

# Taking Learning Outdoors

Student Use & Perception of Outdoor Classrooms at  
Dalhousie University

ENVS/SUST 3502 Campus as a Living Lab

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## Executive Summary

Outdoor classrooms offer a unique opportunity for Dalhousie to enhance both student learning, and campus sustainability. This report summarizes student recollections of their use of outdoor spaces during class time at Dalhousie University's Studley Campus, and their perceptions of the use and improvement of those spaces. The results recommend ways that Dalhousie University can contribute to its goal of increasing campus sustainability with increased outdoor classroom use. In addition, we were interested in the attributes of outdoor spaces that might enhance student learning, and whether an individual's discipline makes them more or less likely to support the use and enhancement of outdoor classroom spaces.

We addressed our research questions with a cross-sectional self-administered interception sample survey of students who have had classes on Studley Campus. We surveyed 77 students at the Killam Memorial Library, the Marion McCain Arts & Social Sciences Building, and the Student Union Building in an attempt to gain a heterogeneous sample among disciplines. Our participants did not accurately represent Dalhousie's demographics, as they were skewed towards students in the Faculty of Arts and Social Sciences and the Faculty of Science. We entered and analyzed the data graphically in Microsoft Excel. Our results showed that only 27% of respondents have had a lecture, lab, or tutorial outdoors. The most popular outdoor spaces were the Ocean Pond, the Quad, and the McCain Courtyard. Most students who have had classes outdoors belong to the Faculty of Science and the Faculty of Arts. When Arts and Science students were compared to respondents from their own faculty, a higher percentage of Arts students have had classes outdoors than Science students. Biology and Sustainability were the most common disciplines that students cited as having had classes outdoors. Students in both Arts and Science identified themselves as having taken Biology and Sustainability courses outdoors. More than three-quarters of students agreed that their classes could use outdoor spaces for lectures and labs, and that outdoor spaces should be enhanced to better facilitate lectures and labs. Increasing use of outdoor spaces for labs was slightly more popular than increasing their use for outdoor lectures; enhancing outdoor lab spaces was also more popular than enhancing outdoor lecture spaces. When compared, arts students supported the use and enhancement of outdoor spaces more than science students. Finally, the characteristics of outdoor classes that students believed could help them in their learning were trashcans, benches and tables, and forested areas. The features that were least important to them were absence of traffic from other students and classes, marine habitats, and high biodiversity.

Despite the fact that a majority of Dalhousie students currently do not experience classes outdoors, there is an opportunity for Dalhousie to increase the use of outdoor classrooms and, should students become more aware of and engaged with environmental issues as a result, campus sustainability. We recommend that Dalhousie educate professors on the benefits of outdoor learning, and encourage them to use outdoor classrooms. Dalhousie could institute a learning module for professors on BBLearn, and facilities management could include outdoor classroom spaces in their room bookings. We recommend that existing outdoor classrooms be improved using the attributes that students identified as benefitting outdoor classrooms. Dalhousie could involve students in their design to maximize the educational potential of these improvements. Finally, we recommend further research: a repetition of our study but with procedures that will render a better reflection of the demographics of Dalhousie, and an in situ study on student behavior and academic performance in outdoor spaces with different attributes to determine the characteristics that enhance their learning. Overall, there is an opportunity for Dalhousie to increase outdoor learning and campus sustainability, but to do so requires that professors are encouraged to take their classes outdoors, and that current outdoor classroom spaces are enhanced.

## Introduction to the Research Problem

Society is urbanizing, and universities are no exception. When institutions like Dalhousie University were founded, they were located in rural areas; today, however, the same universities are now located in urban environments (Wheeler, 2008). As a result, the opportunities for individuals to experience natural environments as part of their university education are dwindling. Decreased use of outdoor spaces is especially an issue at universities, where students spend an overwhelming amount of time indoors. The benefits of spending time outdoors are numerous, including enhanced mental health, increased environmental awareness, and increased engagement with environmental issues (Bogner, 1998; Purcell, 2007; Lawrence, 2012; Hill 2013). Only recently have universities begun to view their surroundings through an ecological lens and to research these benefits (Wheeler, 2008). They have found that outdoor learning is particularly beneficial: not only do students get to spend time outdoors, but they also become more connected to their urban environments and experience real-world complexity as a result (Berman et al., 2008; Schwartz et al., 2013). Dalhousie could increase the number of classes held outdoors to allow students to experience these benefits. In its 2010 Campus Master Plan, the university did not explicitly mention outdoor classrooms, but it recognized a need for a “university wide open space system” to connect existing but disparate outdoor spaces (Dalhousie University, 2010, p. 8). In the same report, Dalhousie identified its goal of increased sustainability, to which outdoor learning could contribute. Students who experience outdoor learning are more likely to engage in environmental issues, including those on the university campus (Bogner, 1998; Lawrence, 2012). In addition, the students that use outdoor classrooms could contribute to on-campus sustainability with practical applications like campus gardens (Purcell, 2007).

Our research opportunity lay in understanding how outdoor spaces are being used during class time at Dalhousie, and how students think the spaces could be improved. There has been no previous research on outdoor classrooms at Dalhousie University. We focused on the use and enhancement of outdoor spaces during class time on Studley Campus. Our objectives were to understand use, and student attitudes towards the use and enhancement of outdoor classrooms, with the ultimate aim of making recommendations to Dalhousie University on ways to expand outdoor spaces and increase campus sustainability. Our primary research questions were:

1. What campus green spaces are being used in class time?
2. What faculties are using campus green spaces?

Our secondary research questions were:

1. Is there a desire for the use and enhancement of outdoor spaces during class time?
2. Does an individual’s academic discipline make them more or less likely to support the use and enhancement of outdoor spaces during class time?
3. What attributes of outdoor green spaces could enhance student learning?

## Literature Review

Outdoor learning has many benefits; the first category of benefits is psychological. Scholars engaged with nature documented the benefits of time spent outdoors as early as the nineteenth century. Henry David Thoreau, for example, wrote that time spent in the woods away from society induces deep contemplation, sensitivity, and appreciation for the natural environment (Thoreau, 1861). It was not until the 1970s, though, that the benefits of nature were formally studied. Ulrich (1979) found that people who view photographs of natural environments experience more positive emotions and moods than those who are shown urban images. Later studies found that a window view of nature has restorative effects on apartment dwellers and also increases neighborhood satisfaction (Kaplan, 2001). Spaces with biodiversity are associated with greater self-identified psychological benefits (Kaplan, 1995). Finally, Grahn & Stigsdottir (2003) found that visits to urban green spaces correlate with decreases in

stress-related illness, an effect from which many university students could benefit. Notably, there is no prominent research that contradicts the psychological and emotional benefits that nature can have on individuals.

There are also educational benefits to outdoor learning. Berman et al. (2008) and Apul et al. (2011) identified some cognitive benefits including improvements in directed attention. A prevalent research theme is the developmental benefits for children; perhaps the best-known scholar to study the phenomenon is Louv (2008), who noted the dearth of learning in outdoor spaces and termed it “nature deficit disorder”. Studies on and applications to university-aged students are more pertinent to our project. The following overview of the research demonstrates that the benefits of outdoor learning – environmental awareness, engagement with environmental issues, and practical applications – could contribute to campus sustainability.

### ***Benefit #1: Environmental Awareness & Attitudes***

Students are more aware of the environment when they have learned outdoors. Geisler (1977) found that environmental concern increased with outdoor recreation. Our study is concerned with learning rather than recreation, so Bogner’s (1998) study of outdoor education programs for pre-teens is more pertinent, though the age group he studied is younger than the students at Dalhousie. Bogner (1998) found that outdoor learning increased pro-environmental attitudes. In a study with similar methods, Hill (2013) found that students who had visited pristine, remote wilderness showed pro-conservation attitudes towards those areas, but when they returned home, they were not as likely to want to conserve natural areas near their homes. Urban environmental education thus has an important role to play in conservation. Hill’s (2013) study is justification that Dalhousie students should have opportunities for outdoor learning on campus rather than on field trips out of the city.

Experiences at local campus green spaces foster a connection between students and regional flora and fauna. For example, students who participate in a riparian restoration project not only learn scientific concepts and applications, but also have more awareness of and appreciation for the riparian zone’s value (Purcell et al., 2007). Even school gardens positively affect student attitudes towards science and environment; many teachers who garden with their elementary-age students report high scores of environmental responsibility (Skelly & Bradley, 2007). Conflictingly, Shepard & Speelman (1986) found that an outdoor education camp program has little effect on students’ environmental attitudes. However, they were concerned with outdoor recreational spaces rather than education spaces, so their results may not be applicable to Dalhousie. Nevertheless, they did find that the longer the program, the greater the development of a pro-conservation attitude. Together these studies justify an increase in the use and frequency of use of outdoor classroom spaces.

Interestingly, attitudes towards the environment vary among academic disciplines. Lawrence (2012) found that college students in North Carolina who were in environment-related fields visit natural areas on campus more frequently than students in other fields, and exhibit higher levels of environmentally responsible behavior (Lawrence, 2012). However, the study did not investigate whether pro-environmental behavior was due to the students’ field of study or their use of natural spaces. A variety of studies further support the difference in awareness or concern among disciplines (Devlin, 2004; Hodgkinson & Innes, 2001; Synodinos, 1990; Tikka et al., 2000); only one has not supported the hypothesis (Shetzer et al., 1991, as cited in Devlin, 2004). Due to the demonstrated disciplinary differences in environmental awareness, we are interested in how awareness relates to outdoor classroom use. Furthermore, as Shepard & Speelman (1986) found that a person’s environmental attitudes experience the most positive growth the first time they are exposed to nature, we have impetus to believe classes of non-environmental disciplines could benefit from the use of outdoor spaces during class time.

### ***Benefit #2: Engagement with Environmental Issues***

Students are more connected to their surroundings and more likely to engage with environmental issues when they spend time outdoors. For example, high school students whose science curricula includes outdoor components have increased place attachment (Kuwahara, 2013). A study on university-age students found that those who use outdoor spaces demonstrate higher emotional connection and investment in those spaces (Lawrence, 2012). In combination with Bogner's (1998) study, Lawrence (2012) shows that students who are exposed to nature and are more aware of environmental issues have more interest in engaging with those issues. Students are more likely to want to conserve spaces when they are emotionally attached to them and aware of environmental issues (Bogner, 1998; Lawrence, 2012). If Dalhousie students were more attached to their campus, they would be more likely to take action to make the campus more ecologically friendly and sustainable.

