

WASHING AWAY WASTE



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ENVS/SUST 3502: Campus as a Living Laboratory

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Washing Away Waste

HOWE HALL RESIDENCE LAUNDRY DETERGENT INITIATIVE

Executive summary:

Waste reduction strategies are an intricate part of the sustainable practices currently being initiated at Dalhousie University. The on-campus residence laundry facilities therefore offers a possible opportunity for further waste reduction strategies to be implemented, with the additional benefit of raising awareness regarding Dalhousie's scent-free policy. This report explores the feasibility and desirability of retrofitting the current Howe Hall laundry washing machines with an automatic laundry detergent-dispensing apparatus, utilizing an eco-friendly, hypoallergenic and locally manufactured laundry detergent, Down East, from Bebbington Industries.

In order to gauge the level of desirability among students, a probabilistic multistage cluster sampling technique was utilized via an online and self-administered survey, to obtain a representative homogenous sample of the residency students. In order to determine the feasibility of the laundry initiative, face-to-face interviews with the residence facilities manager and the owner of Bebbington Industries were conducted.

Results of the data collected via the hundred and one surveys, have demonstrated that the majority of residency students utilized the on-campus laundry facilities and are primarily in favour of the laundry initiative coming into fruition. Furthermore one quarter of the residency students indicated of disposing their laundry containers in the garbage stream, rather than recycling stream, thereby elaborating on the need to reduce unnecessary waste from on-campus laundry facilities. Further information is required to accurately determine the feasibility of this laundry initiative for Dalhousie residencies.

1.0 INTRODUCTION

1.1 DESCRIPTION

The research question for this proposal asked how feasible and desirable it would be to improve the waste reduction and scent-free policy efforts pertaining to on-campus laundry at Dalhousie University residences. The questions of how economically feasible it would be for the university to retrofit current Howe Hall laundry machines with automatic detergent-dispensing apparatus, and how economically feasible this service would be for the students potentially using it were investigated. In addition, it was determined how desirable this service would be for the university, to improve waste-reduction efforts as well as scent-free policy enforcement efforts through these means.

The current proposal's scope is the body of students residing in Howe Hall at Dalhousie University's Studley campus. The application of this technology at other institutions with similar environmental and human health needs as Dalhousie was also investigated.

One important step that was taken to implement delimitations is that only one specific residence, Howe Hall, was studied instead of all the residences at every campus in Halifax. Samples of information were taken instead of trying to reach every student in that residence.

One of the limitations encountered was the negligible amount of peer-reviewed research on the topic of alternative post-secondary laundry practices. Time and budget limitations were that it was difficult to provide incentive to the students to respond to surveys, so the extent and depth of our own research was compromised. The limited sampling tools appropriate for this research also shaped the scope and effectiveness of the research.

A survey of students living in Howe Hall was conducted to determine student support for the automatic dispensing of laundry detergent into washing machines on campus. Interviews with a building manager at Dalhousie University and a representative at Bebbington Industries (Down East) were also conducted to determine the technical and financial feasibility of the proposed project.

1.2 BACKGROUND AND RATIONALE

The rationale for undertaking this project was that on-campus laundry is a possible opportunity for waste reduction, as well as for the better enforcement of Dalhousie's current scent-free policies. Sustainability is intertwined with social and biological networks, systems, ecosystem functioning and productivity. Enforcing a more sustainable laundry practice by integrating environmental and sustainable considerations would more effectively evaluate how issues surrounding waste reduction and other environmental problems at Dalhousie would affect future sustainable practices. This enforcement would also determine how stakeholders in the university would be affected or limited. A more sustainable outlook would consider the need and supply of resources and how to best promote

sustainable human and ecological development. This report addresses that the on-campus laundry system is a significant opportunity for improvement of this nature.

In order to address these opportunities, the feasibility and desirability of retrofitting current on-campus washing machines with automatic detergent-dispensing equipment was investigated. The distributor considered, Down East of Bebbington Industries, is based out of Dartmouth, Nova Scotia, and has products which are EcoLogo certified, environmentally responsible, hypoallergenic and effective (Bebbington Industries, 2013). The rationale was that using the nearest producer is most convenient, because visits to the facilities and personal contact with the management and operational staff are possible, while also enabling a cut-back on transportation costs of goods, if the products are to be used at Dalhousie residences. This producer also caters to our goal of addressing the enactment of the scent-free policy by their production of hypoallergenic products.

Dalhousie University has three Halifax-based campuses, occupying more than 32 hectares throughout central Halifax. The Halifax campuses include Studley Campus, Carleton Campus, and Sexton Campus, and one campus in Truro, Nova Scotia. Dalhousie University has been involved in environment and sustainability issues for over 20 years (Dalhousie University, n.d.a). The Office of Sustainability focuses on promoting and encouraging social, ecological and economic excellence on campus and within the Dalhousie community. Dalhousie has been inspiring students and the larger post-secondary community to become more involved in sustainable activities and operations including the Rethink Sustainability on Campus program, which promotes student-led events such as Green Week and the annual Dump and Run; environmental committees, faculty research, planning and policy adjustment, and integrating sustainability into the curriculum (Dalhousie University, n.d.b).

Currently Dalhousie's on-campus laundry facilities do not provide any access to detergent, which means that users of the laundry rooms must provide their own detergent. If Dalhousie University provided access to laundry detergent within its own facilities, students would not need to procure their own, which would be beneficial in terms of students' convenience. The amount of plastic waste associated with in-residence student laundry could be dramatically reduced, if detergent distribution takes place in the form of retrofitted washing machines, as is being suggested.

Dalhousie could also use this integration of Down East's hypoallergenic products as a way to educate students about, as well as to reinforce the scent-free policy on campus. Laundry products are often overlooked when scent-free policies are introduced, and the introduction of hypoallergenic scent-free products could raise awareness of the problem of chemical sensitivities. Scent sensitivities cause not only health issues among students and staff, but also may lead a chemically sensitive person to be exposed to social stigma, as discussed by Lipson (2004). In this way, the introduction of Down East's automatic detergent-dispensing equipment could have not only an important positive ecological impact, but also make a more livable social environment for students within residences.

Apart from potentially reducing waste production from detergent containers, evidence suggests that the detergent itself could be less harmful to the environment than some mainstream commercial brands. One study conducted a chemical analysis of a selection of powdered and liquid detergents to

assess differences in pH, total dissolved solids (TDS), chloride, sulphate, carbonate and bicarbonate alkalinity (Goel & Kaur, 2012). The results indicated that powder detergents resulted in a significant increase in pH, TDS, chlorides, sulphate, carbonate and bicarbonate in wash water. Sodium silicate solutions have been observed to be the main contributor to the toxicity of detergents (deOude & Hennes-Morgan, 1994; Schifko & Warne, 1999). Dilution in sewers may reduce toxicity from sodium silicate, subsequently potential adverse environmental effects posed by effluent comprising of breakdown products of laundry detergents may be low (Schifko & Warne, 1999). However, the discharge of untreated or primary treated effluent containing detergents may be more problematic and environmentally harmful. The overall message within several of the studies previously discussed propose that consumers should use and adopt eco-friendly liquid detergents and eco-efficiency, such as the Down East detergent, to help minimize water pollution and to promote environmental health (Goel & Kaur, 2012; Järvi & Paloviita, 2008).

1.3 LITERATURE REVIEW

In an a priori content specific search for literature, sources that would help to identify the level of environmental and human health risks in different practices in relation to laundry and the use of detergent were sought after. Research was divided into four criteria: environmental impact of detergents, laundry practices at other postsecondary institutions, plastics and recycling, and chemical and scent sensitivities.

No peer-reviewed accounts of alternative post-secondary laundry practices were found, but detergent auto-dosing is being used at some universities. Four universities and colleges in Massachusetts (Babson College, Endicott College, the Massachusetts College of Liberal Arts and Tufts University), one in Connecticut (Yale University), and one in Maryland (Salisbury University) use the PrecisionWash™ system (Mac-Gray Corporation, 2003; Salisbury University, 2004; Tuna, 2006). The largest laundry facilities contractor to American universities and colleges, Mac-Gray Corporation, created the PrecisionWash™ system as a component to their Intelligent Laundry Solutions™ (Mac-Gray Corporation, 2003). The system eliminates the need for students to buy, store and tote laundry soap because an exact amount of detergent is injected into each load of laundry (Mac-Gray Corporation, 2003). PrecisionWash™ can prevent malfunctioning machines and drainage problems, and use less detergent, water and energy (Macbeth, 2007; Tuna, 2006). Too much soap creates an over-sudsing problem which causes the washers to use more water than should be needed, and more energy is required to treat the waste water (Tuna, 2006). Excessive detergent can also ruin clothes and prevent clothing from being properly laundered, and cause allergic reactions and environmental damage (Mac-Gray Corporation, 2003). Salisbury University's Director of Campus Sustainability and Environmental Safety, Wayne Shelton, says "the program is important as it reduced the use of water, electricity and waste from detergent containers" (W. Shelton, personal communication, February 21, 2013). St. Aidan's College at Durham University in the UK has automatic detergent and fabric softener dispensing in all but one of its washing machines "for environmental reasons" (Durham University, 2011).

The information available on environmental impacts of plastics and detergent proved to be extensive. One of the most valuable pieces of information which was gleaned from the plastics studies

was that when examining the negative environmental impacts associated with plastic laundry detergent bottles, it is important to consider all the impacts associated with their production. This includes the extraction and mining operations of raw materials, energy consumption in production, use of fossil fuels and their subsequent emitting of greenhouse gas emissions, refining of raw materials, manufacturing of the bottles, packaging, transportation, consumer use, and finally their disposal (Zoller, 2004). The process of the life cycle assessment approach reveals the broader spectrum of negative environmental impacts associated with plastic laundry detergent bottles.

A Tellus packaging study conducted by the Tellus Institute, a non-profit research and policy organization based in the U.S. reported that polyethylene, one of the main materials used in the production of plastic bottles, is produced from roughly 33% natural gas and 67% oil (Zoller, 2004). This reiterates the extent to which the environment is negatively affected by not just the potential for improper disposal of laundry detergent bottles, but also their production. This is valuable information to this project given that retrofitting the current washing machines will result in the reduction of plastic waste production and its subsequent disposal at Dalhousie residences.

According to the International Association for Soaps, Detergents and Maintenance Products, efforts are being made by producers in Europe to render detergent products more compact, with the aim of reducing waste (AISE, 2009). While there is evidence of a move towards packaging reduction on the commercial production level, it was found that limited information of push from the consumer level towards more sustainable detergent packaging practices. However, McCoy's study (2008) shows that even with increased concentrations of detergents and smaller packaging, there are still large quantities of laundry detergent bottles ending up in the landfill, meaning the problem has slowed but is still a persistent concern. This improper disposal is an indication that consumer awareness of environmental impact could be a factor in waste reduction. Due to the importance of consumer awareness, catalytic validity was maximized by informing students of the environmental and human health benefits of having Down East detergent-dispensing machines available for use.



Figure 1: Picture of landfill

Research on scent and chemical sensitivities also uncovered some information which contributes to catalytic validity in terms of the scent-free policy. Many medical journals yielded studies done on products that contained harmful synthetic fragrances and chemical compounds. One such study is that of Fisher (1998), who found that people who have chemical sensitivities report “headache, dizziness, nausea, fatigue, shortness of breath, difficulty with concentration and allergy-like symptoms” when exposed to certain chemical compounds that are commonly found in personal and household cleaning products. An increase in the use of hypoallergenic and scent-free detergents would render Dalhousie residences more accessible to people with scent and chemical sensitivities.

