristow, Haley Williams, Marcus Gezelius, Madeleine Wilson, and Ashley Childs. The online survey will be made available to all students via the internet.

5. Compensation of Participants*:* Will participants receive compensation (financial or otherwise) for participation?
Yes [X] No [ ] If **Yes**, provide details:
The participants who complete survey have the potential to be compensated with a fifty dollar prize that is drawn using contact information we have acquired separately from the survey for the sole purpose of the draw.

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. Note: When available, a copy of an executive summary of the study outcomes also should be provided to participants.

There will be a section at the end of the online survey asking of the participant is interested in finding out our data. If they indicate interest, we will email them our results. Participants will be informed that the final report will be available online.

POTENTIAL BENEFITS FROM THE STUDY

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

Anticipated benefits to the participants from their involvement in this project are the potential to raise awareness of sustainability issues and electronic e-waste recycling. We hope to use this data to develop a program or plan of action to raise awareness among students who attend Dalhousie, and the potential to create an e-waste disposal program in the future.

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

The anticipated benefits to society include increased awareness of e-waste recycling within Halifax. Future benefits may include the sharing of knowledge between universities and communities abroad.

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 and burdens.**
   [ ] No known or anticipated risks Explain why no risks are anticipated:

[ ] Minimal risk * Description of risks:
[X] Greater than minimal risk** Description of risks:

As with any new project there is some risk associated with it. However, there should be no real stressor or risk put on participants by taking part in the survey part of this study. The study will not take a lot of time and should not have an impact on someone's schedule, therefore having no real effect on the participant. They also have the ability to decline the survey, therefore if a risk or stressor should affect them then they have the right to decline.

***** *This is the level of risk associated with everyday life. ** This level of risk will require ethics review by appropriate Dalhousie Research Ethics Board*

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.

The procedures or safe guards in place to protect the physical and psychological health of participants are the ability to decline to participate in the survey, as well as having data collected anonymously.

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
[X] Other (specify)

The in person survey will require a signature to ensure participants consent to the information being used in the research process. The signature will be removed from the survey and destroyed before the data is used. For the online survey, participants will be asked to click on a link titled AGREE if they consent to having their answers used in the research.

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.**

   Personal information will not be collected during the in-person survey. After completion of the on-line survey, participants will have the opportunity to submit their contact information for use in the draw. The contact information will be collected separately from the survey questions in order to maintain confidentiality.

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

   All surveys will be completely removed/destroyed once used.

4. **Indicate how long the data will be securely stored as well as the storage location over the duration of the study. Also indicate the method to be used for final disposition of the data.**

[X] Paper Records Will be destroyed after the project is completed (April 13, 2012)

[X] Confidential shredding after April 13, 2012
[ ] Data will be retained until completion of specific course.
[ ] Audio/Video Recordings
[ ] Erasing of audio/video tapes after _____
[ ] Data will be retained until completion of specific course.
[ ] Electronic
[X] Erasing of electronic data after April 13, 2012
[ ] Data will be retained until completion of specific course.
[ ] Other _____
(Provide details on type, retention period and final disposition, if applicable)

Specify storage location: 6293 Payzant Ave Halifax NS B3H 2B2. Personal address of one of the investigators (Madeleine Wilson).

Appendices: 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.
[X] **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 _____
_____

Appendix B – Interview Questions

Research Survey for ENVS 3502: E-Waste Recycling

The main purpose of this project is to research whether there is a lack of student understanding concerning current e-waste and battery recycling programs at Dalhousie University. We're looking to gage interest in having e-waste recycling options available to students. This information will be used to make recommendations for improvements to the current e-waste and battery recycling programs.

Please answer all the questions and sign your name at the bottom to consent to having the information used in our data collection and research project. All data will be collected anonymously and signatures will be destroyed when data is complied. Once the survey is complete, please feel free to enter your name and contact information in the box to be entered to win a $50 prize. Thanks for your time!