### ***Benefit #3: Practical Applications***

The most concrete benefit to sustainability from outdoor classrooms is the creation of practical projects on campus that enhance the built environment. Outdoor projects undertaken in class time can aid sustainability while also achieving learning outcomes. For example, students at the University of California, Berkeley surveyed vegetation in an urban creek and another on-campus area, removed exotic vegetation, and replaced what they had removed with native plants, thereby increasing native species richness (Purcell et al., 2007). Another popular project is building a garden. At the University of Toledo, an outdoor garden improvement project enabled engineers to learn theoretical and technical skills, while contributing to campus sustainability (Bermen et al., 2008). At the University of Utah, campus gardens have been slowly expanding, and a course on organic gardening regularly uses the space during class time (Chambless et al., 2012). A benefit of campus gardens is that students may become advocates for and producers of locally grown and organic food (Graham et al., 2005). Increased environmental awareness is not limited to food production: studies found that the same increase resulted from students growing flowers (Skelly & Bradley, 2007). Finally, various universities use outdoor classroom spaces with natural elements for entomology lessons and to collect specimens for their laboratory sessions, saving the cost and emissions generated from buying and shipping insects from afar (Wheeler, 2008). The practical applications of outdoor classrooms further justify inquiry into the use and the potential for improvement to Dalhousie's outdoor classrooms.

## **Methods**

### ***Survey Design & Variables***

We addressed our research questions with a cross-sectional self-administered interception sample survey of Dalhousie students who have had classes on Studley Campus (Appendix A). A cross-sectional study is a study that gives a snapshot view of a population at a particular time (Levin, 2006), which is relevant to our research questions as we are interested in students' experiences and opinions at the present moment. We used a self-administered on-the-spot survey because of the time constraints for our project; individual interviews would have taken too much time considering our four-week research period. In addition, we used self-administration because it allowed us to gather phenomenological data regarding the students' perceptions and worldviews (Barker et al., 2002). Finally, we used in-person interception because people are overwhelmed with the volume of online surveys that they are asked to complete, and so that method has a low response rate (Bickart & Schmittlein, 1999). The locations we used – the Killam Memorial Library, the Marion McCain Arts & Social Sciences Building, and the Student Union Building - allowed for a heterogeneous sample among disciplines

because a variety of different faculties use those buildings. We offered candy as incentive for students to fill out the survey.

To determine the appropriate sample size for our survey, we used the Survey System Sample Size Calculator (Creative Research Systems, 2012, "Sample Size Calculator"), which itself used the following equation where  $ss$  = sample size,  $Z$  = Z value,  $p$  = percentage picking a choice,  $c$  = confidence interval (Creative Research Systems, 2012, "Sample Size Formulas"):

$$ss = \frac{Z^2 * (p) * (1-p)}{c^2}$$

We chose a 95% confidence level and a confidence interval of 10 because it yielded a sample size that we thought would be achievable in the four weeks allowed for this research project. The number of part-time and full-time university students enrolled at Dalhousie University for the 2013/2014 academic year is 18 564 (Association of Atlantic Universities, 2013). Therefore, an adequate sample size, as calculated by the Survey System Sample Size Calculator, is 96 students. However, we were only able to collect 77 surveys in the time allotted.

As our study involved human participants, it required ethics approval. We made ethical considerations including "free and informed consent", "privacy and confidentiality", and "balancing harms and benefits" (Kirby et al., 2010, p. 88). We submitted our Dalhousie Ethics Approval Form and Consent Form (Appendix B) to Dr. Hendricus Van Wilgenburg. They were approved on 15 March 2014. During our data collection, respondents viewed the consent form and verbally gave their consent prior to completing the survey. Our research proposal (Appendix C) was also reviewed and approved.

The survey consisted of five closed-ended questions that took 5-10 minutes for respondents to answer. We used closed-ended questions in order to keep the responses standardized and easily quantifiable (Penwarden, 2013). However, when there was potential for a response beyond our given options, participants were able to select "other". The initial questions assessed the demographics of the respondent in order that we could analyze outdoor classroom use by faculty. The next questions assessed whether participants had had classes outdoors, and, if so, what the nature of the classroom experience was. They centered on the space that was used, the type of class that occurred in the space (i.e. lab or lecture), and the subject of the class. The variables allowed us to compare the faculties that use outdoor spaces. We loosely based these questions upon Lawrence's (2012) study, in which she calculated the frequency at which students visited campus green spaces. Using this data, we were able to understand the proportion of students who have used outdoor classrooms, and the distribution of faculties to which the students who used outdoor spaces belonged.

Next, we used a five-category Likert scale, ranging from "Strongly Disagree" to "Strongly Agree", to gauge student attitude towards the use and enhancement of outdoor spaces. As the categories in the Likert scale are open to individual perception of the level of agreement signified, the students may select the same category but hold differing opinions. The advantage of this scale, however, was that it was easy for participants to understand and could incorporate neutral or undecided responses (Naser, 2013).

Lastly, we used another five-category Likert scale, this time ranging from "Not Important" to "Very Important" to gauge student attitude towards various attributes of outdoor spaces. The attributes that the students rated were adapted from a survey of teachers using outdoor classrooms in Denmark (Bentsen, 2013). We used the information from all respondents to determine the attributes that could enhance student learning in an outdoor classroom setting.

## Data Analysis

A Likert scale is an ordinal scale with discrete categories; therefore, we were unable to do parametric analysis on our data (Allen & Seaman, 2007). Instead of statistical analysis and inference, we used frequencies to single out relationships between the variables. First, we entered the data into an Excel spreadsheet, and then we represented the relationships graphically. We compared how many students had used outdoor classroom spaces, and how many had not. We also assessed which spaces were used and at what frequency. We examined whether a participant's faculty was related to their use of outdoor classrooms. Beyond our main research questions, we looked to establish the differences in students' opinions on the use of outdoor classroom spaces and their enhancement based on their faculty. Lastly, we compared student responses to different outdoor classroom enhancement options.

## Limitations and Delimitations

Our research project had several self-imposed delimitations. We delimited our research project to Studley Campus because it is Dalhousie's main Halifax campus, and its size was manageable given the four-week research period. We chose only to survey students, rather than professors, because we were able to access a larger population of students than professors, and because we were interested in student attitudes in particular. Our final delimitation was the limited financial means for outdoor spaces on campus that Dalhousie University identified in its 2010 Master Plan (Dalhousie University, 2010). We focused solely on reasonably priced enhancements to existing spaces, rather than proposing expensive improvements or the establishment of new outdoor classrooms.

Our research project had several limitations. First, our study was temporally limited, as we only had four weeks in which to complete the research phase. As a result, we did not have the opportunity to test pilot our survey prior, which as Bogner (1998) notes, detracts from its reliability. Furthermore, a survey may not be the most effective way of determining the attributes of outdoor classrooms that enhance learning, because the qualities that students desire may be different than those that will truly enhance their education. An in situ study of student behavior and performance in outdoor spaces with different attributes might have been more effective than a self-directed student survey, but such methods were not possible for this project given our time constraint.

Next, there were methodical and analytical limitations. Our survey was self-administered, which can affect its validity because respondents may not be truthful, and they may be unable to accurately judge the factors that affect their learning (Barker et al., 2002). We asked only closed-ended questions, which respondents may interpret differently than one another (Barker et al., 2002). Respondents may have self-selected, with only those who are already aware of the issue of outdoor classes responding to the survey (Lane, n.d.). During our analysis, as we have mentioned, we were unable to do statistical analysis because we chose a Likert scale with discrete categories (Allen & Seaman, 2007).

Finally, group members experienced technical challenges while they were surveying participants. Students most often passed the survey locations as they were moving between classes, but most were not interested or available to stop and to participate in the project. There was also a lack of writing surfaces on which the students could complete the survey comfortably, which detracted from the number of students who could complete the survey at one time. As we only surveyed on Studley Campus, we did not receive many responses from students in faculties based on other Dalhousie campuses. Many graduate students attend classes on campuses besides Studley, and so we did not receive many responses from them.

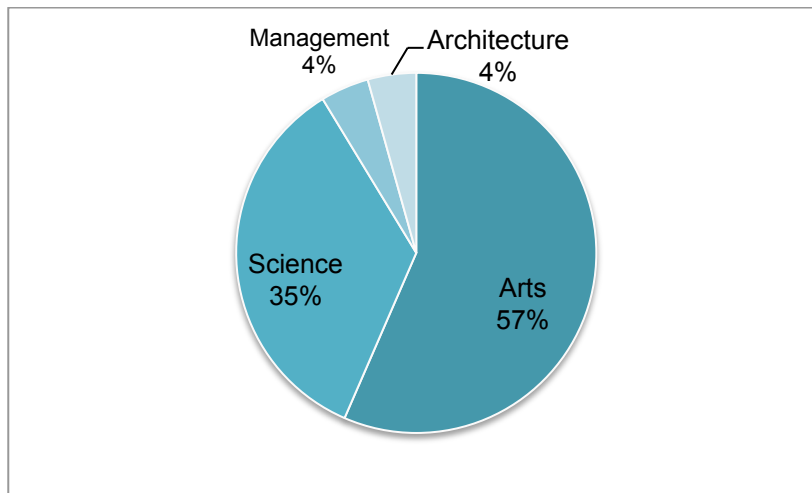


## Results

We collected 77 surveys from students on Dalhousie University's Studley Campus: 76 responses were from undergraduate students, and one response was from a graduate student. The volume of surveys collected from each of the surveying locations was similar: 29 from the McCain Building, 23 from the Killam Library, and 25 from the Student Union Building. The responses show that 27% of respondents have had a lecture, lab, or tutorial outdoors, whereas 73% of respondents have not had a class outdoors. The most popular spaces for outdoor labs are the Ocean Pond and the Quad, while outdoor lectures are most often held in the Quad and the McCain Courtyard.