1.4 STAKEHOLDERS/ACTORS

- ☞ Core actors: Our group of four researchers; Dalhousie residence and building managers.
- ☞ Supporting actors: Students living in Howe Hall who have completed the survey; Tony Bebbington, the owner of Bebbington Industries (Down East); Representatives of other universities that have implemented similar equipment (Wayne Shelton, Director of Campus Sustainability & Environmental Safety, Salisbury University; Dave Gutoskey, Director of Student Housing, Salisbury University)
- ☞ Should-be actors: The Dalhousie students living in residences that did not complete the survey; Dalhousie administration, management and staff.

1.5 COMMUNICATIONS AND DELIVERABLES

The communications of this study are aimed at the Office of Sustainability, Facilities Management, including building and residence managers, and administrators of Dalhousie University. The communication tools that have been used and will be using to reach this audience are this report, which includes the findings, methods, suggestions for further research and a discussion of the problems at hand, as well as possible solutions to harmful on-campus laundry practices. Another audience are the future students of ENVS/SUST 3502. The goal of this study is to communicate that alternative laundry practices such as built-in detergent dispensers are not only available, but are potentially economically beneficial and desirable for students, as well as more environmentally efficient. Furthermore, the study aims to communicate to facilities management and members of the Sustainability Office that this alternative practice may raise both the awareness and the practice of the on-campus scent-free policy amongst students. It will be ensured that this communication through the means of passing on this study, as well as meeting for face-to-face communication in the coming months with key members. Current SUST/ENVS 3502 students were reached, as well the Director of the Office of Sustainability, Rochelle Owen, through the Pecha Kucha presentation.

These communications are meant to yield growing awareness of the need for adherence to the scent-free policy on campus to both building and residence managers, as well as amongst the students. The results of this study will also enforce the idea that small, everyday changes can make a lasting impact on personal budget and improve the level of environmental awareness in groups which may consider environmental responsibility outside of their interest or economic ability amongst students. This study was also intended to produce physical results through communication with Rochelle Owen, to implement our suggested changes to on-campus laundry practices at the Studley campus.

2.0 RESEARCH METHODS

The quantitative and qualitative methods that were used to research the feasibility and desirability of this project were; a literature review; a survey for students currently living in Howe Hall residence; face-to-face interviews with Mateo Yorke, the residence facilities manager for Risley Hall, as Maryanne Barkley the facilities manager for Howe Hall was unavailable, and Tony Bebbington of Bebbington Industries and owner of Down East; as well as attempting to contact other institutions via email who have tried alternative laundry practices. In addition, a schedule and budget were developed. A preliminary proposal was written and submitted. A funding proposal was submitted to the Dalhousie Student Union Sustainability Office and a request for donations was emailed to Just Us!. The survey was amended based on suggestions from the graded proposal. A communication plan was created for all the stakeholders involved, in order to determine whether or not all the stakeholders' best interests were being addressed through this proposed project.

2.1 LITERATURE REVIEW

A literature review was conducted to explore and investigate past, current and future projects and apparatuses that are similar in scale and scope to this proposal. Environmental implications of laundry detergents and plastic container waste on the environment and current scent-free policies at Dalhousie University were also investigated for the purpose of the literature review. An a priori content specific coding scheme, a form of qualitative analysis, was used to investigate the areas of interest for the literature review. University OR college; laundry detergent AND environment, plastic* OR packag*; environment OR landfills; and laundry OR detergent AND dispens* OR vendor were the main codes and themes searched for within the Environmental Sciences Pollution Management, Web of Science and Mechanical Engineering databases, which were accessed through Dal Libraries.

2.2 SURVEY

2.2.1 Survey Design

The researchers developed survey to determine the desirability of this project, a copy of which can be found in Appendix D. A pilot survey was tested with students living in residences other than Howe Hall and the interview questions were reviewed by the researchers' supervising instructor, Dr. Tarah Wright.

Dalhousie University has over 2000 students living in residence at the Halifax campuses. Howe Hall is the largest, with 716 students (Dalhousie University, n.d.c). This residence was selected for the survey to achieve a representative sample of the students living on campus. Its large population will allow for a statistically significant sample size while using a questionnaire to gather data. The sampling frame and target sample for this study was therefore Dalhousie students that lived in Howe Hall residence at the time of the survey circulation. A probabilistic sampling technique was used to obtain a representative sample of a homogeneous target population which consisted of all students that currently live in Dalhousie residences on all Halifax campuses to gather insight on student preferences and opinions with relation to current and proposed laundry practices (Atchison & Palys, 2008a). More specifically, a multistage cluster sampling technique was used, which involved random sampling of a cluster within a cluster, until at least ten percent of the sampling frame was surveyed (Atchison & Palys, 2008a). Howe Hall residence is one cluster out of all the Dalhousie residences on Halifax campus that collectively forms the population of Dalhousie students who currently live in residence.

Close ended or structured questions in combination with open ended questions were formulated for the purpose of the student survey (Atchison & Palys, 2008b). There is a graduation of more general questions in relation to how and where laundry is done and detergent preferences flowing into more specific questions concerning the in-residence laundry service our group is proposing. A brief project description of the proposal was provided at the top of the survey for participants to understand the objectives of the proposal as well as the environmental incentives the potential service may offer. Instructions were also provided to help alleviate any uncertainty with how to complete the survey.

Below is an enumeration of the survey question types which were used in this study, with correspondent survey questions.

The following are examples of closed or structured types of questions that were incorporated into the survey. Categorical questions are mutually exclusive and exhaustive where all possible answers are categories and the respondent must belong to one category (Atchison & Palys, 2008b). Most questions were of this type. Question 5 was the only question where more than one answer may have applied to the participant. Likert-type questions allowed for students to respond to a question with a rating on a scale (Atchison & Palys, 2008b). Questions 11 and 12 asked participants to select their level of agreement to the statements “reducing waste is important to you” and “buying local is important to you” respectively. One single response question, a structured question that supplies a space for a single response item, was included in the survey that asked participants to disclose their major/faculty within the demographic section (Atchison & Palys, 2008b).

Open ended questions encourage student opinion and expression which allowed for some individuality within the survey to explore students’ opinions and reasons for their answers more deeply (Atchison & Palys, 2008b). The use of open-ended questions (3,13 &15) gave the researchers more insight as to why students do not buy their laundry detergent, and if they do not, whether the service of automatically dispensed laundry detergent is desirable for students and if students had any further comments concerning detergent and laundry in Howe Hall.

Questions were written in a clear and precise manner without abbreviations or scientific terminology in order to minimize ambiguity. Double-barreled and biased questions were avoided; clear instructions were provided and mutually exclusive and exhaustive selections were provided for categorical questions all of which improved the validity, reliability and trustworthiness of the results (Wright, 2013a).

2.2.2 Surveying Techniques

As an incentive for students to complete the survey, a draw was offered with twelve prizes ranging from gift cards to coffee, tea and chocolate. The Dalhousie Student Union Sustainability Office provided funds for gift cards for prizes and for pudding and whipped cream for pies, and Just Us! Coffee Roasters Co-Operative donated coffee, tea and chocolate as prizes for the draw. Posters, as seen in the Appendix E, were created, printed and approved by Dean Martin, Dalhousie residence life manager and placed outside of the dining hall and throughout Howe Hall residence to alert the in-residence students of the survey, the proposed laundry initiative and the potential prizes that could have been won.

The survey was posted online on Opinio, a Dalhousie survey service, which opened March 8, 2013 at 12:00AM and closed March 18, 2013 at 11:59 PM. 100 student surveys and 300 URL strips were printed at Campus Copy on March 8, 2013 in preparation for URL slip distribution to students at the north and south entrances of the Howe dining hall Friday, March. 8 and Monday, March. 11, 2013 respectively from 11:00AM to 1:00PM on both occasions to capture the high traffic of students during

lunch. During these times, a table was stationed by the dining hall entrance where student surveys and posters were displayed on the table and the back wall in the efforts to entice students to either complete the survey there or take a URL slip for students to complete the online survey on their own time. At least two of the laundry initiative researchers were present during both occasions to stimulate student response and participation. The URL link to the survey was also displayed on the posters.

The researchers discussed the low level of responses to the online survey with their supervising instructor at 8:00PM on March 12, 2013 and came up with an alternative means of encouraging participation (pie-throwing). The researchers held the pie throwing station Thursday March 14, 2013, which conveniently took place on Pi (π) Day during dinner hours from 4:30PM-6:40PM at the north entrance of dining Hall and Saturday March 16, 2013 during lunch from 11:00AM-2:00PM at the south entrance of dining hall. Pies were made out of chocolate pudding and whipped cream. Music was also played to attract students to the station. While at least one researcher was being pied, the other researchers tried to compel as many students as they could walking by to complete the survey by stating that they had the opportunity to pie someone in the face, would have the chance to win one of twelve prizes and that the purpose of it was conducting a research study on a potential sustainability initiative for Dalhousie.

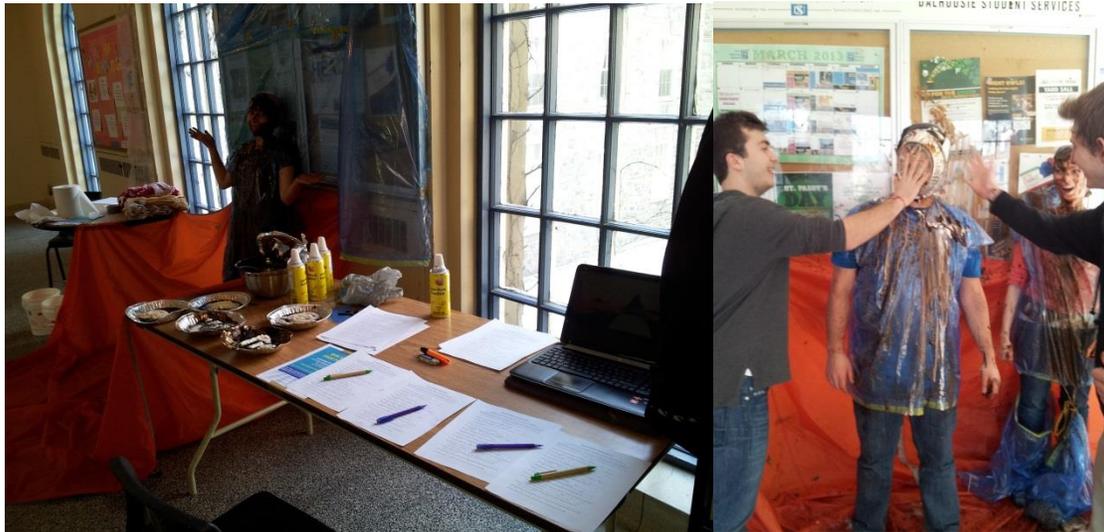


Figure 2: Pie throwing station, Howe Hall.

On Friday, March 22, 2013, all of the surveys that disclosed participants' name and email addresses were randomly drawn from a bag to select twelve winners. All participants who had submitted their names and email addresses had an equal chance of winning so there was no bias. Drawn winners with emails that were illegible were redrawn. Answers and demographic information that correspond to participants that provided their name and email for draw entry remained confidential whereas participants that did not disclose their name and email remained anonymous. Winners were notified via email. Prizes were dropped off at Howe Hall front deck for student pick-up Monday March, 25, 2012.