1. What types of electronics do you use (check all that apply)?

Desktop __	Audio Players (ipod, mp3, etc.) __
Laptop__	Cellular telephone__
Printer__	Non-cellular telephone__
Monitors(tv or computer)__	Home/car audio system__

2. How often do you purchase new electronics (circle all that apply)?

Computers	Mobile Devices	Media Devices	Other
Every Year	Every Year	Every Year	Every Year
2 Year	2 Year	2 Year	2 Year
3-5 Year	3-5 Year	3-5 Year	3-5 Year
6-9 Year	6-9 Year	6-9 Year	6-9 Year
10 or more	10 or more	10 or more	10 or more

3. Why do you purchase new electronics (check all that apply)?

Old item broke, lost, or stolen __
Necessity (work/school)__

New and improved is available__
Gift__
Other_____

4. What do you do with your old electronics?

Trash Recycle Sell Keep Other_____

5. How often do you purchase batteries (check best option)?

Weekly__

Once a month__

Every few months__

Rarely__

Never__

I use rechargeable batteries__

6. How do you dispose of your batteries?

Trash Recycle

Part 2

1. Does Nova Scotia law require the recycling of e-waste (circle one)?

Yes No No Idea

2. Does Nova Scotia law require the recycling of batteries (circle one)?

Yes No No Idea

3. Does Dalhousie University have an electronics waste recycling program?

Yes No No Idea

4. Does Dalhousie University have a battery recycling program?

Yes No No Idea

5. How far would you be willing to travel to recycle e-waste or batteries (assuming you're close to Dal campus)?

E-Waste:	Batteries:
To the nearest garbage__	To the nearest garbage__
To a campus drop site__	To a campus drop site__
To a drop site in Halifax__	To a drop site in Halifax__
To the Bedford recycling facility__	To the Bedford recycling facility__
Wherever is necessary__	Wherever is necessary__

6. Would you prefer to bring old electronics to an on campus recycling location rather than to an off campus location?

Yes No Don't Care

7. Should Dalhousie University be responsible for providing students with an e-waste recycling system?

Yes No Don't Care

8. Any comments or suggestions?

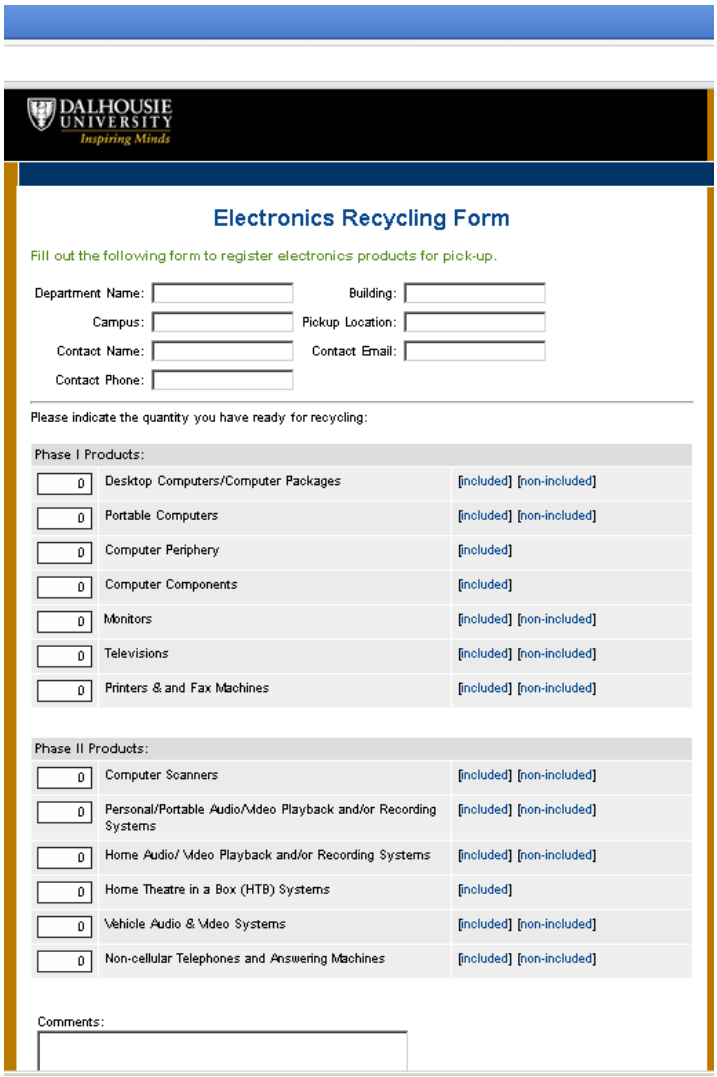
Appendix C – Results Sheet (Combined Data)