The respondents belong to eight different faculties: Architecture, Arts & Social Sciences, Computer Science, Engineering, Medicine, Science, Management, and Health Promotion. The majority of respondents belong to either the Faculty of Science (54%) or the Faculty of Arts & Social Sciences (34%). Most students who had classes outdoors also belong to the Faculty of Science and the Faculty of Arts, though arts students comprise a larger percentage than science students (Fig. 1).

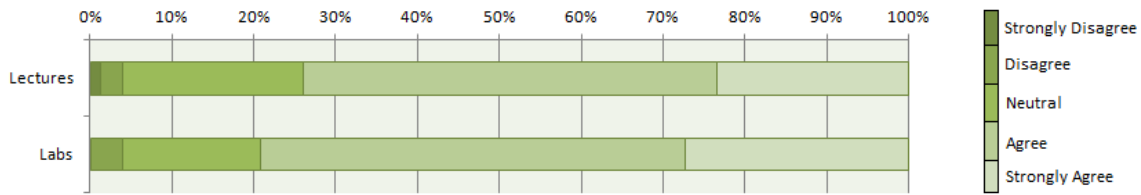
The volume of responses from faculties other than Arts and Science is not statistically significant, so they were omitted from the remaining inter-faculty comparisons. When Arts students and Science students were compared to respondents from their own faculty, a higher percentage of Arts students (42%) than Science students (20%) have classes outdoors. Respondents cite a variety of subjects, ranging from Geology to Theatre that have taken place outdoors, but the classes that are mentioned most often are Biology and Sustainability. Arts students and Science students both mention these subjects.



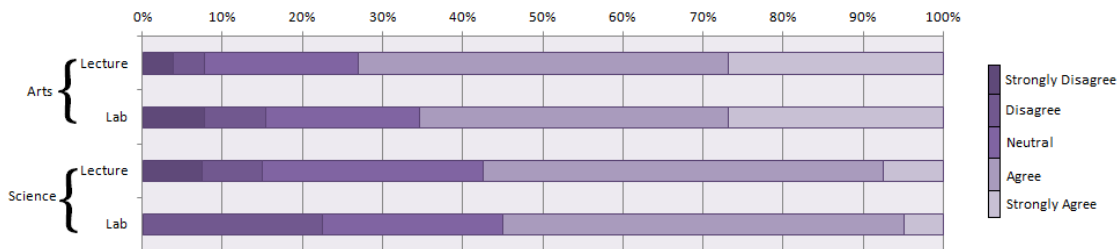
**Figure 1. Distribution by faculty of Dalhousie students who have had classes outdoors on the Studley Campus.**

To address our secondary research questions, we asked students whether they think that their classes could use outdoor spaces during lectures and labs, and whether they would like to see those spaces enhanced. When all responses are considered, including those of students who had not had classes outdoors, the vast majority (>75%) agree that their classes could use outdoor green spaces for lectures and labs (Fig. 2). The median response in both cases was "Agree", and <5% of students think that lectures should not be held outdoors. Outdoor labs are slightly more popular than outdoor lectures.

When the opinions of Arts and Science students on the use of outdoor classroom spaces for lectures and labs are compared, more Arts students than Science students agree that lectures and labs should be held outside (Fig. 3). Notably, many more Arts students than Science students strongly agree that their classes could use outdoor spaces.



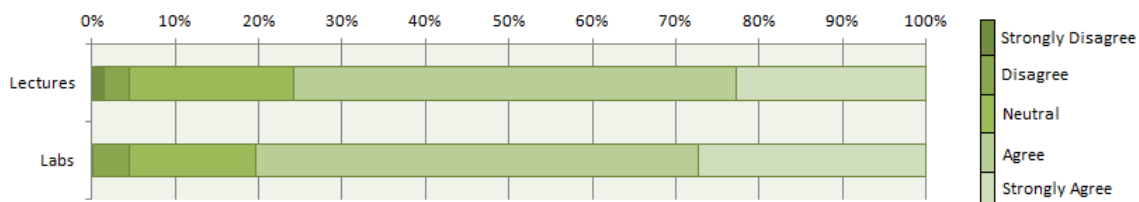
**Figure 2. Desire for increased usage of outdoor spaces during class time among all survey respondents.**



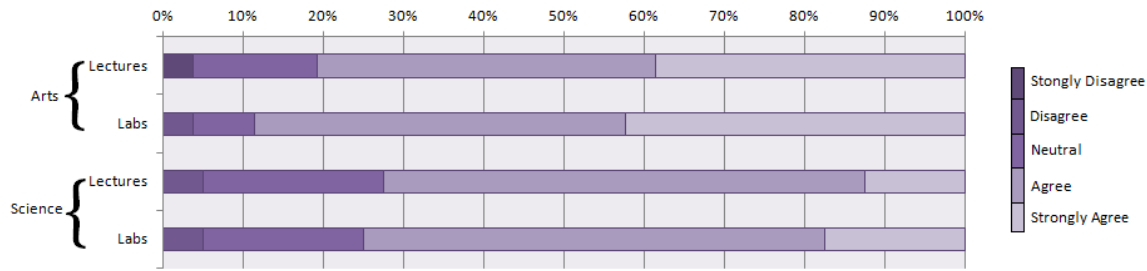
**Figure 3. Comparison of Arts and Science student support for increased use of outdoor spaces during class time.**

We conducted a similar analysis of student support for the enhancement of outdoor classroom spaces (Fig. 4). When all responses were considered, including those of students who had not had classes outdoors, the vast majority (>75%) agreed that their classes could use outdoor green spaces for lectures and labs (Fig. 4). The median response in both cases was “Agree”, and <5% think that outdoor spaces should not be enhanced. The enhancement of outdoor spaces for labs was slightly more popular than the enhancement of outdoor spaces for lectures.

When the opinions of Arts and Science students on the enhancement of outdoor classroom spaces for lectures and labs are compared, Arts students display higher levels of support than Science students (Fig. 5). Again, many more Arts students than Science students strongly agree that outdoor spaces should be enhanced.

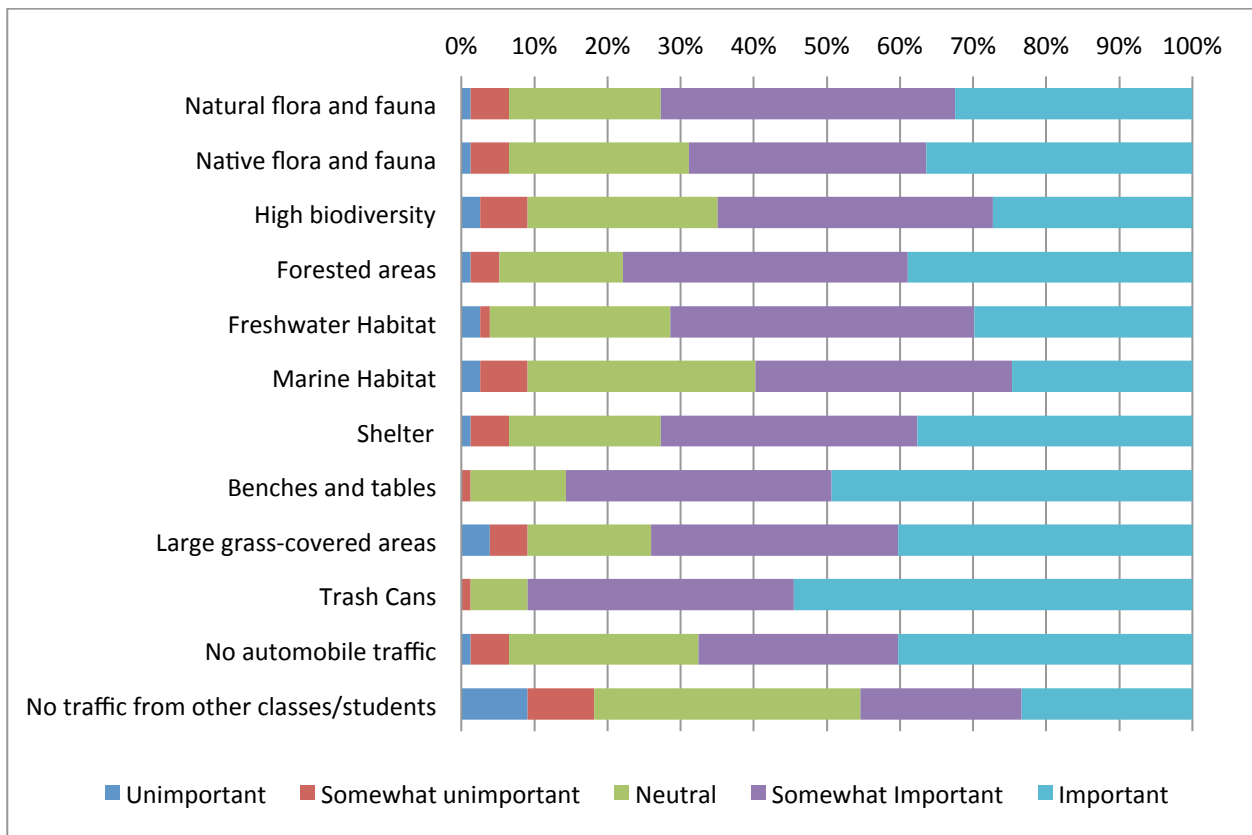


**Figure 4. Desire for the enhancement of outdoor classrooms among all survey respondents.**



**Figure 5. Comparison of Arts and Science students' support for the enhancement of outdoor spaces used in class time.**

Finally, to determine which attributes students look for in an outdoor classroom space, the respondents rated the importance characteristics that could help them in their learning (Fig. 6). When all respondents were compared, trashcans, shelter, and forested areas are the attributes that students deem to be the most important for an outdoor classroom. The attributes of outdoor classrooms that are least important are marine habitats, high biodiversity and the absence of traffic from other students and classes. The students agree that every attribute listed is important or very important to an outdoor classroom, besides there being no traffic from other students and classes, for which “neutral” is the most common response. The only attribute for which the median response was “very important” was trashcans.