2.3 DATA ANALYSIS

Qualitative data and four types of quantitative data (nominal, categorical, ordinal, interval) were collected from the student surveys (Atchison & Palys, 2008c). Data analysis was achieved by categorizing each survey question and its corresponding answers as one of the following levels of measurement: nominal and categorical data, which both measure mode; ordinal data, which measures mode and median; and interval data, which measures mode, median or mean. This data was analyzed to determine student desire for the automatic dispensing of laundry detergent into washing machines.

A frequency table summarized the set of categorical, nominal, and ordinal data for each survey question (Wright, 2013b). Frequency tables summarise data and represent how often each value or, set of values of the variable in each question occurs. The relative percentage of each variable was also included.

Descriptive statistics was performed and achieved by using data display with either a histogram, a bar graph or a pie chart to visually represent the central tendencies and dispersions of the data for each survey question (Wright, 2013b). In addition, mode, median and mode values were attached to each graph where applicable.

2.4 INTERVIEWS

Interview questions were designed by the researchers and reviewed by the supervising instructor. Interviews were arranged by phone with both Tony Bebbington and Mateo Yorke. Mateo Yorke, residence facilities manager for Risley Hall at Dalhousie, and Tony Bebbington, owner and founder of Bebbington Industries (Down East), both partook in face-to-face interviews. The interview questions can be found in Appendix G. Face-to-face interviews help collect valid and reliable data that is relevant to the study's research objectives and allow for personal communication and data quality enhancement (Atchison & Palys, 2012b).

An interview was arranged with Tony Bebbington for March 12, 2013 at Bebbington Industries in Dartmouth, Nova Scotia. It took place in a conference room and was recorded, with Mr. Bebbington's permission, for reference while preparing this report. The interviewers introduced themselves and proceeded to ask questions pertaining to Down East laundry detergent and the equipment available to dispense the detergent automatically into washing machines. Following the interview, Mr. Bebbington

provided the interviewers with a tour of the Bebbington Industries facilities and samples of Down East laundry detergent. The interview summary can be found in Appendix H.

The interview with Mateo Yorke was held on March 13, 2013 at his office in Risley Hall. Similar to the interview with Mr. Bebbington prior consent was given for the meeting to be recorded for future reference. A list of questions asked pertaining to laundry facilities at Howe Hall can be found in Appendix G and an interview summary can be found in Appendix H.

2.5 EMAIL CORRESPONDENCE

There was email correspondence between the researchers and Wayne Shelton of Salisbury University, in which technicalities of the process were discussed, as pertaining to Salisbury University's use of automatic detergent-dispensing machines. At this institution, costs of the service are included in housing fees. The emails between Mr. Shelton and a researcher are found in Appendix I. Other emails were sent to other institutions (Yale University and St. Aidan's College) using similar auto-dosing systems to request data and opinions, and to find a possible interviewee.

2.6 LIMITATIONS AND DELIMITATIONS OF THE STUDY

Limitations are elements in which researchers have no control over. One of the limitations in this study was the negligible amount of peer-reviewed research on the topic of alternative post-secondary laundry practices. The researchers received limited or no feedback from representatives of other universities that were contacted via email. It was difficult for us to provide incentive to the students to respond to surveys, so the extent and depth of our own research was compromised. The limited sampling tools appropriate for this research also shaped the scope and effectiveness of our research. Names were not clearly printed for prize winners, had to redraw once. Time was limited to collect as many surveys as possible, given that methods were changed to make filling out surveys more appealing and enticing! The quality of the pies was compromised due to budget constraints.

Delimitations are elements researchers can control. Pie throwing does not appeal to everyone! Another appealing activity could have been incorporated, if time and budget permitted, to attract those who were not interested in pie throwing in order to collect a larger sample. In addition, "more questions on the back page" on the bottom of the front page of the student survey should have been included to reduce the quantity of surveys that did not have the back page filled out. Both of these suggestions would have improved the validity of the research findings.

2.7 BUDGET

There were two parts to the budget for this project: incentives for the completion of the survey and costs of materials. Funding for the incentives and materials was applied for on February 22, 2013 from the Dalhousie Student Union Sustainability Office (DSUSO). The funding proposal can be found in Appendix B.

Funding was approved by DSUSO on February 27, 2013, but not for the amounts asked for in the proposal. \$50 for gift cards, rather than \$100 for cash prizes, was approved for survey completion incentives. \$40 was approved for printing costs. It was suggested by DSUSO that the survey be conducted online to minimize paper waste and costs.

A draw with 12 prizes was used to compel students in Howe Hall to complete the survey. \$50 was provided by the Dalhousie Student Union Sustainability Office for gift cards (one \$30 gift card and one \$20 gift card for businesses chosen by the winners). The remaining prizes were donated by Just Us! (coffee, tea and chocolate with a value of \$39.90) and one of the student researchers (a \$20 Tim Horton's gift card).

100 copies of the survey were printed, along 12 sheets of URL slips, at a cost of \$19.20; 20 color posters were also printed at a cost of \$8.97. The materials for pudding and whipped cream pies for the first pie day cost \$18.70, and \$15.34 for the second pie day.

The total budget for this project was \$112.19, provided by the Dalhousie Student Union Sustainability Office. Donations amounted to \$58.90. The student researchers also incurred some expenses that were not accounted for (printing on personal computers/printers, cleaning supplies, thank-you cards for the winners of the draw and transportation costs associated with travelling to and from an interview and picking up materials and donations).

2.8 SCHEDULE: WINTER TERM 2013

January 2013

SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22 First meeting with mentor (Tarah Wright)	23	24	25	26
27	28	29 Meeting with mentor	30	31		

February 2013

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4 Met with librarian (lit. review)	5 Meeting with mentor	6	7	8	9 Group meeting
10	11	12 Meeting with mentor	13 Pilot testing for student survey began	14	15	16
17	18 Last day for pilot testing	19 Edited and finalized student survey questions, meeting with mentor	20 E-mailed: Wayne Shelton (Salisbury Univ.; Yale student Laundry; Aiden's College	21 Response from Wayne Shelton received	22 preliminary proposal submitted Applied for DSUSO funding	23
24	25	26 Meeting with mentor Applied for Just-Us! donations	27 DSUSO confirmed funding	28 Rochelle Owen was contacted for Opinio information		



March 2013

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3 Just-Us! donation for survey incentive	4 Began to arrange face-to-face interviews with Down East and building managers	5 Meeting with mentor	6 Poster finalized	7 Printed posters	8 Start date for online survey, poster approved, surveys/urls printed & past out URL slips for online survey	9
10	11 Past out URL slips for online survey	12 Tony Bebbington interview at Down East, meeting with mentor	13 Mateo Yorke interview	14 Pie throwing 4:30pm-6:40pm (north entrance of dining Hall)	15	16 Pie throwing 11am-2pm (south entrance of dining Hall)
17	18 Stop date for online survey	19 Meeting with mentor	20	21	22 Drew for survey winners	23 Started data analysis
24 Group meeting	25 Prizes left at Howe Hall front desk for pick-up	26	27	28	29 Completed data analysis Compiled results	30 Started working on Pecha Kucha slides
31 Continued working on Pecha Kucha slides						



April 2013

SUN	MON	TUE	WED	THU	FRI	SAT
	1 Pecha Kucha presentation finalized and submitted	2 Pecha Kucha at the Grawood, Dalhousie	3	4	5	6
7	8	9 Group meeting to edit final paper Reimbursed for printing/materials	10	11 Group meeting editing of final paper	12 Group review of final paper, final Report submitted Peer reviews submitted	13
	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

3.0 RESULTS

3.1 SURVEY

In total, 101 students filled out the survey. 82 filled out the paper version of the survey during the pie-throwing session, while 19 filled the survey out online. Three participants did not fill out the demographic questions (back page) for the paper survey. They were included in the results; they were taken on their word that they were students living in Howe Hall. One person was omitted for the reason that they stated they were not a Howe Hall resident on their survey. Complete survey results with corresponding data displays are in Appendix F.

73.23% of the students stated that they do 100% of their laundry in residence. Most students (46.53%) stated that they do 1 load of laundry per week, and 94% of students buy their laundry detergent. Almost half of the students (49.5%) buy detergent once a semester.

The top three reasons stated as to why students choose their detergent are cost (52 students opt for the least expensive option, while 39 students chose their detergent according to preferred brand, and 21 students chose their detergent based on its efficiency in cold water. Tide was the most popular brand, used by 70.3% of the students who completed the survey.

In regards to packaging, 88.12% of students' detergents come in plastic packaging, while the remaining 9.9% come in cardboard packaging. Only 67.33% of students stated that they put their empty containers and packaging in the recycling bin 75.73% of students used liquid detergent.

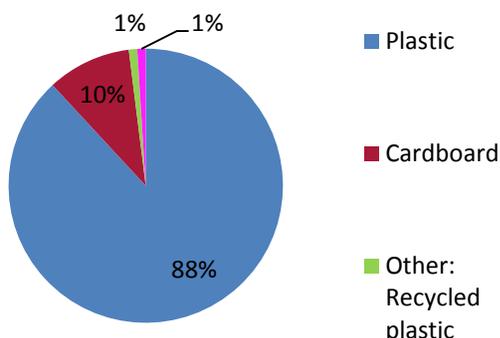


Figure 3: Pie chart that represents the relative frequency distribution (%) of the categorical responses to the question, “what is the container/packaging of the detergent you use most often made of?”

Table 1: Frequency distribution table for “what is the container/packaging of the detergent you use most often made of?”

Detergent packaging	Plastic	Cardboard	Other: Recycled plastic	Other: Tin	Total
Freq.	89	10	1	1	101
Relative Freq. (%)	88.12	9.90	0.99	0.99	100

Mode = Plastic packaging

34.65% of students strongly agreed that waste reduction is important to them, and only 6% of students said that waste reduction is not important to them. Buying locally was significantly less important to students who completed the survey. The highest percentage of students (23.76%) answered that they only slightly agree that buying locally is important to them. 51.49% of students did not know whether or not their detergent is High Efficiency.

53.48% of students stated that they would be interested in using automatic detergent-dispensing washing machines. Qualitative feedback was mixed in terms of positivity and negativity. Positive feedback was mostly expressed towards increased convenience, reduction of waste and access to a more eco-friendly option. Concerns pertained to costs added onto what is already considered to be an expensive laundry service. A price comparison between Down East and Tide, performed by the researchers, placed Down East at \$0.21 per load and Tide at \$0.25 per load. Some also expressed the desire to use their own detergents for personal reasons. Written responses yielded concerns pertaining to dal-card accessibility, and a reduction in overall laundry cost.

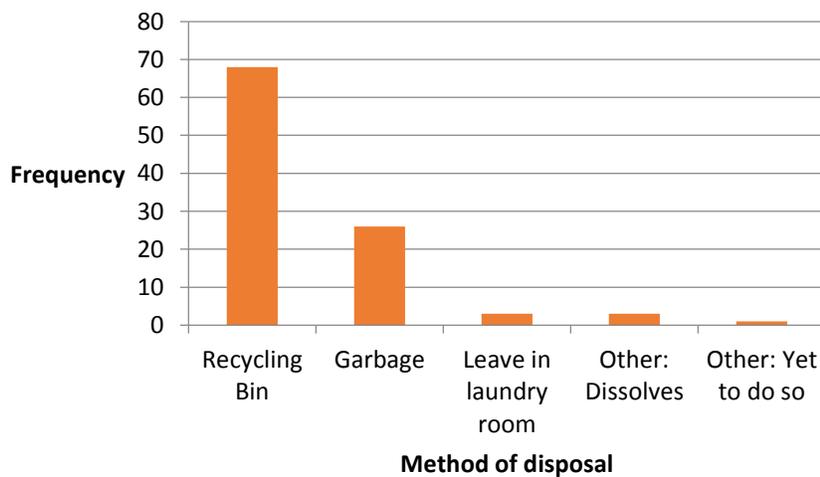


Figure 4: Bar graph that represents the frequency distribution of the categorical responses to the question, “how do you dispose of your container/packaging?”