Question 1									
					Sum				
Desktop		12	7	28	47				
Laptop		45	15	103	163				
Printer		40	16	87	143				
Monitors		28	17	24	69				
Audio Players		36	15	69	120				
Cell Phones		46	3	107	156				
Non-Cellular Phone		11	12	19	42				
Home/car audio systems		20	9	30	59				
Question 2									
		Every Year	**2 Year**	**3-5 Year**	**6-9 Year**	**10 or more**			
Computers		2	14	42	4	3			
Mobile Devices		8	31	26		1			
Media Devices		7	15	34	7	2			
Other		6	10	20	9	7			
Question 3									
					Sum				
Broke/lost/stolen		37	13	10	60				
Necessity		33	15	76	124				
New improved		16	11	23	50				
Gift		14	6	30	50				
Other		2	1	3	6				
Question 4									
					Sum				
Trash		10	6	23	39				
Recycle		13	4	71	88				
Sell		20	6	41	67				
Keep		26	10	72	108				
Other		2	1	10	13				
Question 5									
Weekly		0	0						
Once a month		9	0						
every few months		15	9						

rarely		21	8						
never		3	1						
use rechargeable		8	3						
Question 6									
					sum				
Trash		29	12	44	85				
Recycle		23	6	64	93				
Part 2									
Question 1									
					Sum				
Yes		11	9	37	57				
No		7	1	7	15				
No Idea		30	8	62	100				
Question 2									
					Sum				
Yes		11	7	39	57				
No		8	2	8	18				
No Idea		29	9	61	99				
Question 3									
					sum				
Yes		28	8	47	83				
No		1	3	2	6				
No Idea		19	7	59	85				
Question 4 - problem w online data									
Yes		26	7						
No		0	3						
No Idea		22	8						
Question 5									
		E-Waste			**Sum**	**Batteries**			Sum
Nearest Garbage		16	5	7	28	16	7	7	30
Campus drop site		24	8	68	100	20	6	68	94
drop site in halifax		9	2	24	35	11	2	24	37
bedford recycling facility		4		1	5	2		1	3

Wherever necessary		6	1	9	16	3		9	12
Question 6									
					sum				
Yes		35	12	83	130				
No		2	1	2	5				
Dont Care		11	5	23	39				
Question 7									
					Sum				
Yes		37	13	90	140				
No		4	1	10	15				
Dont Care		7	4	9	20				

Appendix D – Facilities Management Electronics Recycling Form



DALHOUSIE UNIVERSITY
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Electronics Recycling Form

Fill out the following form to register electronics products for pick-up.

Department Name: Building:
Campus: Pickup Location:
Contact Name: Contact Email:
Contact Phone:

Please indicate the quantity you have ready for recycling:

Phase I Products:		
0	Desktop Computers/Computer Packages	[included] [non-included]
0	Portable Computers	[included] [non-included]
0	Computer Periphery	[included]
0	Computer Components	[included]
0	Monitors	[included] [non-included]
0	Televisions	[included] [non-included]
0	Printers & and Fax Machines	[included] [non-included]

Phase II Products:		
0	Computer Scanners	[included] [non-included]
0	Personal/Portable Audio/Video Playback and/or Recording Systems	[included] [non-included]
0	Home Audio/ Video Playback and/or Recording Systems	[included] [non-included]
0	Home Theatre in a Box (HTB) Systems	[included]
0	Vehicle Audio & Video Systems	[included] [non-included]
0	Non-cellular Telephones and Answering Machines	[included] [non-included]

Comments:

Available at http://erecycling.dal.ca/