**Figure 6. Qualities that all respondents look for in a campus green space that will be used during class time.**

## Discussion

The purpose of our research project was to determine current use of outdoor spaces during class time at Dalhousie University's Studley Campus, and to determine student attitudes towards the potential for their increased use and enhancement. Demographics are important to the validity of our findings. The demographics present in our study were dissimilar to the demographics of Dalhousie University. We collected only 77 surveys, instead of our planned 96, so the sample may not be representative. Of our respondents, 54% were in the Faculty of Science, whereas only 22% of Dalhousie students on the Halifax campuses study Science (Dalhousie University, 2012). Similarly, 34% of our respondents were in the Faculty of Arts & Social Sciences, whereas only 17% of Dalhousie students on the Halifax campuses study Arts (Dalhousie University, 2012). Computer Science, Engineering, Health Professions, Management, and Medicine were severely underrepresented in our sample, and the Faculties of Dentistry and Law were not represented at all. The skew towards respondents in Arts and Science was likely because we only surveyed on Studley Campus where the majority of classes for those disciplines take place, whereas many of the faculties that were not as well represented are based on Carleton Campus or Sexton Campus. The lack of students from Management and Computer Science was likely because we did not survey in the Kenneth C. Rowe Building or the Goldberg Computer Science Building where those disciplines have most of their classes. Ultimately, the respondents from faculties other than Arts & Social Science and Science were so few that they were statistically insignificant, and we did not include them in our inter-faculty comparison.

Another demographic trend at Dalhousie that was not well represented was the ratio of undergraduate to graduate students. Only one of our 77 respondents (1.3%) identified as a graduate student, whereas 28% of Dalhousie students are in graduate studies (Dalhousie University, 2012). The fact that we only surveyed on Studley Campus could again be the cause of this discrepancy, as many graduate faculties, like Medicine and Law, are based on other campuses. However, our research questions did not address differences in attitudes among undergraduate and graduate students, so this lack of demographic accuracy is not as significant as the lack of demographic accuracy among faculties. Nevertheless, it is important to note that our results are skewed towards undergraduate Arts and Science students.

Despite the bias, our findings were significant. First, we determined that only 27% of Dalhousie students have had classes outdoors. Though the low proportion may relate to Halifax's long winters and rainy climate, and the fact that many classes require technology, like projectors, which is not available outdoors, the statistic is telling of the low proportion of students who are experiencing the benefits of outdoor learning. Most Dalhousie students (73%) do not have outdoor classes, and so do not experience the benefits of outdoor learning, like enhanced environmental awareness and increased engagement with environment issues. Dalhousie should promote outdoor classrooms in order to enhance students' academic experiences while potentially increasing campus sustainability through increased student involvement in environmental issues.

Our second significant finding was that a greater percentage of students in the Faculty of Arts & Social Sciences have had outdoor classes than students in the Faculty of Science, which is interesting because on the surface, it contradicts previous research that students in environmental fields spend more class-time outdoors (Lawrence, 2012). However, both Arts and Science students mention Biology and Sustainability as subjects for which they have had classes outdoors. The prevalence of these subjects could be due to self-selection, in which students who have studied the environment are more aware of environmental issues, and are more likely to take a survey on outdoor classrooms. Another reason could be that Biology is a class that Arts students commonly take as a first year science requirement at Dalhousie, and Sustainability can be studied both as an art and as a science. As a result, our findings may actually be consistent with Lawrence's (2012) study: students who study

environmental subjects spend more time outdoors than those who study other subjects. Based on this finding, Dalhousie should consider promoting the use of outdoor classrooms to professors of subjects in non-environmental disciplines in order to increase the percentage of students who have the opportunity to experience class outdoors.

Our comparison of the attitudes of students towards the use and enhancement of outdoor spaces found that the vast majority of students supported increased use of outdoor spaces (Fig. 2), and their enhancement to better accommodate outdoor classes (Fig. 4). There has been no previous research on student attitudes towards outdoor classroom use and enhancement at Dalhousie or at other universities, so our findings are novel. Dalhousie should consider encouraging the use of outdoor spaces, and facilitating their enhancement, according to student desire.

To address inter-faculty differences, we compared the attitudes of students from the two major faculties represented in our sample: the Faculty of Arts & Social Sciences, and the Faculty of Science. While students from both faculties overwhelmingly supported the use (Fig. 3) and enhancement (Fig. 5) of outdoor spaces, Arts students showed their support more frequently and more strongly than Science students. Our study did not determine environmental awareness or concern among disciplines, as several previous studies have (Devlin, 2004; Hodgkinson & Innes, 2010; Synodinos, 1990; Tikka et al., 2000), so we cannot conclude that Arts students are more environmentally aware than Science students based on their desire for outdoor classes. However, we suggest that Dalhousie should increase outdoor classroom use in the Faculty of Arts & Social Sciences due to particularly strong student support. It should not ignore science students, though, as they also indicated a desire for increased use.

We found that the campus green spaces that are used most often are the Ocean Pond, the Quad, and the McCain Courtyard. These three spaces are very prominent, and many people walk by them every day. Perhaps their conspicuousness means that professors are more likely to use these spaces during class time. In addition, awareness might cause students and professors to be more attached to the spaces, and more interested in studying them. Should the Dalhousie administration wish to improve outdoor spaces, it could focus on areas like the Ocean Pond and the Quad that are already being used during class time. On the other hand, perhaps other campus green spaces like the campus garden are not being used during class time because they are not as well known. Dalhousie University should publicize these spaces in order that they are used more often for outdoor learning.

Finally, we assessed student attitudes toward different features of outdoor spaces. It is interesting that the most popular features of outdoor spaces – trashcans, and benches and tables (Fig. 6) – could be considered practical in contrast with the least popular features: absence of traffic from other students/classes, marine habitat, and biodiversity. One explanation is that the respondents were thinking generally of outdoor spaces rather than outdoor classrooms, and so identified attributes like trashcans that are not particularly related to education. Alternatively, it might be a result of a lack of environmental awareness, though our study did not address this factor and so we can draw no conclusions. Speculatively, if the students who identified practical attributes as beneficial to outdoor classrooms were able to learn outside, they might increase their awareness of the environment (Bogner, 1998; Skelly & Bradley, 2007). Then, perhaps, they might identify ecological factors as being more important to outdoor learning spaces. Nonetheless, students clearly desire trashcans, benches and tables, and forested areas in their outdoor classroom spaces, and should Dalhousie wish to enhance outdoor spaces, it should consider this desire.

## Conclusions

Overall, this research project has shown that a majority of Dalhousie students do not experience classes outdoors, but that there is an opportunity for Dalhousie to increase student experiences and campus sustainability. Currently, Dalhousie does not promote outdoor classrooms and outdoor learning,

and so does not capitalize on the psychological and environmental benefits that arise from exposure to outdoor spaces, like decreased stress (Grahn & Stigsdottir, 2003), pro-environmental attitudes and awareness, and engagement with environmental issues (Bogner, 1998; Lawrence, 2012). Considering that Dalhousie has identified sustainability as one of its goals in its 2010 Master Plan, and that the university is generally concerned with its students' well-being, the potential for student stewardship should provide incentive to investigate the potential for increased outdoor classroom use.

Our first recommendation to Dalhousie University to increase outdoor classroom use is that the administration informs professors of the many benefits of outdoor learning, and encourages them to use existing outdoor classrooms. For example, Dalhousie could have an interactive web page or a learning module on BBLearn for professors. The site should include photos, details, and a map of existing campus green spaces. As professors largely decide on the curriculum and location of their classes, increasing their awareness is likely the most effective means of increasing outdoor classroom use. In addition, we suggest that facilities management add established outdoor classrooms to their room bookings chart so that professors are assured they will have the facilities needed for their classes when taken outside. Each of these options could be done as a pilot project. There are thus multiple routes that Dalhousie University could take to expand the use of outdoor classrooms.

Our second recommendation is that Dalhousie University enhances existing outdoor classroom spaces. While doing so, the administration should consider the attributes that students identified as desirable: trashcans, benches and tables, and forested areas. Improving the built environment offers the opportunity for students to become involved in hands on learning. For example, students in community design could help to plan the spaces, and students in biology could ensure that existing ecosystems are conserved or that new ones are constructed in an ecologically sound manner. A pilot project using a particular class would be a useful model with which to begin practical improvements, similarly to the engineering students' construction of a campus garden at the University of Toledo (Berman et al., 2008). If the program is successful, it could be expanded to more disciplines. Enhancing outdoor classrooms could thus benefit student learning and encourage increased use of those spaces.

Finally, we recommend that Dalhousie conduct further research. First, we suggest that our study is repeated with a larger sample size to ensure that it accurately represents the demographics of Dalhousie University. Additional procedures could include determining locations that would ensure diverse respondents, like surveying on multiple campuses, analyzing student traffic flow to increase the chance of student interception, and surveying professors as well as students. The trends uncovered in that survey would be a more accurate representation of general perceptions. In addition, we suggest an in situ study of student behavior and performance in outdoor spaces with different attributes. It would determine the attributes that contribute best to student learning, rather than those attributes that students perceive as being important. This information would give Dalhousie a better idea of what features to implement in outdoor classrooms. Overall, there is a tremendous opportunity for Dalhousie to increase outdoor learning, but to do so requires that the administration encourage professors to take their classes outdoors, and that existing green spaces are enhanced.

## **Acknowledgements**

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## Appendix A: Sample Survey

### ENVS3502/SUST3502 Outdoor Classroom Use Survey for Studley Campus

**This survey is only for currently students who have or have had classes on Studley Campus.** Thank you for taking to time to assist in our research project on the uses of campus green spaces as areas for outdoor learning. This survey should take 5-10 minutes to complete. All answers will be confidential.

**Please check the appropriate option.**

What is the Faculty of your primary major or area of study?

- |  |  |
|--|--|
| <input type="checkbox"/> Agriculture<br><input type="checkbox"/> Architecture and Planning<br><input type="checkbox"/> Arts and Social Sciences<br><input type="checkbox"/> Computer Science<br><input type="checkbox"/> Dentistry<br><input type="checkbox"/> Engineering | <input type="checkbox"/> Graduate Studies<br><input type="checkbox"/> Health Professions<br><input type="checkbox"/> Law<br><input type="checkbox"/> Management<br><input type="checkbox"/> Medicine<br><input type="checkbox"/> Science |
|--|--|

**Please select yes or no for the following question:**

At least one of my courses has had at least one class session outdoors.