Table 2: Frequency distribution table for “how do you dispose of your container/packaging?”

Method of Disposal	Recycling Bin	Garbage	Leave in the laundry room	Other: Dissolves	Other: Yet to do so	Total
Freq.	68	26	3	3	1	101
Relative Freq. (%)	67.33	25.74	2.97	2.97	0.99	100

Mode = Recycling bin

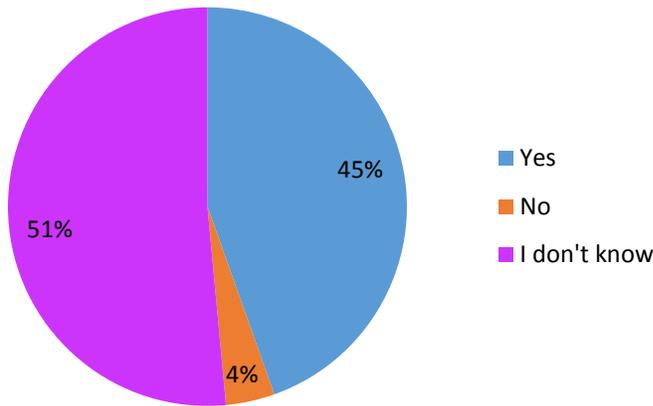


Figure 5: Pie chart that represents the relative frequency distribution (%) of the categorical responses to the question, “is your detergent HE (high efficiency)?”

Table 3: Frequency distribution table for “is your detergent HE (high efficiency)?”

High Efficiency Detergent	Yes	No	I don't know	Total
Freq.	45	4	52	101
Relative Freq. (%)	44.55	3.96	51.49	100

Mode = I don't know

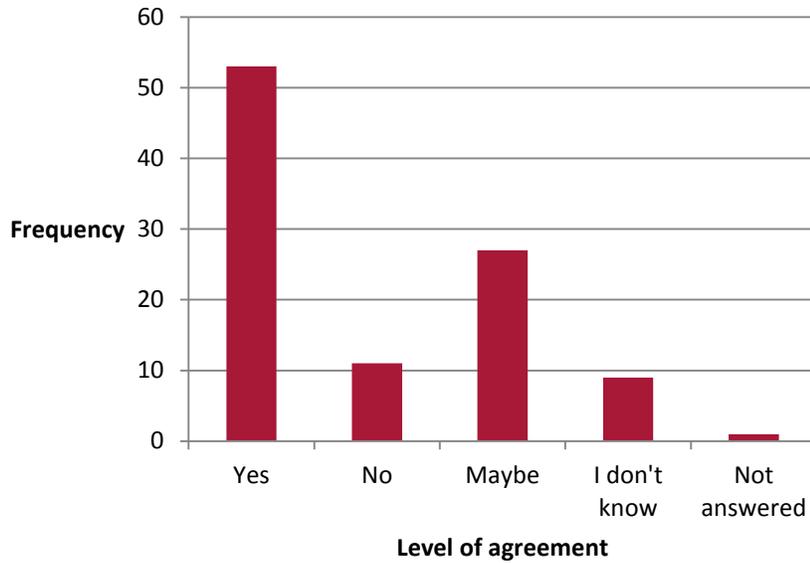


Figure 6: Bar graph that represents the frequency distribution of the categorical responses to the question, “would having detergent automatically dispensed in laundry machines interest you?”

Table 4: Frequency distribution table for “would having detergent automatically dispensed in laundry machines interest you?”

Interest in the service	Yes	No	Maybe	I don't know	Not answered	Total
Freq.	53	11	27	9	1	101
Relative Freq. (%)	52.48	10.89	26.73	8.91	0.99	100

Mode = Yes

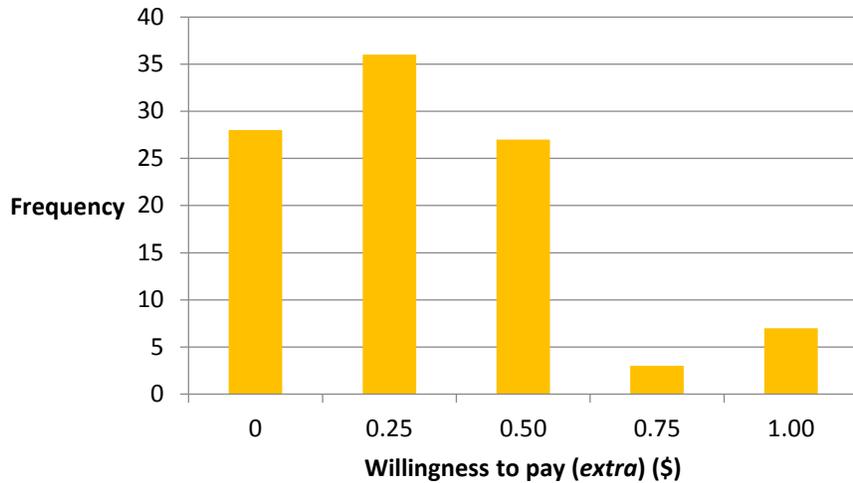


Figure 7: Bar graph that represents the frequency distribution of the categorical responses to the question, “how much EXTRA would you be willing to pay for a load of laundry if detergent was included?”

Table 5: Frequency distribution table for “how much EXTRA would you be willing to pay for a load of laundry if detergent was included?”

Willingness to pay (Extra) (\$)	0	0.25	0.50	0.75	1.00	Total
Freq.	28	36	27	3	7	101
Relative Freq. (%)	27.72	35.64	26.73	2.97	6.93	100

Mode = \$0.25

Median = \$0.25

Mean = \$0.31

3.2 INTERVIEWS

3.2.1 Face-to-Face

The interview with Mateo Yorke, the residence facilities building manager, helped to determine the technical and financial feasibility of the project, along with any concerns and challenges that may need to be addressed. While Mateo expressed that while retrofitting some machines to automatically dispense detergent “would make total sense”, there also costs to be considered. One example is the cost that Dalhousie would incur from the actual retrofitting of the machines. He also raised the concern of students incurring the cost of detergent per load. Most machines in Howe Hall are already DalCard operable, so costs related to changing coin-slots to address a change in price of service would not be a concern for the DalCard operated machines (for full interview summary see Appendix H).

Tony Bebbington, owner of Bebbington Industries (Down East), provided assistance determining the technical requirements and problems associated with installation of equipment, and the cost of implementation. The technology which is used by Bebbington Industries can equip front-loading washers. They would also be able to service the implemented apparatus once installed. The cost of retrofitting machines depends on the make and model of machines which are currently in place. There are two different possible methods: the first is a computerized system, and the second would be a pump-action system. Mr. Bebbington would need to be brought in to examine the current washing machines to produce a viable estimate. Mr. Bebbington is also concerned with providing an ethical consumer choice, and says “I have people calling me from the Philippines offering to do my design work for five dollars an hour compared to what I pay here at around eighty dollars per hour”. The summary is in Appendix H.



Figure 8: Down East laundry detergent product

3.2.2 Email

A telephone interview with a representative of another university regarding similar achievements of this proposal was attempted, in order to provide a perspective of the successes, limitations and difficulties of the project once it is in use; however the researchers were unable to secure an interview with representatives from any of the institutions that were contacted via email. Wayne Shelton, Director of Campus Sustainability & Environmental Safety, Salisbury University responded to the email sent by the researchers and provided information and his opinion on the program at Salisbury University. The “conversion to front-load washing machines and automated detergent dispensing was a decision by the director of housing after due consideration” (W. Shelton, personal communication, February 21, 2013). Mr. Shelton was unaware of any research conducted before implementation. “From my perspective as Sustainability director, the program is important because it reduced use of water, electricity and waste from detergent containers” (W. Shelton, personal communication, February 21, 2013). The complete correspondence can be found in Appendix I.

4.0 DISCUSSION

The questions of how economically feasible it would be for the university to retrofit current Howe Hall laundry machines with automatic detergent-dispensing apparatus, and how economically feasible this service would be for the students potentially using it were explored. In addition, it was determined how desirable this service would be for the university, to improve waste-reduction efforts as well as scent-free policy enforcement efforts.

Overall, the student response to the suggested alternative laundry practice was positive. The majority of the survey respondents stated they would use the service and would be willing to pay a fee for the detergent. As discussed in the results, concerns of some of the surveyed students are the extra cost of the automatic detergent dispensing service and the ability to use own detergent. To address this concern, a few machines could be omitted from the retrofit, leaving the option for those students to use their own detergent. This would also lessen possible negative feedback from students, who may feel that their choice to use a specific detergent impinged upon if all the machines were retrofit without consulting students.

Over half of the students that participated in the survey did not know if the detergent they most often use is High Efficiency. As stated by Mateo Yorke in the interview, the front-load washing machines in the residences are high efficiency washers, therefore they require High Efficiency detergent. By providing detergent to students through automatic dispensing equipment, Dalhousie can ensure that the proper type of detergent is being used in the residences.

Awareness of sustainability and scent-free practices would help make the transition smoother, as students are more than likely not aware of the problem of scent sensitivities as discussed Lipson’s study (2004). Dalhousie’s scent-free policy demonstrates an institutional concern for scent-free products, and the implementation of some Down East detergent dispensing machines would make a scent-free option available to students who may be averse to hypoallergenic and scent-free detergents because of a perceived price difference between these products and more common detergents. Another concern was

the ability to pay by DalCard, so if these machines were fit with the right technology, students would have easier access to the scent-free, hypoallergenic and environmentally friendly option.

In terms of increasing level of appeal to students, practicality is crucial, so enabling students to skip the step of having to go out and buy detergent or borrow some from someone else would make the Down East product an easy choice. If a student has just run out of detergent and they're in a rush, the automatic dispensing machines would be there, ready for quick use. To increase level of appeal further, research into cost effectiveness of using the suggested dispensing technology is necessary.

A significant positive to having this technology available to students is that it would raise awareness about sustainable practices because they would be exposed to a locally made product which is less likely to be harmful to the health of their peers and of themselves than the most prominent brands currently being used in residence.

5.0 CONCLUSION

The goal of this research is to find out how to make laundry-related sustainable practice an easy and attractive option to students, and the implementation of automatic detergent-dispensing machines would add convenience to sustainable laundry practices at Dalhousie residences. A positive response among students towards the possibility of implementing automatic detergent-dispensing washing machines equipped with Down East detergent was established. This implies that this project would be a worthwhile undertaking at Dalhousie residences. Only a small percentage of students were unwilling to pay extra money for the automatic detergent dispensing service. The researchers suggest that Dalhousie implement a pilot project using the equipment needed to automatically dispense detergent into washing machines and Down East laundry detergent, or another detergent that meets the standards set out in this report. If the pilot project is successful, university-wide implementation should follow.