YES                      NO

**If you answered yes, please provide the subject area for the courses that you have had outdoors on Dalhousie Studley campus, whether it was for lectures or labs/tutorials, and the spaces in which your lectures or labs/tutorials**

Subject Area (e.g. BIOL)	Lectures or Lab/Tutorials	On-Campus Spaces Used (select all that apply) O = Ocean Pond; Q = Quad; M = McCain Courtyard C = Campus Garden; Please specify "other"
	<input type="checkbox"/> Lecture	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lab/Tutorial	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lecture	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lab/Tutorial	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lecture	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lab/Tutorial	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lecture	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lab/Tutorial	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lecture	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lab/Tutorial	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:

**Regardless of your answers to the previous questions, please rate your agreement with the following statements.**

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Only my classes with curriculum related to the environment can benefit from the use of outdoor spaces during class time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Only my classes with hands-on lab/tutorial components can benefit from the use of outdoor spaces during class time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My classes that do not currently use outdoor spaces could be using them for lectures or class discussion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My classes that do not currently use outdoor spaces could be using them for hands-on experiential learning like labs/tutorials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to see enhanced outdoor spaces on campus for regular class lectures or class discussions on Studley campus.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to see enhanced outdoor spaces on campus that can be used for hands-on experiential learning like labs/tutorials on Studley campus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Please rate the following attributes based on the qualities that you look for in a campus green space that will be used during class time.**

	Unimportant	Somewhat unimportant	Neutral	Somewhat important	Important
Natural flora and fauna	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Native flora and fauna	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High biodiversity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Forested areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Freshwater Habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marine Habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shelter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Benches and tables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large grass-covered areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trash cans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No automobile traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No traffic from other classes or students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Appendix B – 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:** Taking Classrooms Outdoors: Investigating the Use of Campus Green Spaces as Areas of Outdoor Learning at Dalhousie University's Studley Campus

**2. Faculty Supervisor(s)** Hendricus A. Van Wilgenburg    **Department:** Environmental Science  
**e-mail:** hvanwilgenb@gmail.com

**3. Student Investigator(s):** Caira Clark, Annick Colbert, Kendra Marshman, Lori Martinez, Abdulrahaman Refaei

**Department:** College of Sustainability

**E-mail:** cr639164@dal.ca


**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:** March 6<sup>th</sup>, 2014

**b. Indicate the anticipated completion date for this project:** April 11<sup>th</sup>, 2014

<b>1.2 Supervisor Name:</b> Dr. Hendricus Van Wilgenburg	
Department	Faculty of Science

Email	hwilgenb@dal.ca	Phone	(902) 678-3844
<p>I have reviewed the attached ethics application prior to its submission for ethics review, including the scientific/scholarly methods of the research project which is described in the ethics application, and believe it is sound and appropriate. I will ensure this research will be conducted following the principles of the Tri-Council Policy Statement <i>Ethical Conduct for Research Involving Humans</i> and consistent with the University <i>Policy on the Ethical Conduct of Research Involving Humans</i>.</p>			
Supervisor signature:			
		March 15, 14	

<b>1.3</b> Department/unit ethics review (if applicable). Minimal risk research only.
This submission has been reviewed and approved by the research ethics committee.
Authorizing name and signature:
Date of approval:

**SUMMARY OF PROPOSED RESEARCH**

**1. Purpose and Rationale for Proposed Research:**

There has been no research on outdoor classrooms or outdoor learning at Dalhousie University. We would thus like to research the issue of outdoor classrooms at Dalhousie; as our literature review has shown, sustainability on campus could benefit from four results of outdoor learning and outdoor classrooms: an increase in environmental awareness and pro-environmental attitudes, an increased sense of place, increased engagement with environmental issues, and practical applications in the built environment (Bogner, 1998; Purcell, 2007; Lawrence, 2012; Hill, 2013). A study of outdoor classroom use at Dalhousie University could determine whether those benefits are being experienced on campus. Research supports the view that certain disciplines are more likely to use outdoor classrooms than others (Devlin, 2004; Hodgkinson & Innes, 2010); therefore, a study of the use of outdoor classroom spaces on campus could determine which faculties are and are not using outdoor spaces. Finally, the attributes of the outdoor classrooms themselves affect their use (Abu-Ghazze, 1999; Bentsen, 2013). Research into the attributes that students value in outdoor classroom spaces, and into what spaces are currently being used, might result in findings that could influence recommendations to the Dalhousie Administration as to the possibilities for improvement of outdoor classrooms.

**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.**

The members of the research team have completed a comprehensive literature review on the subject of outdoor classrooms and accordingly designed the surveys and methods to be used in line with that research. We will be collecting data through the use of surveys. The surveys will be responses in-person in the Killam Memorial Library, Life Sciences Centre, the Marion McCain Arts & Social Sciences Building, the Goldberg Computer Science Building, and the Kenneth C. Rowe Building, from 9 March 2014 to 15 March 2014. We will be conducting a statistical analysis of the data to compare the use of outdoor spaces among faculties and the attributes that students look for in outdoor classrooms. We will be using GIS mapping to illustrate the most-used outdoor classroom areas on Studley Campus. We will be presenting our results in a Pecha Kucha presentation on the Grad House on April 1. The final report will be submitted to our professor on April 11.

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

Dalhousie Participants:

Undergraduate students

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 will be all students who attend Dalhousie University and who have had classes on Studley Campus.

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

We expect to have between 95 and 110 participants involved in this study.

#### **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) Dalhousie University Buildings: Killam Memorial Library, Life Sciences Centre, the Marion McCain Arts & Social Sciences Building, the Goldberg Computer Science Building, and the Kenneth C. Rowe Building.

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.**

The five research team members will be involved in recruiting the study participants. We will have a table set up (where). Passing students will be invited to passing by whether they would like to fill out a short survey on outdoor classrooms and outdoor learning. We will provide them with the survey, which they will fill out on their own. When the participants have completed the survey, they will be offered a candy.

**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.**

Included at the end of this document.

**5. Compensation of Participants: Will participants receive compensation (financial or otherwise) for participation?**

Yes  No  If Yes, provide details: A lollipop for completing 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.**

After the participant has completed the survey, we will thank them for their time and offer them a candy for their participation.

**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.**

### **POTENTIAL BENEFITS FROM THE STUDY**

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

The participants are not likely to benefit directly from this study. Alternatively, the participants may benefit in that completing the survey is an opportunity to share their opinions and experiences on outdoor classrooms, and thus potentially contribute to campus sustainability. It may also offer them the opportunity to think critically about how campus green spaces could be improved.

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

Anticipated benefits to society from this study are:

- Information on the use and disuse of outdoor spaces at Dalhousie University.
- Information on use and disuse of outdoor spaces among faculties at Dalhousie University.
- Information on student attitudes towards outdoor classrooms and their improvement at Dalhousie University.
- Information on attributes of outdoor spaces that students value at Dalhousie University.
- Potential contribution to environmental sustainability on campus and in society.

### **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.

[X ] No known or anticipated risks Explain why no risks are anticipated: self-reporting survey, no coercion, no bodily or mental harm, no demographic sampling beyond the name of the faculty to which the student belongs.

[X] Minimal risk \* Description of risks:

[ ] Greater than minimal risk\*\* Description of risks:

\* 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.**

N/A

### **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 (included at the top of survey)

Information/cover letter; provide a copy

Other (specify)

### **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.**

No identifying information will be attached to the survey (e.g. signatures or name). We will be asking for the name of their faculty, and that will be the only personal information connected to the survey responses. The name of their faculty will not tie back to their identities. The surveys will be kept in a locked room and shredded after the findings are released. Responses will be grouped by faculty for analysis and not discussed individually.

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

Completed surveys will be locked in Caira Clark & Lori Martinez's secure apartment at 6058 Pepperell Street, Halifax, NS. All surveys will be destroyed once data analysis is complete and the course-based report has been submitted. Data will be in digital format and deleted once the data analysis is complete and the

report submitted. Data in digital form will be kept on a laptop, with password protection, that belongs to one the team members.

**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.**

Paper records (surveys) will be kept in a secure apartment building and will be destroyed after the project is completed (April 11, 2014)

Confidential shredding

Electronic data in Excel files will be retained on one group member's password-protected laptop until completion of ENV5/SUST3502.

Audio/Video Recordings

Erasing of audio/video tapes after \_\_\_\_\_

Data will be retained until completion of specific course.

Electronic

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:** Completed surveys will be stored in the locked apartment of one of the group members. Digitalized data will be kept on the password-protected laptop of one of the group members.

**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.

[X] Information Letter and Consent Form(s). Used in studies involving interaction with participants (e.g. interviews, testing, etc.)

[X] 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:**

Caira Clark

Annick Colbert

Kendra Marshman

Lori Martinez

Abdulrahaman Refaei

## **Informed Consent Script**

**Study Name:** Investigating the Uses and Underuses on Campus Green Spaces at Dalhousie University Halifax Campuses

**Purpose of the Research:** To discover which existing campus green spaces are used and underused by students and professors as areas for outdoor learning. We also have a special interest in whether or not faculties/majors play a role in determining how many opportunities students will have for outdoor learning within campus green spaces. You are being invited to take part in this research study because we are seeking Dalhousie students from a variety of academic majors to create a well rounded sample to study.

**What Will You Be Asked to Do in the Research:** As a research participant, you will be asked to give us ten minutes of your time to fill out the provided survey. You will be asked to answer questions regarding your demographic make up, such as age, gender and academic major and/or position at Dalhousie University, as well as questions pertaining to your current use of campus green spaces.

**Benefits of the Research and Benefits to You:** Benefits to you as a participant will be generated from the knowledge that you assisted inexperienced researchers in discovering possible ways to improve campus green spaces. We appreciate the reciprocity of researchers and research participants helping one another to gain more experience in the research process pertaining to campus sustainability issues. Benefits that may be felt by the university as a whole, or by students in particular academic majors, might be more time spent learning outdoors.

**Voluntary Participation:** Your participation in the study is completely voluntary and you may choose to withdraw at any time, without penalty. If you choose to withdraw, your decision will not influence the nature of the ongoing relationship you may have with the researchers, or the nature of your relationship with Dalhousie University.

**Confidentiality:** Unless you choose otherwise all information you supply during the research will be held in confidence and unless you specifically indicate your consent, your name will not appear in any report or publication of the research. Only research staff and the course supervisor will have access to this information until the research project is submitted to Dalhousie

**Questions About the Research:** If you have questions about the research in general or about your role in the study, please feel free to contact Dr. Hendricus A. Van Wilgenburg either by telephone at (902) 678-3844, or by e-mail [hwilgenb@dal.ca](mailto:hwilgenb@dal.ca). This research has been reviewed and approved by the Dalhousie University's Environmental Science Program Ethics Review Committee and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, please contact Research Ethics, Dalhousie Research Services, 5<sup>th</sup> Henry Hicks Building, Rm 231, Dalhousie University, PO Box 15000, Halifax, Nova Scotia B3H 4R2 (telephone 1.902.494.3423 or e-mail [ethics@dal.ca](mailto:ethics@dal.ca)).

**Project Title: Investigating the Uses and Underuses on Campus Green Spaces  
at Dalhousie University Halifax Campuses**

**This survey is only for currently students who have or have had classes on Studley Campus.** Thank you for taking to time to assist in our research project on the uses of campus green spaces as areas for outdoor learning. This survey should take 5-10 minutes to complete. All answers will be confidential.

**Information Consent Script:** I understand that by completing this survey I am verbally consenting to participate in this study.

**Directions: Please check the appropriate option.**

What is the Faculty of your primary major or area of study?

- |  |   |
|--|---|
| <input type="checkbox"/> Agriculture               | <input type="checkbox"/> Graduate Studies   |
| <input type="checkbox"/> Architecture and Planning | <input type="checkbox"/> Health Professions |
| <input type="checkbox"/> Arts and Social Sciences  | <input type="checkbox"/> Law                |
| <input type="checkbox"/> Computer Science          | <input type="checkbox"/> Management         |
| <input type="checkbox"/> Dentistry                 | <input type="checkbox"/> Medicine           |
| <input type="checkbox"/> Engineering               | <input type="checkbox"/> Science            |

**Please select yes or no for the following question:**

At least one of my courses has had at least one class session outdoors.

YES

NO

**If you answered yes, please provide the subject area for the courses that you have had outdoors on Dalhousie Studley campus, whether it was for lectures or labs/tutorials, and the spaces in which your lectures or labs/tutorials**

Subject Area (e.g. BIOL)	Lectures or Lab/Tutorials	On-Campus Spaces Used (select all that apply) O = Ocean Pond; Q = Quad; M = McCain Courtyard C = Campus Garden; Please specify "other"
	<input type="checkbox"/> Lecture	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lab/Tutorial	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lecture	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lab/Tutorial	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lecture	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lab/Tutorial	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lecture	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:
	<input type="checkbox"/> Lab/Tutorial	<input type="checkbox"/> O <input type="checkbox"/> Q <input type="checkbox"/> M <input type="checkbox"/> G <input type="checkbox"/> Other:

Regardless of your answers to the previous questions, please rate your agreement with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Only my classes with curriculum related to the environment can benefit from the use of outdoor spaces during class time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Only my classes with hands-on lab/tutorial components can benefit from the use of outdoor spaces during class time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My classes that do not currently use outdoor spaces could be using them for lectures or class discussion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My classes that do not currently use outdoor spaces could be using them for hands-on experiential learning like labs/tutorials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to see enhanced outdoor spaces on campus for regular class lectures or class discussions on Studley campus.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to see enhanced outdoor spaces on campus that can be used for hands-on experiential learning like labs/tutorials on Studley campus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rate the following attributes based on the qualities that you look for in a campus green space that will be used during class time.

	Unimportant	Somewhat unimportant	Neutral	Somewhat important	Important
Natural flora and fauna	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Native flora and fauna	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High biodiversity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Forested areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Freshwater Habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marine Habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shelter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Benches and tables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large grass-covered areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trash cans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No automobile traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No traffic from other classes or students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Appendix C**  
**Project Proposal**

***Taking Classrooms Outside: Investigating the Use of Campus Green Spaces as Areas of Outdoor Learning at Dalhousie University's Studley Campus***

**ENVS/SUST 3502 Campus as a Living Lab**

**Dr. Hendricus Van Wilgenburg**

**February 27, 2014**

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## 1. Project Definition

### Key Terms

- **Green space:** an outdoor space that incorporates elements of the natural environment.
- **Outdoor learning:** any education, formal or informal, that takes place outdoors.
- **Outdoor classroom:** an outdoor area in which formal education takes place.
- **Sustainability:** a pathway of continual improvement where actions protect and enhance human and natural resources needed by future generations to enjoy a quality of life greater than our own” (Dalhousie, 2010, p. 1), whether on a university campus (referred to here as “campus sustainability”) or in perpetuating biological systems (ecological sustainability)

### Research Problem

This research project will focus on the use of outdoor spaces in university classes at Dalhousie University’s Studley Campus. Our own positive experiences with outdoor learning have led to our interest in the topic. We chose Studley Campus because it is the campus with which our group members are most familiar. Personal interest is not the only rationale for the project, however. When many universities like Dalhousie were founded, they were in rural areas; today, they are in urban areas instead (Wheeler, 2008). Universities have only recently begun to view their surroundings through the lens of urban ecology, which is important for biodiversity and ecological sustainability in cities and on university campuses because it considers the ways in which humans and ecological systems affect one another in urban settings (Alberti, 2008, as cited in McDonnell, 2011; Wheeler, 2008). Outdoor learning offers the opportunity to connect city dwellers to nature amongst continually growing environments (Schwartz et al., 2013). Furthermore, outdoor learning can decrease isolation between students and the environments in which they learn by allowing students to experience real-world complexity (Berman et al., 2008). As such, our primary research questions are:

1. What campus green spaces are being used in class time?
2. What faculties are using campus green spaces?

A sub-topic that we are interested in pursuing is the possibility of an increase in use of existing outdoor spaces on campus. Thus, our secondary research questions are:

1. Would students like to see an increase of outdoor space use during class time?
2. Are different disciplines more likely to support the use and enhancement of outdoor spaces on campus?
3. What attributes of outdoor green spaces could enhance student learning?

### Project Urgency & Practical Value

The urgency and practical value of research into the use of outdoor classrooms stems primarily from the fact that Dalhousie University has already identified the need for increased outdoor space for students in its 2010 Campus Master Plan. Though the report does not mention outdoor classrooms in particular, it recognizes a need for a “university wide open space system” to connect existing but disparate outdoor spaces (Dalhousie University, 2010, p. 8). The university does recognize its main constraint as being its limited budget (Dalhousie University, 2010, p. 8). As researchers, we share a common goal with Dalhousie: to intensify the use of existing green space instead of expanding campus boundaries, because increasing the use of outdoor spaces for classroom learning can help Dalhousie to improve its academic programs and its administrative policies to forward its goal of sustainability (Dalhousie University, 2010, p. 10). A practical result of the project could be that if a need for enhanced green spaces on campus is

identified, the planning committee for the current Student Union Building renovations (Dalhousie Student Union, n.d.) could incorporate green spaces into their design based on our recommendations. Thus, the use of time, materials, and effort is justified because there is a practical application for the results on campus.

### Differences of Opinion

Our project addresses the differences in use of outdoor spaces among faculties, so there will likely be variation in the different faculties' opinions on environmental issues. Devlin & Sherburn (2004) found that students majoring in economics valued environmental issues less than students in environmental studies programs; perhaps this dichotomy will also be seen at Dalhousie. Perhaps in addressing the factors that perpetuate the use of outdoor spaces and those that detract from their use, we will be able to make recommendations to increase non-environmental faculties' use of outdoor spaces.

### Limitations

There are some limitations to this research project. The most prominent limitation is that Dalhousie University (2010) identified its limited budget for the implementation and increased use of outdoor spaces on campus. We will need to keep their financial concerns in mind when making recommendations. The second limitation is related to the idea discussed above that certain faculties may be more interested in environmental issues than other faculties. Students in those faculties that do not regularly use outdoor spaces might be less inclined to want to learn outside. Practical reasons for not using outdoor spaces, like limited accessibility for PowerPoint Presentations, are the third limitation. Finally, as Bogner (1998) noted in his study that, like ours, incorporated a self-administered survey, there has been no opportunity to pilot test the survey prior to its use, which detracts from its reliability.

## **2. Background and Rationale**

The rationale for our project is a result of the benefits and situational challenges of outdoor learning. The concept of an outdoor classroom began with a series of studies, beginning in the 1970s, which showed evidence of the beneficial psychological and emotional effects of nature. Ulrich (1979) conducted one of the first studies, and showed that people who viewed photographs of natural environments experienced Positive Affect - positive emotions and moods (Springer Reference, 2014) - versus those who were shown urban images. The same scholar later showed that those who use parks experience positive psychological benefits (Ulrich, 1981). Later, studies found that nature has restorative effects (Kaplan, 2001) and that increased biodiversity has positive psychological results (Kaplan, 1995; Fuller, 2007). As a result of this previous research, McFarland et al. (2008) did a study using an online survey at a Texas university that found a positive relationship between quality of life and use of campus green space. They completed a similar study on graduate students in 2010 that mirrored those results. In addition, Grahn & Stigsdotter (2003) found that increased visits to urban green spaces also correlated with a decrease in stress related illness, an effect from which many students could benefit. Notably, there is no prominent research that contradicts the psychological and emotional benefits that nature can have on individuals.

While psychological and emotional studies might inform Dalhousie's focus on campus green spaces, the education-based benefits of nature are also likely a factor. Berman et al. (2008) and Apul et al. (2011) identify those cognitive benefits, which include, for example, improvements in directed attention. Inquiry into nature's developmental benefits on children is prevalent; perhaps the best-known scholar to study the phenomenon is Louv (2008), who identified the dearth of learning in outdoor spaces and termed it "nature-deficit disorder" in the subtitle of his book. Studies on university-aged students are

more pertinent to this project, however. An overview of the research on that age group uncovers the benefits of outdoor learning that could contribute to campus sustainability: environmental awareness, sense of place, engagement with environmental issues, and practical applications. When combined with the factors that students look for in outdoor classroom spaces, these benefits inform our research questions, as they provide motivation to increase the use of outdoor spaces during class time in order to enhance sustainability outcomes at Dalhousie.