The positive response to an eco-friendly approach amongst students also suggests that it would be worthwhile to investigate other alternatives for sustainable laundry practices. One possible area of research would be looking into the feasibility and desirability for clothes drying racks in each room in the residences. As one study shows, in-dorm drying racks are a way for students to save money and energy in their laundry practices (Hodge, 2009).

Another possible research topic is related to the surveying techniques the researchers used in this project. Prizes and online access did not induce participation levels as had been anticipated, but the pie-throwing events were extremely successful. This and other alternative means of encouraging participation in research could be an interesting topic to explore.

6.0 ACKNOWLEDGEMENTS

Emma Hoffman, Izzy Morin, Peter Moore and Kelli Smith would like to acknowledge the Environmental Problem Solving team at Dalhousie University: Tarah Wright, ENVS 3502 associate professor, for her guidance and support throughout this project; the teaching assistants of ENVS 3502 for their contributions and recommendations and Rochelle Owen, Director of the Office of Sustainability, for her support for this project. Wayne Groszko, ENVS 3501 Sessional Instructor, for his feedback on the initial proposal.

The authors greatly appreciate Toby Bebbington, founder and owner of Down East and Mateo Yorke, residence facilities manager for Risley Hall who both partook in our interviews and provided us with invaluable information in the preparation of this report. Thanks are also extended to Wayne Shelton, Director of Campus Sustainability & Environmental Safety, Salisbury University for providing information and perspective on the program at Salisbury University.

The authors would also like to thank Dean Martin, Dalhousie residence life manager for approving and distributing our posters and for his support for this project; student survey participants; Howe Hall custodial and dining hall staff for providing cleaning materials for the pie day events; Howe Hall front desk for holding and distributing prizes to survey winners; Just-Us! Coffee Roaster Co-op for their generous donations and Dalhousie Student Union Sustainability Office for project funding.

Finally, the authors thank the Reference and Research center at the Killam Library, for taking the time to provide helpful information on how to search for the study's literature review.

7.0 REFERENCES

- AISE. (2009, January 1). *New more compacted laundry detergents will help reduce impact on environment*. Retrieved from http://www.aise.eu/PDF/LSP2COMTOOLKIT_pressrelease_1Jan09.pdf
- Atchison, C. & Palys, T. (2008a). Sampling. *Research Decisions: Quantitative and Qualitative Perspectives* (pp. 107-135). Toronto: Nelson Education Ltd.
- Atchison, C. & Palys, T. (2008b). Interactive methods: surveys, interviews, and oral history techniques. *Research Decisions: Quantitative and Qualitative Perspectives* (pp. 153-198). Toronto: Nelson Education Ltd.
- Atchison, C. & Palys, T. (2008c). A conceptual introduction to quantitative data analysis. *Research Decisions: Quantitative and Qualitative Perspectives* (pp. 330-372). Toronto: Nelson Education Ltd.
- Bebbington Industries. (2013). *Down East*. Retrieved from http://www.bebbingtonindustries.com/down_east.html
- Dalhousie University. (n.d.a). Office of Sustainability. Retrieved from <http://www.dal.ca/dept/sustainability/about.html>
- Dalhousie University. (n.d.b). Sustainability. Retrieved from <http://www.dal.ca/about/halifax-campuses/sustainability.html>
- Dalhousie University (n.d.c). *Residence & housing*. Retrieved from http://www.dal.ca/campus_life/residence_housing/residence/your-residence-options/residences-halifax/howe-hall.html
- de Oude, N. T., & Hennes-Morgan, E. C. (1994). Detergents. In *Handbook of Ecotoxicology* (P. Calow, Ed.). *Blackwell Scientific*, (2), 130-154., Oxford.
- Durham University. (2011). *Laundry*. Retrieved from <http://www.dur.ac.uk/st-aidans.college/postgraduate/facilities/other/>
- Fisher, B. (1998). Scents & sensitivity. *Environmental Health Perspectives*, 106(12). Retrieved at <http://www.jstor.org/stable/3434115>

- Goel, G., & Kaur, S. (2012). A study on chemical contamination of water due to household laundry detergents. *Journal of Human Ecology*, 38(1), 65-69. Retrieved from <http://ezproxy.library.dal.ca/login?url=http://search.proquest.com/docview/1032895524?accountid=10406>
- Hodge, C. (2009). *Hanging It Out On Campus: A Guide to Providing Line-Drying Options to College Students and Promoting Other Eco-Friendly Laundry Habits*. Claremont, California: Pomona College. Retrieved from http://www.aashe.org/files/resources/student-research/2009/Hanging%20It%20Out%20On%20Campus%20-%20A%20Guide_0.pdf
- Järvi, P. & Paloviita, A. (2008). Environmental value chain management of laundry detergents in the use phase. *International Journal of Consumer Studies*, 32(6), 607-612. doi: <http://dx.doi.org/10.1111/j.1470-6431.2008.00692.x>
- Lipson, J. (2004). Multiple chemical sensitivities: stigma and social experiences. *Medical Anthropology Quarterly*, 18(2). Retrieved at <http://www.jstor.org/stable/3655476>
- McCoy, M. (2008). Greener Cleaners: Consumer demand for environmentally friendly cleaning products has changed the game for chemical suppliers. *Chemical and Engineering News*, 86:3, 15-23.
- Macbeth, C. (2007, September 6). Univ. pilots eco-friendly detergent. *Yale Daily News*. Retrieved from <http://yaledailynews.com/blog/2006/09/06/univ-pilots-eco-friendly-detergent/>
- Mac-Gray Corporation. (2003, September 25). *Press Release: Mac-Gray Corporation Unfolds Next-Generation Laundry Systems at Four College Campuses*. Retrieved from http://phx.corporate-ir.net/phoenix.zhtml?c=63154&p=irol-newsArticle_print&ID=452840&highlight=
- Salisbury University. (2004, October 24). *Press Release: New SU Student Service: 'You've Got Laundry'*. Retrieved from <http://www.salisbury.edu/newsevents/fullstoryview.asp?id=3754>
- Schifko, A. D., & Warne, M. S. (1999). Toxicity of laundry detergent components to a freshwater cladoceran and their contribution to detergent toxicity. *Ecotoxicology and Environmental Safety*, 44(2), 196-196. Retrieved from <http://ezproxy.library.dal.ca/login?url=http://search.proquest.com/docview/14532718?accountid=10406>
- Tuna, C. (2007, February 15). Laundry may go green in the fall. *Yale Daily News*. Retrieved from <http://yaledailynews.com/blog/2007/02/15/laundry-may-go-green-in-fall/>
- Wright, T. (2013a). Week 5 lecture. *ENVS/SUST 3502: The Campus as a Living Laboratory*. Halifax: Dalhousie University

Wright, T. (2013b). Week 7 lecture. *ENVS/SUST 3502: The Campus as a Living Laboratory*. Halifax: Dalhousie University

Zoller, U. (2004). *Handbook of detergents. part b, environmental impact*. (Vol. 121, pp. 299-316). Rochester, New York: Marcel Dekker. Retrieved from <http://www.crcnetbase.com/doi/abs/10.1201/9780203020500.ch11>

8.0 APPENDICES

APPENDIX A: *Ethics Form*

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: **Washing Away Waste: A Howe Hall Laundry Detergent Initiative**
2. Faculty Supervisor(s): **Dr. Tarah Wright**
Department: Environmental Science
e-mail: tarah.wright@dal.ca
ph: (902) 494-3683
3. Student Investigator(s): **Emma Hoffman; Peter Moore; Isabelle Morin; Kelli Smith**
Department: Environmental Science
e-mail: em284069@dal.ca; is433065@dal.ca; pt283455@dal.ca; ksmith7@dal.ca
ph: (902) 396-7577; (902) 222-4007; (902) 293-8444; (902) 448-9894
4. Level of Project: Non-thesis Course Project [] 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: **January 22, 2013**
b. Indicate the anticipated completion date for this project: **April 12, 2013**

SUMMARY OF PROPOSED RESEARCH

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

How feasible and desirable would it be to improve the waste reduction and scent-free policy efforts pertaining to on-campus laundry at Dalhousie residences?

Laundry is a common household and in-residence task where detergent is one of the fundamental components used to satisfy the need for fresh and clean clothes. If Dalhousie University provided access to

laundry detergent within its own facilities, students would not need to procure their own. The amount of plastic waste associated with in-residence student laundry could be dramatically reduced. Though not as significant as the amount of waste reduction, transportation emissions could also be reduced as fewer students would use private and public transit when in need of clean laundry.

Dalhousie could also use this integration as a way to educate students about, and reinforce the scent-free policy on campus. Laundry products are often overlooked when scent-free policies are introduced. The availability of laundry detergent on campus could also serve to create more awareness throughout the student body to sustainability in general.

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: Email correspondence_____

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.

- Development of survey and interview questions
- Pilot testing of survey and mentor/faculty supervisor review of interview questions
- Submission of preliminary proposal
- Apply for funding, donations
- Contact other universities to obtain data, opinions, find an interviewee
- Printing of paper survey and design of online survey
- Arrange interviews
- Open online survey to students
- Conduct interviews
- Close survey and conduct draw for student participants
- Perform data analysis
- Present project
- Submit report

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.

Students living in Howe Hall, a residence at Dalhousie University – male and female; Facility managers of Dalhousie University residences; The owner of a company in Dartmouth, NS that produces laundry detergent and can equip washing machines with equipment to automatically dispense laundry detergent into each wash; A representative of another university that has implemented a similar system.

c. How many participants are expected to be involved in this study? Up to 750 (105 participated)

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): Howe Hall residence, Dalhousie Facilities Management
- Local School Boards*
- Halifax Community
- Agencies
- Businesses, Industries, Professions
- Health care settings*
- Other, specify (e.g. mailing lists) _____ * Applicant may also require ethics approval from relevant authority, e.g. school board, hospital administration, etc.

b. Identify who will recruit potential participants and describe the recruitment process. Provide a copy of any

materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts in the appendices section).

The student investigators, posters and paper slips with the URL for the online survey, email, telephone (to arrange interviews).

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

Yes [X] No [] If Yes, provide details:

The student participants have the option of entering their name and email address to enter a draw for one of 12 prizes (one \$30 gift card of their choice, one \$20 gift card of their choice, one \$20 gift card for Tim Horton's, three bags of Just Us! coffee, three boxes of Just Us! tea, three Just Us! chocolate bars)

6. Feedback to Participants

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

Wherever possible, written feedback should be provided to study participants including a statement of appreciation, details about the purpose and predictions of the study, contact information for the researchers, and the ethics review and clearance statement. Note: When available, a copy of an executive summary of the study outcomes also should be provided to participants.

Appreciation for student participants is included on the survey; those who win prizes will receive thank you cards with their prizes. Email respondents will be thanked by email. The business owner will be provided with a copy of the report.

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 survey participants that win prizes in the draw benefit from the prizes, all students living in residences at Dalhousie University could benefit from the project if it is implemented in the future. The owner of the company that produces detergent and installs equipment could benefit if the project is implemented and his company receives a contract with Dalhousie University.

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

Society would benefit from the implementation of the project due to the reduction of waste in landfills and recycling centers.

POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY

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

No known or anticipated risks Explain why no risks are anticipated: participation is voluntary, identifying information is not required to participate, no one outside of the student investigators will have access to the names and email that are voluntarily provided for the draw.

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.