#### *Benefit #1: Environmental Awareness & Attitudes*

The first benefit to sustainability is that students become more aware of their environment when they learn outside. Geisler (1977) found that environmental concern increased with outdoor recreation. More pertinent to the issue of outdoor classrooms rather than recreation is Bogner's (1998) study of outdoor education programs for pre-teens; his before-and-after survey showed that the exposure increased pro-environmental attitudes. Hill (2013) documented similar results, but also found that students were more aware of environmental issues. Survey responses from students who participated in a riparian restoration project support Hill's (2013) results; the students not only learned scientific concepts and applications, but also they had more awareness and appreciation for the riparian zone's value (Purcell, 2007). Even school gardens positively affect students' environmental attitudes (Skelly & Bradley, 2007). Increased environmental awareness is therefore a reason to look at the use of outdoor spaces on campus. However, Shepard & Speelman (1986) found that an outdoor education camp program had little effect on environmental attitude. Their study is perhaps not applicable to Dalhousie, though, as it does not concern lab, tutorials, or lecture sessions. Shepard & Speelman (1986) did document some impact since they also found that the longer the program, the greater the development in pro-conservation attitude. Their study is useful to our research therefore, because it justifies questioning the frequency of the use of outdoor classroom spaces.

Also related to environmental awareness is the difference in use of and attitude towards the environment among disciplines. Lawrence (2012) focused on students at a North Carolina College, a similar age group to those attending Dalhousie University, finding that students in environment-related fields visited natural areas on campus more frequently than students in other fields; the students also had higher levels of environmentally responsible behavior. A detriment of that study was that it was indeterminate whether their behavior was due to their field of study or their use of natural spaces. However, a variety of studies support the difference in awareness or concern among disciplines (Devlin, 2004; Hodgkinson & Innes, 2010; Synodinos, 1990; Tikka et al., 2000); only one had results to the contrary (Shetzer et al., 1991, as cited in Devlin, 2004). The difference in awareness between disciplines directly informs our research question of whether certain faculties use campus green space more than others. Additionally, Shepard & Speelman (1986) found that a person's environmental attitudes experience the most positive growth the first time they are exposed to nature. Thus, we have further impetus to question whether more classes of non-environmental disciplines could benefit from the use of outdoor spaces during class time.

#### *Benefit #2: Sense of Place*

Students feel more connected to their surroundings when they spend time outdoors. Hill (2013) linked place-based learning to effective education for a sustainable future. While Lawrence (2012) did not explicitly link use of natural spaces to increased sense of place, students in environmental fields who used outdoor spaces more than students in other disciplines demonstrated higher emotional connection and investment in those spaces. Kuwahara (2013) more concretely supports Hill's (2013) results, as he showed that high school students whose science curricula included outdoor components had increase place attachment. Hill (2013) does caution, though that outdoor learning should emphasize local environments, because traditional views of wilderness may not allow for the development of a useful

understanding of nature and sustainability. Overall, though the benefit of increased sense of place is thus another reason our research is interested in the outdoor space use at Dalhousie University.

### *Benefit #3: Engagement with Environmental Issues*

A third benefit, a result of increased awareness and sense of place, is that students become more engaged with environmental issues when they have spent time outdoors, and learned outdoors. Students who are exposed to nature and are more aware of environmental issues want to and do become engaged in those causes (Bogner, 1998; Lawrence, 2012). Bogner (1998) uses survey methodology, but his methods are not useful to us because his survey is, whereas ours is cross-sectional. However, while Lawrence (2012) used an online survey where we are using an in-person survey, she did ask the students in her student about the frequency at which they used outdoor spaces. We are not interested in frequency but rather which faculties use what green spaces so Lawrence's survey methods can serve as a base that can be adapted for our purpose. Ultimately, if Dalhousie is looking to further its sustainability goals through environmental engagement, opportunities to experience nature like outdoor classrooms could foster that behavior. Thus, another reason to question the use of outdoor green spaces during class time is the potential benefits it offers for campus sustainability.

### *Benefit #4: Practical Applications*

Perhaps the most concrete benefit to sustainability that outdoor classrooms can cause is the institution of practical projects on campus that enhance the built environment. There are case studies of outdoor projects undertaken in class time to enhance campus sustainability while achieving learning outcomes. For example, students at the University of California, Berkeley surveyed vegetation in an urban creek and another on-campus area, removed exotic vegetation, and replaced what they had removed with native plants, thereby increasing species richness (Purcell, 2007). Another popular project is to build a garden. At the University of Toledo, an outdoor garden improvement project enabled engineers to incorporate learning theoretical and technical skills, while contributing to sustainability on campus (Bermen et al., 2008). Campus Gardens at the University of Utah have been slowly expanding, and a course on organic gardening regularly uses the space during class time (Chambless et al., 2012). One environmental benefit is that student use of gardens can also advocate for and produce locally grown and organic food, another cause related to sustainability (Graham et al., 2005). Even if the gardens grew flowers instead of vegetables, environmental awareness increased (Skelly & Bradley, 2007). A final concrete use, though related to sustainable improvement of the built environment on campus' is that various universities use outdoor classroom spaces with natural elements for entomology lessons and to collect specimens for their laboratory sessions, saving the cost and emissions generated from buying and shipping insects from afar (Wheeler, 2008). There are obvious practical applications that outdoor classrooms could contribute to Dalhousie's campus sustainability, providing further justification for inquiry into the use but also the potential for improvement to those areas with specific class projects.

### *Factors Determining Use or Disuse*

A final important aspect to research on outdoor learning is the factors that determine the use or disuse of outdoor spaces. Abu-Ghazze (1999) studied the factors that affect student use of outdoor campus spaces in Jordan. He used maps, photos, text, and in-person participant selection among those items to determine the prevailing factors, which included the landscape and design, the possibility of socialization, and the presence of other outdoor spaces (Abu-Ghazze (1999). Bentsen (2013) studied the specific attributes that influence teachers' use of outdoor classrooms in Denmark. The four factors that were the most important to the teachers were "areas with natural flora and fauna", "areas with water", "areas within walking distance", "areas reminiscent of forest" and "areas with places for making

a fire” (Bentsen, 2013, p. 569). As one of the members of our research team is studying Community Design, and because a survey of students’ perspectives on the attributes that contribute well to outdoor spaces might increase their usefulness and utilization during class time, we are interested in surveying to uncover those attributes. In terms of methods, while Abu-Ghazzeah also surveyed for specific attributes, the factors that Bentsen (2013) was interested in could be adapted for our purposes, provided that they were each feasible on Dalhousie’s Studley Campus. A survey of attributes that students look for in outdoor classrooms could increase their use, and thus benefit the previously discussed sustainability outcomes.

### Research Opportunities

The impetus for our research project lies in research opportunities that the previously summarized research presents. The most obvious gap is that we are interested in sustainability at Dalhousie University, and none of the studies addressed outdoor learning that school. Research on Dalhousie’s outdoor classrooms regardless of its nature, would thus be an opportunity. However, our literature review has shown that sustainability at Dalhousie could benefit from four results of outdoor learning and outdoor classrooms: an increase in environmental awareness and pro-environmental attitudes, an increased sense of place, increased engagement with environmental issues, and practical applications in the built environment (Bogner, 1998; Purcell, 2007; Lawrence, 2012; Hill, 2013). A study of outdoor classroom use at Dalhousie University could determine if these benefits were being experienced on campus. Furthermore, as certain disciplines are more likely to use outdoor classrooms than others (Devlin, 2004; Hodgkinson & Innes, 2010), a study of the use of outdoor classroom spaces on campus could determine which faculties are and are not using outdoor spaces. Finally, the attributes of the outdoor classrooms themselves affect their use (Abu-Ghazzeah, 1999; Bentsen, 2013). Research into the attributes that students value in outdoor classroom spaces, and into what spaces are currently being used, could allow for recommendations to the Dalhousie Administration as to the possibilities for improvement of outdoor classrooms. Ultimately, our research project will address each of the previous issues in order to better understand the use of outdoor classrooms on campus and to make possible recommendations to improve campus sustainability at Dalhousie University.

## **3. Methods**

### Preliminary Research

First, group members conducted preliminary research on subjects related to outdoor classrooms and outdoor learning with a literature review. The primary source of information was digitalized journal articles accessed through the Dalhousie library system; in particular, the databases Web of Science, Environmental Sciences and Pollution Management, Science Direct, and GreenFILE were used. The vast majority of research was in peer-reviewed journals; grey literature was only used for specific case studies. The literature review was used to narrow our research’s points of emphasis and to determine our two primary and three secondary research questions.

### Survey Design & Variables

We determined that the best method given our research questions and the research parameters given to us in ENVS/3502 was to do a cross-sectional self-administered interception sample survey of Dalhousie students who have had classes on Studley Campus. We chose a survey because it will provide an overview of the experiences and opinions of a certain population (Merriam-Webster, 2014); in our case that would be Dalhousie students’ experiences of outdoor classrooms and outdoor learning. A cross-sectional study is a study that gives a snapshot view of a population at a particular time (Levin,

2006), which is relevant to our research questions as we are interested in students' experiences and opinions at one point in time, not how they change with exposure to outdoor classrooms and outdoor learning. We decided to use a self-administered survey because of the time constraints for our project; interviews would take too much time considering that we have only four weeks in which to conduct the research and process the information. Finally, we have decided to rely on in-person interception survey because people are oversurveyed with online surveys and so they have a low response rate (Bickart & Schmittlein, 1999). The locations we have chosen – the Killam Memorial Library, the Life Sciences Centre, the Marion McCain Arts & Social Sciences Building, the Goldberg Computer Science Building, and the Kenneth C. Rowe Building - will allow for a heterogeneous sample among disciplines because a variety of different faculties use those buildings. Additionally, all of the buildings are on Dalhousie's Studley Campus, which is the area that we are studying. We will be offering candy as incentive for students to fill out the survey.

The variables that we will be using are addressed sequentially in our survey questions (Appendix A). The first set includes the different faculties to which the students completing the survey belong. The second set is "yes" and "no" to the question of whether or not the student has had class outdoors. Then, there are the individual subjects for which they had classes outdoors, the options of lab and/or lecture/tutorial, and the various green spaces on campus where their classes might have taken place. Those variables will allow us to compare the faculties that use outdoor spaces; we loosely based this question upon Lawrence's (2012) study in which she calculated the frequency at which students visited campus green spaces. However, we are not interested in the specific frequency of use among faculties and so will not be asking students for the number of times that they visited specific campus green spaces during specific classes. The next variables are statements rated on a 5-part Likert Scale (from Strongly Disagree to Strongly Agree) that address the students' attitudes towards the use of outdoor classrooms and whether or not they would like to see improvement to outdoor spaces. We chose to use a Likert scale because it is easy for participants to understand and thus get consistent answers, the quantitative results are readily interpretable, and can be analysed mathematically, and the scale can incorporate neutral or undecided responses (Naser, 2013). While we designed the survey questions to address the previous variables, the final question was adapted from Bentsen (2013). It is also a Likert scale (from Not Important to Very Important), and addresses the importance that students put on various attributes of outdoor spaces. Bentsen (2013) determined his survey's validity with a pilot test where teachers and researchers completed it and gave feedback. When we adapted the results, we did not include variables that would not be applicable to Dalhousie's Studley Campus; for example, "areas with hills" and "areas without traffic noise". In altering the survey, we did negate its the validity and reliability. We do not have time for a pilot test of our own survey, and so will need to be cautious of its results.

### Sample Design

To determine the appropriate sample size for our survey, we used the Survey System Sample Size Calculator (Creative Research Systems, 2012, "Sample Size Calculator"), which itself used the following equation where  $ss$  = sample size  $Z$  =  $Z$  value,  $p$  = percentage picking a choice,  $c$  = confidence interval (Creative Research Systems, 2012, "Sample Size Formulas"):

$$ss = \frac{Z^2 * (p) * (1-p)}{c^2}$$

We chose a 95% confidence level because it means that 19 times out of 20 the results will not occur by chance; higher thresholds would generally only be selected if we were doing the same comparison several times (Laerd Statistics, n.d.). We chose a confidence interval of 10 because it yielded a sample size that we thought would be achievable in the four weeks allowed for this research project. The part-

time and full-time university students enrolled at Dalhousie University for the 2013/2014 academic year is 18564. Therefore, an adequate sample size, as the Survey System Sample Size Calculator has calculated, is 96 students.

### Ethics Approval

Our study involved human participants; therefore it has to go through ethics approval. Some ethical considerations when conducting research are “free and informed consent”, “privacy and confidentiality”, and “balancing harms and benefits” (Kirby et al., 2010, p. 88); these should be taken into account for ethics approval. We have filled out the Dalhousie ethics approval form (Appendix B) and consent form (Appendix C) and will be submitting them to Dr. Hendricus van Wilgenburg for approval prior to conducting our survey.

### Data Analysis

A variety of data analysis methods will be used to analyze the results; those methods are dependent on our research questions.

First, to determine green spaces are being used in class time, we will compile the frequency results for the use of outdoor spaces and map them using Geographic Information System software to visually display the most used areas on campus. The GIS analysis will be completed for the frequency of use in lectures, for labs/tutorials, and for both combined.

Second, to determine what faculties are using campus green spaces, we list the faculties who have classes that have taken students outdoors and those that have not taken students outdoors.

Third, to determine if different faculties are more likely to support the use of outdoor spaces on campus, we will compare the answers given on a 5-point Likert scale of students from different faculties to the statements “my classes that do not currently use outdoor spaces could be using them for lectures or class discussion” and “my classes that do not currently use outdoor spaces could be using them for hands-on experiential learning like labs/tutorials” using a pooled t-test. A pooled t-test is able to identify any significant differences between groups (DeVeaux et al., 2012, p. 669). In our analysis, each faculty will be its own group, so the pooled t-test will identify differences between faculties.

This test compares the means of two groups (DeVeaux et al., 2012, p. 669), so if the means are significantly different, it will represent that the use of outdoor classrooms and/or the support of outdoor classrooms varies between faculties. To compare student attitude toward the enhancement of outdoor spaces on campus, we will also use a pooled t-test to compare the student responses among faculties to the statements “I would like to see enhanced outdoor spaces on campus for regular class lectures or class discussions on Studley campus” and “I would like to see enhanced outdoor spaces on campus that can be used for hands on experiential learning like labs/tutorials on Studley campus”; here, we chose the pooled t-test for the same reasons as we did for comparing different faculties’ use of outdoor spaces. In addition, we will use a test of significance and a test of independence to determine if the variables correlate significantly.

Fourth, to determine if students would like to see an increase of outdoor space use during class time, we will calculate 5-point Likert scale means and significant differences for the statement “only my classes with curriculum related to the environment can benefit from the use of outdoor spaces during class time”, “only my classes with hands-on lab/tutorial components can benefit from the use of outdoor spaces during class time” and “my classes that do not currently use outdoor spaces could be using them for lectures or class discussion”.



Fifth, to determine what attributes of outdoor green spaces could enhance student learning, we will calculate 5-point Likert scale means and significant differences for the various attributes that were adapted from Bentsen, 2012. A comparison of the different scores will show which are the most popular among respondents.

#### 4. Deliverables

We will have five deliverables, as shown in Table 2.

*Table 2 Deliverables for a survey-based research project on outdoor classroom use at Dalhousie University's Studley Campus.*

Deliverable	Description
Report	a thorough document explaining our methods, analysis, discussion, and conclusion
Summary	a brief overview of our significant findings and their implications that can be sent to the stakeholders identified in the communication plan
Frequency-of-Use Map	a GIS map that visually displays how often campus green spaces are used as outdoor classrooms.
Suggested Improvement Pamphlets	a brochure with a compiled list of recommendations for future green space on Studley campus based on our results. It can be sent to the stakeholders identified in the communications plan.
Recommendations for future research	a list of topics or subject areas that could be researched to further understanding of outdoor classroom use at Dalhousie University

## 5. Communication Plan

We will communicate with five different groups, as shown in Table 3.

*Table 3 Stakeholders, impetus for their inclusion, and communication objectives for the study of outdoor classroom use at Dalhousie University.*

Stakeholder	Issues related to this stakeholder	Communication Objectives
Dr. Hendricus van Wilgenburg	Dr. van Wilgenburg is the professor for the class and so will be grading the report.	To allow Dr. van Wilgenburg to grade the report and provide any feedback.
Sydney Tori	Ms. Tori is our mentor so she will be interested in the results and providing feedback.	To allow for feedback.
Dalhousie Student Union/Lydon Lynch Architects	The DSU is interested in redesigning the SUB (Dalhousie Student Union, n.d.). They may be interested in incorporating more green space into the new renovations.	To discuss the possibility of integrating an outdoor classroom in the Student Union Building renovations.
Department of Facilities Management (DFM)	DFM is committed to providing Dalhousie with a sustainable environment that promotes learning (Dalhousie University, n.d., "Facilities"), so they will likely be interested in outdoor classrooms on campus.	To discuss the possibility of enhancing existing outdoor learning spaces.
Dalhousie Sustainability Office	The Sustainability Office is concerned with increasing environmental awareness, sense of place identity & engagement with environmental issues (Dalhousie University, n.d. "About Us")	To discuss the possibility of adding outdoor classrooms to the Dalhousie Sustainability Plan.

## 6. Schedule

The major steps of our project have been identified in the following Gantt chart. Certain group members will spearhead each task; however, all members will assist with every task. We will finish collecting data by March 14<sup>th</sup>; at this time, we will begin data analysis and GIS analysis. Data analysis will be completed by March 18<sup>th</sup> so the drafting the report will begin. Shortly thereafter, our group will draft and refine our Pecha Kucha presentation, which is due on April 1<sup>st</sup>. After the Pecha Kucha presentation, we will continue refining the final report, which is due on April 11<sup>th</sup>.

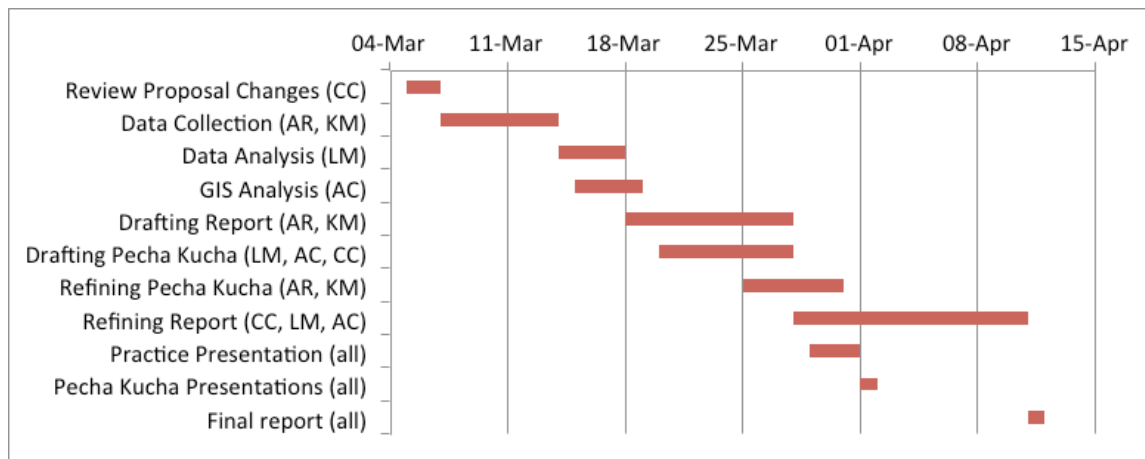


Figure 1 Gantt chart schedule for our research project on outdoor classrooms. CC: Caira Clark; AR: Abdulrahman Refaei; KM: Kendra Marshman; LM: Lori Martinez; AC: Annick Colbert.

## 7. Budget

Our project only has two costs: photocopying the survey sheets at the Killam Library and buying candy as incentive to complete the survey. We allowed for 110 participants in case some surveys were spoiled and could not be used in our analysis. The costs will be divided among group members. We will not be applying for funding.

Table 1 Budget for a survey-based research project on outdoor classroom use at Dalhousie University's Studley Campus.

Item	Price	Quantity	Total
Survey sheets	\$0.18/double sided black & white sheet	110	\$19.80
Candy incentives	\$0.20/individually wrapped candy	110	\$22.00
			\$41.80

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