INFORMED CONSENT PROCESS

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

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

Information letter with written consent form; provide a copy

Information letter with verbal consent; provide a copy

Information/cover letter; provide a copy

Other (specify): Verbal communication of information with verbal consent (interviews); written information included on survey with voluntary participation

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

Consent from the survey participants is implied by their voluntary completion of the survey. Verbal consent will be obtained from the interviewees.

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.

Only the student investigators will ever have access to the names and email addresses that are voluntarily provided by survey participants. They will not be named in the report.

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

Only the student investigators will have access to these materials.

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
- Confidential shredding after _____
- Data will be retained until completion of specific course.
- Audio/Video Recordings
- Erasing of audio/video tapes after _____
- Data will be retained until completion of specific course.
- Electronic
- Erasing of electronic data after _____
- Data will be retained until completion of specific course.
- Other _____

(Provide details on type, retention period and final disposition, if applicable)

Specify storage location: Paper - student investigators’ homes; Audio - student investigator’s LiveScribe SmartPen (on person); Electronic – Student investigators’ email accounts and computers, Dalhousie University’s Office of Sustainability Opinio account.

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

- Recruitment Materials:** A copy of any poster(s), flyer(s), advertisement(s), letter(s), telephone or other verbal script(s) used to recruit/gain access to participants.
- Information Letter and Consent Form(s).** Used in studies involving interaction with participants (e.g. interviews, testing, etc.)
- Information/Cover Letter(s).** Used in studies involving surveys or questionnaires.
- 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.

All are included in the report, along with this ethics form.

SIGNATURES OF RESEARCHERS

Signature of Student Investigator(s) Date Kelli Smith February 22, 2013

Signature of Student Investigator(s) Date Emma Hoffman February 22, 2013

Signature of Student Investigator(s) Date Peter Moore February 22, 2013

Signature of Student Investigator(s) Date Izzy Morin February 22, 2013

Signature of Student Investigator(s) Date _____

Signature of Student Investigator(s) Date _____

Signature of Student Investigator(s) Date _____

FOR ENVIRONMENTAL SCIENCE PROGRAM USE ONLY: Ethics proposal been checked for eligibility according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans

_____ Signature Date

_____ Signature Date

APPENDIX B: DSUSO Funding Proposal Form

ENVS/SUST 3502 Funding Proposal Form **In-Residence Laundry Detergent Initiative**

How feasible and desirable would it be to improve the waste reduction and scent-free policy efforts pertaining to on-campus laundry at Dalhousie residences?

The primary goal of this proposal is to decrease plastic waste and to promote environmental health by retrofitting current residence laundry machines with an automatic detergent-dispensing apparatus. The laundry detergent associated with this proposal is EcoLogo certified, hypoallergenic and locally manufactured. Other effects that this proposal could result in are: less detergent waste with an automatic dispenser, greater adherence and awareness of the scent-free policy at Dalhousie, and greater awareness and participation in sustainability at the university.

Description

We are conducting a survey of students living in Howe Hall to determine student support for the automatic dispensing of laundry detergent into washing machines on campus. We are also conducting interviews with building managers at Dalhousie and a representative at Bebbington Industries (Down East) to determine the technical and financial feasibility of the project.

Budget

- \$137.75 - 159.50 for materials
- \$100 for incentives

We need to print over 700 copies of our survey to provide one for each student currently living in Howe Hall to maximize our sample size. Questionnaire can have low response rates (10-40%), and we want to get a representative sample of the student population living in residences at the Halifax campuses. The cost of printing at Campus Copy is \$137.75 for white paper and \$159.50 for coloured paper. We would prefer to use coloured paper, as it is more appealing, however we will use white paper if that is all the budget will allow.

We would also like to provide a cash incentive for students to complete the survey. We would award this randomly, using a draw to determine the winners. Our hope is to award a first prize of \$50, and two second prizes of \$25 (or \$30 for second and \$20 for third). I am also contacting Just Us! to inquire about a donation of a few free coffees that we can award as runner-up prizes.

Contact Info

Kelli Smith ksmith7@dal.ca

We do not have a recipient name right now, but our understanding is that you reimburse after payments.

APPENDIX C: Just-Us! Donation Form



Just Us! Donation Form

Thank you for your request for a donation from Just Us! Coffee Roasters. We are happy to support local community initiatives when we can. Remember we usually need **one week's notice** to process any requests and arrange for pick up. Contact Kathy Day for more information. (542-7474, ext. 230 or kathy@justuscoffee.com or fax 902-542-4436)

Contact Name: Kelli Smith	Date of Event: March 11, 2013 (it may be a few days later depending on when we received funding confirmation for printing)
Name of Organization: Dalhousie University - Department of Environmental Science	Customer #
Mailing Address: 41 Bayview Rd. (this is my address, not Dalhousie)	
City: Halifax	Postal Code: B3M 1N8
Email: ksmith7@dal.ca	Phone: 446-5676

Donation Request	
Type of event (Auction, Reception, Meal, Door Prizes) Are you looking for coffee/tea to serve or product for prizes?	Product for prizes
Number of people expected: over 700 for the survey, 5-10 winners of the draw.	Can we use information about your event on our website to show how we are reaching out to help the community? X YES <input type="checkbox"/> NO
Benefit to Just Us! (Primary focus of support will be social justice and environmental concerns, community support)	We are conducting research related to environmental sustainability at Dalhousie, specifically related to waste and pollution from laundry detergents used in residences and a possible solution.

Delivery Options (to keep costs down, we ask that you pick up your donation when possible)
Pick up location – Pick ups are usually at the coffeehouse in Grand Pre or Spring Garden <input type="checkbox"/> Grand Pre <input checked="" type="checkbox"/> Spring Garden (deliveries only Wednesdays and Fridays) Other (only by special arrangement):
<input type="checkbox"/> By Mail
<input type="checkbox"/> By Courier

	Preferred variety Coffee – Medium, Dark, Decaf Tea – Black, Green, Rooibos, Herbal Chocolate – Dark, Milk, White	Preferred Grind (choose 1) • WB - whole bean • P - ground for percolator (coarser) • G - regular drip/French press grind **COFFEE IS NOT BREWED**	Amount required Coffee - 1-2lb. bag will make approx. 80 cups Teas - 20 tea bags per box
Coffee	Medium	X	
Tea	Any		
Sugar			
Chocolate	Any		
Gift Card	This would be ideal, in \$5 or \$10 denominations, but coffee, tea and chocolate would be great instead.		

Donation Approved <input type="checkbox"/> YES <input type="checkbox"/> NO INVOICE NUMBER:

APPENDIX D: **Student Survey****Howe Hall Laundry Detergent Initiative**

PLEASE READ the following before completing the SURVEY and to enter the DRAW

All questions must be answered to be eligible for the draw; one entry per student currently living in Howe Hall

Project Description: We are trying to find out whether students living in residence would want and/or use laundry machines that automatically dispense detergent. The primary goal of this proposal is to decrease plastic waste and to promote environmental health. The laundry detergent associated with this proposal is EcoLogo certified, hypoallergenic and locally manufactured.

For the following questions, please *check*, where applicable, the answer *you* feel *best* applies to you. If ‘*other*’ is selected, please state your answer.

1. What percentage of your laundry do you do in residence? (check ONE)

0% [] 1-20% [] 21-40% [] 41-60% [] 61-80% [] 81-99% [] 100% []

2. On average, how often do you do laundry in residence? (check ONE)

0 loads/month [] 1 load/month [] 1 load/2 weeks [] 1 load/week [] 2+ loads/week []

3. Do you buy laundry detergent? Yes [] No []

If no, please explain: _____

4. How often do you buy your own detergent? (check ONE)

Once a month [] Once a semester/term [] Once a year [] Never [] Other _____

5. Why do you choose the detergent that you use? (Check ALL that APPLY)

Cost (cheapest) [] Brand [] Concentrated [] Weight [] Scented [] Scent-free [] Hypoallergenic []
Good in Cold Water [] Convenience [] Eco-Friendly [] Other _____

6. What brand of detergent do you use the most? (check ONE)

Cheer [] DownEast [] Nature Clean [] Sunlight [] Tide [] Other _____

7. What is the container/packaging of the detergent you use most often made of? (check ONE)

Plastic [] Cardboard [] Other _____

8. What form of detergent do you most like to use? (check ONE)

Liquid [] Powder [] Pre-Measured Tablets/Pellets [] Other _____

9. How do you dispose of your detergent container/packaging? (check ONE)

Garbage Bin [] Recycling Bin [] Leave it in the Laundry Room [] Other _____

10. Is your detergent High Efficiency  (low-sudsing and highly concentrated)? (check ONE)

Yes [] No [] I Don't Know []

Please indicate your level of agreement with the following two statements (11) and (12): (check ONE for each statement)

11. Reducing waste is important to you Not at all [] Slightly [] Very [] Completely []

12. Buying local is important to you Not at all [] Slightly [] Very [] Completely []

13. Would having detergent automatically dispensed in laundry machines interest you? (check ONE)

Yes [] No [] Maybe [] I Don't Know []

Please explain your answer: _____

14. How much EXTRA would you be willing to pay for a load of laundry if detergent was included? (check ONE)

\$0 [] \$0.25 [] \$0.50 [] \$0.75 [] \$1.00 []

15. Is there anything else you would like to add about laundry and detergent use in Howe Hall?

Demographic Questions:

Sex: Male [] Female [] Other []

What is your year of study? 1st [] 2nd [] 3rd [] 4th [] Other []

What is your Major/Faculty? _____

What House do you live in? Bronson [] Cameron [] Fountain [] Henderson [] Smith [] Studley []

If you want to participate in the draw for ONE of the TWELVE prizes (1 \$30 giftcard of your choice, 1 \$20 giftcard of your choice, 1 \$20 Tim's card, 3 bags of Just Us! coffee, 3 boxes of Just Us! tea, 3 Just Us! chocolate bars), please include:

Name: _____

Email Address: _____

THANK YOU FOR PARTICIPATING IN OUR SURVEY!!

PLEASE NOTE

All information provided will remain anonymous. Names and contact information are collected only for the purpose of the draw.

Giftcards cannot be provided for alcoholic beverages.

The draw will be held on March 22nd, 2013. Winners will be notified by email.

Survey and draw available only to students currently living in Howe Hall.

If you have any questions and/or concerns about this survey, please contact:

Dr. Tarah Wright, Associate Professor, Dalhousie's Environmental Science Program
Life Sciences Centre, Room 821
902.494.3683

This survey/project is being conducted by ENVS 3502 students:

Emma Hoffman, Peter Moore, Izzy Morin, Kelli Smith

APPENDIX E: Poster

**WIN 1 OF 12
FREE PRIZES!!!**

GIFTCARD OF YOUR CHOICE
1st prize valued at \$30, 2nd \$20
\$20 Giftcard for Tim Hortons
Assorted prizes donated by
Just Us! Coffee Roasters Co-op

Just complete the ONLINE SURVEY

SURVEY/DRAW AVAILABLE ONLY TO STUDENTS CURRENTLY LIVING IN HOWE HALL

Link: <https://surveys.dal.ca/opinio/s?s=18091>
Survey closes March 15, 2013 at 11:59PM
DRAW will be March 22, 2013

Participate in a Howe Hall Laundry Detergent initiative to help promote sustainability on Dalhousie Halifax campus

Exception: Giftcards cannot be provided for alcoholic beverages

This survey/project is being conducted by **ENVS 3502** students:
Emma Hoffman, Peter Moore, Izzy Morin and Kelli Smith

APPENDIX F: Survey Results

1. What percentage of your laundry do you do in residence? (check ONE)

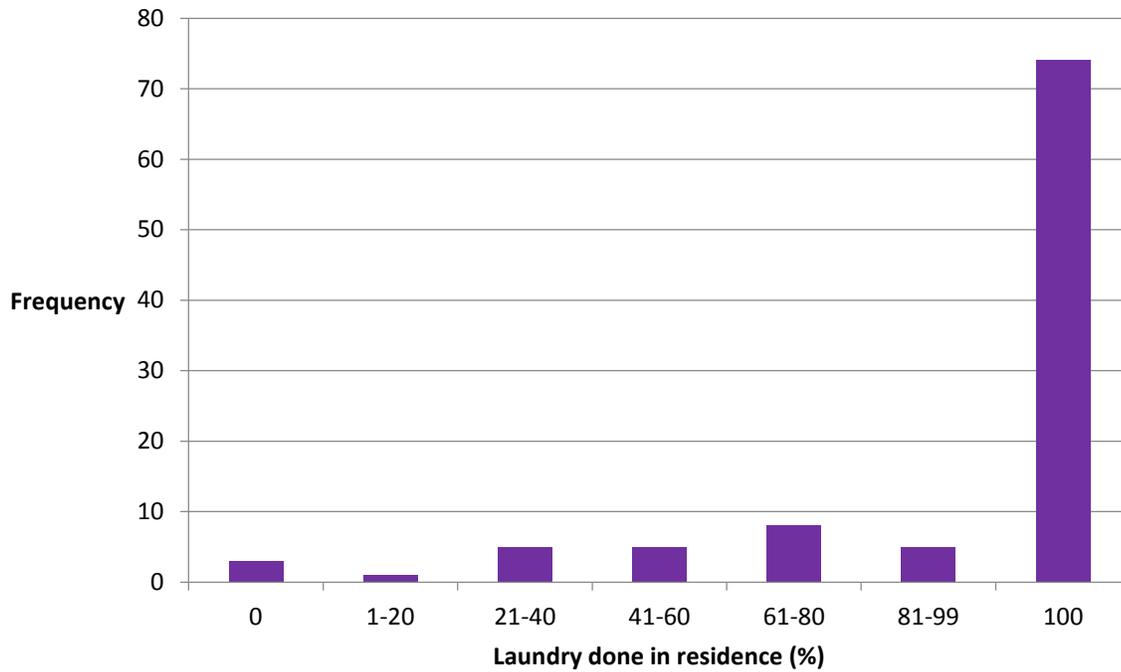


Figure 1: Histogram that represents the frequency distribution of the categorical responses to the question, “what percentage of your laundry do you do in residence?”

Table 1: Frequency distribution table for “what percentage of your laundry do you do in residence?”

Percent of laundry done in residence (%)	0	1-20	21-40	41-60	61-80	81-99	100	Total
Freq.	3	1	5	5	8	5	74	101
Relative Freq. (%)	2.97	0.99	4.95	4.95	7.9	4.95	73.27	100

Mode = 100%

2. On average, how often do you do laundry in residence? (check ONE)

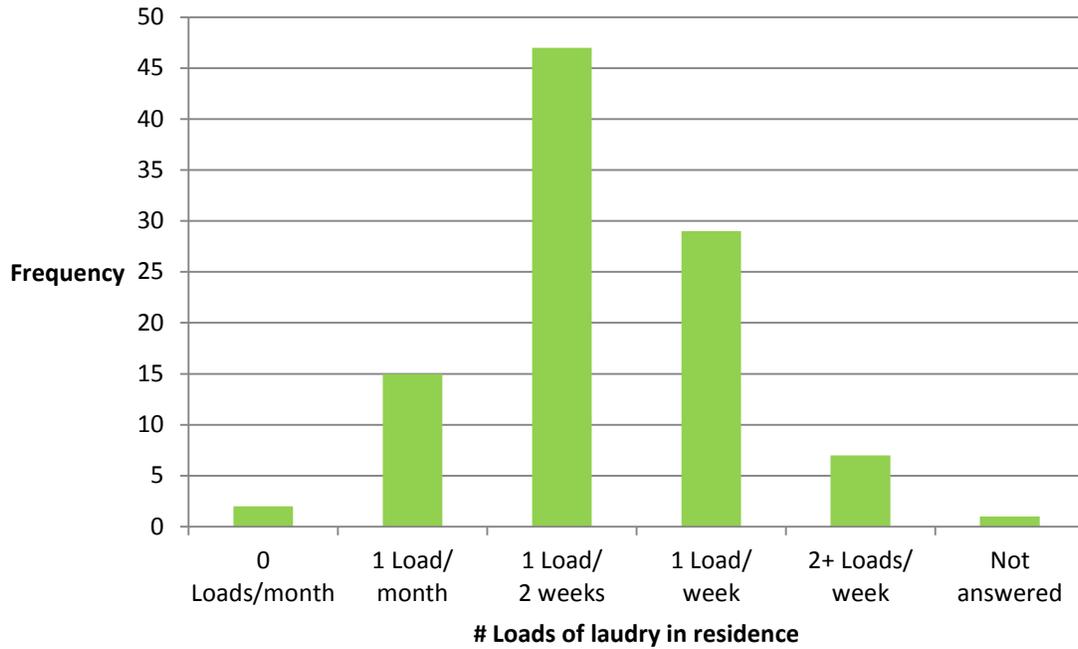


Figure 2: Bar graph that represents the frequency distribution of the categorical responses to the question, “on average, how often do you do laundry in residence what percentage of your laundry do you do in residence?”

Table 2: Frequency distribution table for “on average, how often do you do laundry in residence what percentage of your laundry do you do in residence?”

Loads of laundry in residence	0 Loads/month	1 Load/month	1 Load/2 weeks	Load/week	2+ Loads/week	Not answered	Total
Freq.	2	15	47	29	7	1	101
Relative Freq. (%)	1.98	14.85	46.53	28.71	6.93	0.99	100

Mode = 1 Load per two weeks

3. Do you buy laundry detergent?

If no, please explain: _____

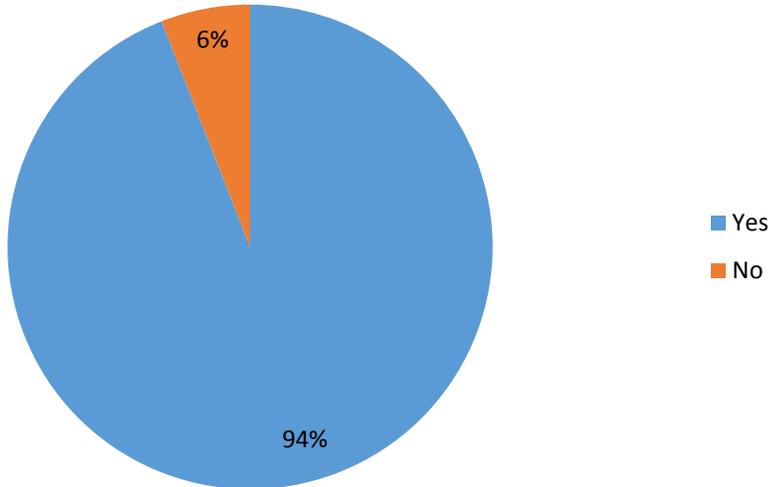


Figure 3: Pie chart that represents the relative frequency distribution (%) of the categorical responses to the question, “do you buy laundry detergent?”

Table 3: Frequency distribution table for “do you buy laundry detergent?”

Buys laundry detergent	Yes	No	Total
Freq.	95	6	101
Relative Freq. (%)	94.06	5.94	100

Mode = Yes

Written responses from participants that selected ‘No’:

- “Pre bought”
- “Have some”
- “Take from roommate”
- “Mom buys it”
- “Parents”

4. How often do you buy your own detergent? (check ONE)

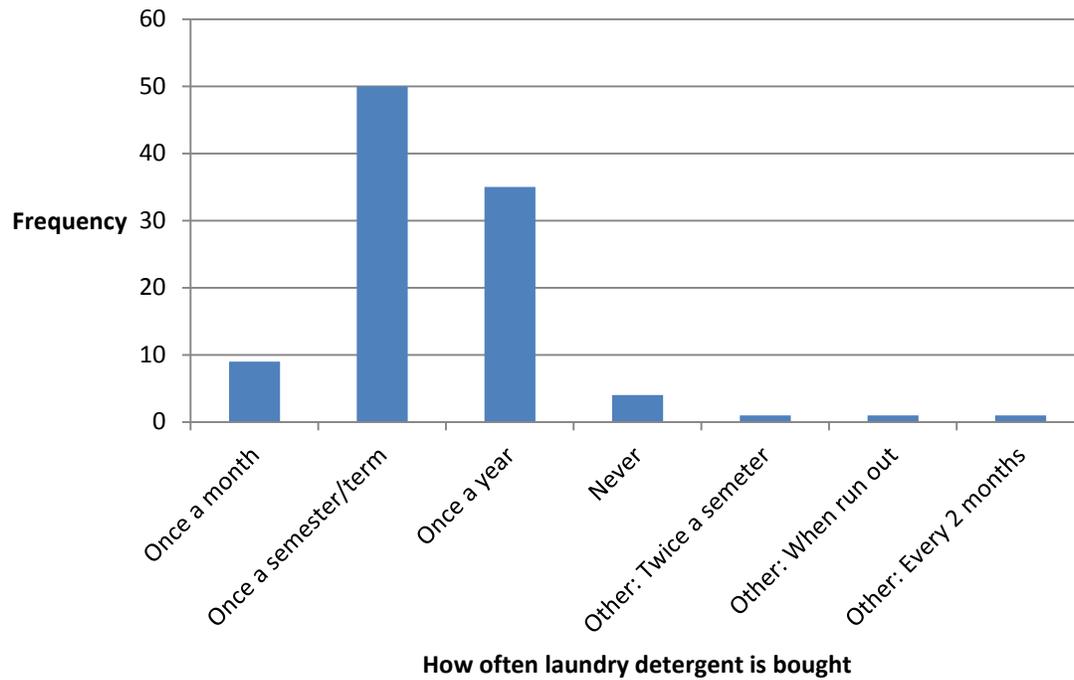


Figure 4: Bar graph that represents the frequency distribution of the categorical responses to the question, “how often do you buy your own detergent?”

Table 4: Frequency distribution table for “how often do you buy your own detergent?”

How often detergent is bought	Once a month	Once a semester/term	Once a year	Never	Other: Twice a semester	Other: When run out	Other: Every 2 months	Total
Freq.	9	50	35	4	1	1	1	101
Relative Freq. (%)	8.91	49.50	34.65	3.96	0.99	0.99	0.99	100

Mode = Once a semester/term

5. Why do you choose the detergent that you use? (Check ALL that APPLY)

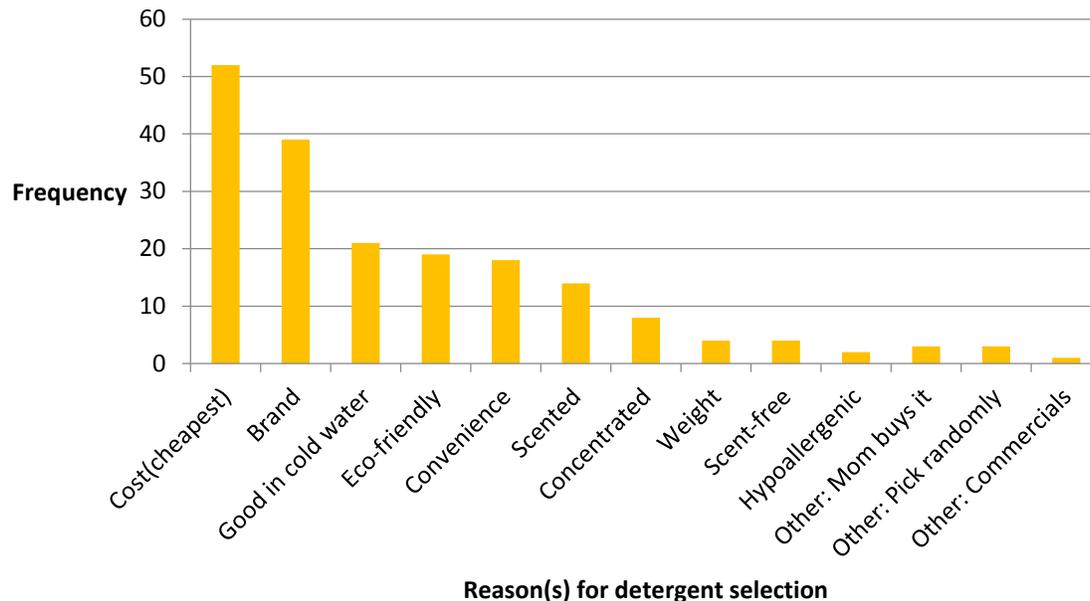


Figure 5: Bar graph that represents the frequency distribution of the categorical responses to the question, “why do you choose the detergent that you use?”

Table 5: Frequency distribution table for “why do you choose the detergent that you use?”

Reason(s) for detergent selection	Cost (cheapest)	Brand	Good in cold water	Eco-friendly	Convenience	Scented
Freq.	52	39	21	19	18	14
Relative Freq. (%) total choices selected (188)	27.66	20.74	11.17	10.11	9.57	7.45
Relative Freq. (%) students	51.49	38.61	20.79	18.81	17.82	13.86

Reason(s) for detergent selection	Concentrated	Weight	Scent-free	Hypoallergenic	Other: Mom buys it	Other: Pick randomly	Other: commercials	Total
Freq.	8.00	4.00	4.00	2.00	3.00	3.00	1.00	188
Relative Freq. (%) total choices selected (188)	4.26	2.13	2.13	1.06	1.60	1.60	0.53	100
Relative Freq. (%) students	7.92	3.96	3.96	1.98	2.97	2.97	0.99	100

Mode = Cost (cheapest)

6. What brand of detergent do you use the most? (check ONE)

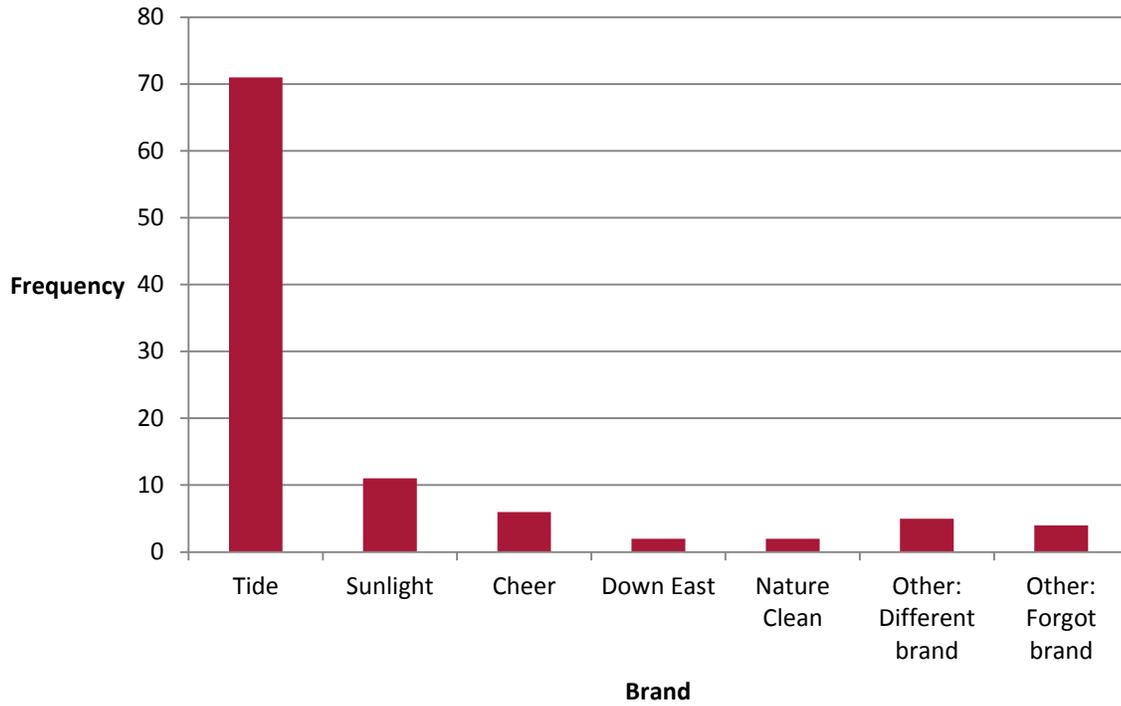


Figure 6: Bar graph that represents the frequency distribution of the categorical responses to the question, “what brand of detergent do you use the most?”

Table 6: Frequency distribution table for “what brand of detergent do you use the most?”

Detergent brand	Tide	Sunlight	Cheer	Down East	Nature Clean	Other: Different brand	Other: Forgot brand	Total
Freq.	71	11	6	2	2	5	4	101
Relative Freq. (%)	70.30	10.89	5.94	1.98	1.98	4.95	3.96	100

Mode = Tide

7. What is the container/packaging of the detergent you use most often made of? (check ONE)

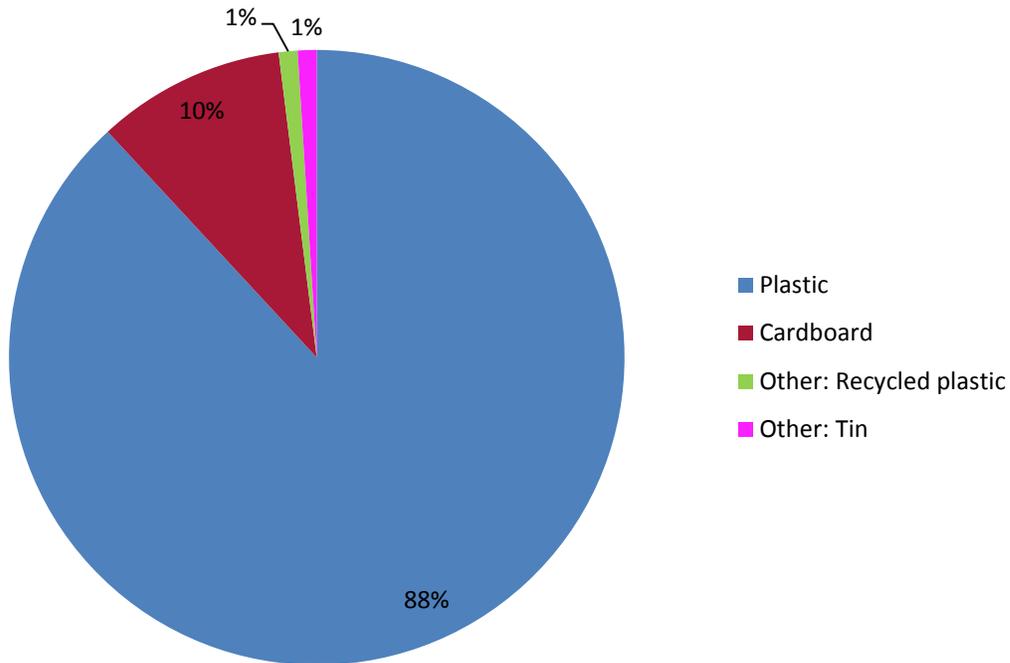


Figure 7: Pie chart that represents the relative frequency distribution (%) of the categorical responses to the question, “what is the container/packaging of the detergent you use most often made of?”

Table 7: Frequency distribution table for “what is the container/packaging of the detergent you use most often made of?”

Detergent packaging	Plastic	Cardboard	Other: Recycled plastic	Other: Tin	Total
Freq.	89	10	1	1	101
Relative Freq. (%)	88.12	9.90	0.99	0.99	100

Mode = Plastic packaging

8. What form of detergent do you most like to use? (check ONE)

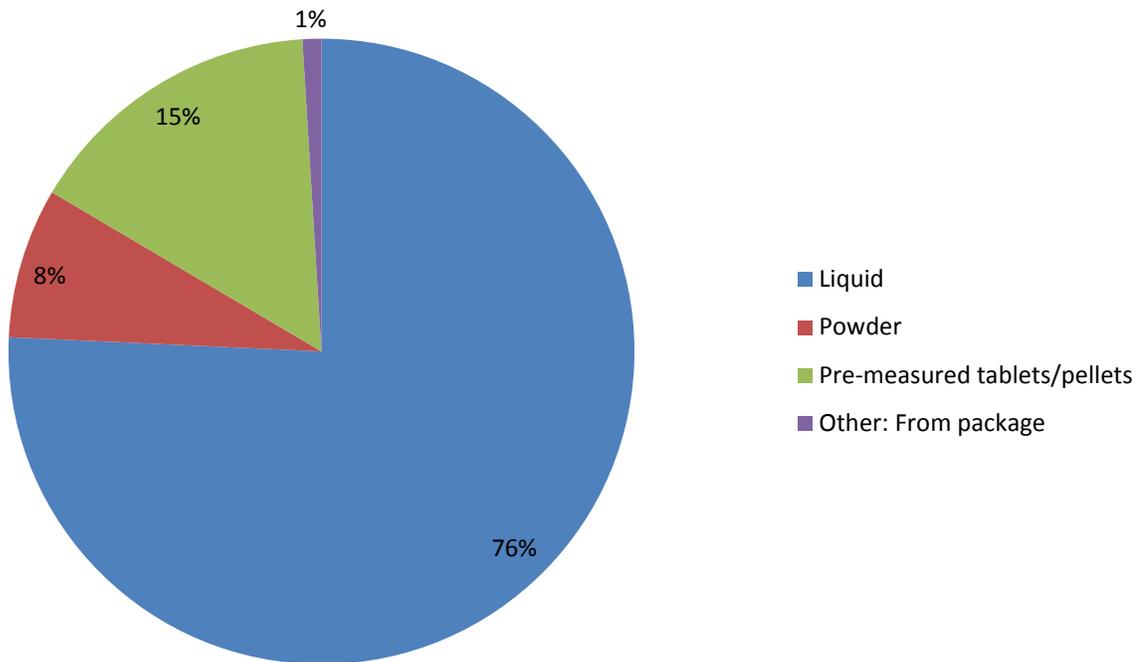


Figure 8: Pie chart that represents the relative frequency distribution (%) of the categorical responses to the question, “what form of detergent do you most like to use?”

Table 8: Frequency distribution table for “what form of detergent do you most like to use?”

Form of Detergent	Liquid	Powder	Pre-measured tablets/pellets	Other: From package	Total
Freq.	78	8	16	1	103*
Relative Freq. (%)	75.73	7.77	15.53	0.97	100

*Two students use both liquid and tablet forms of detergent

Mode = Liquid detergent

9. How do you dispose of your detergent container/packaging? (check ONE)

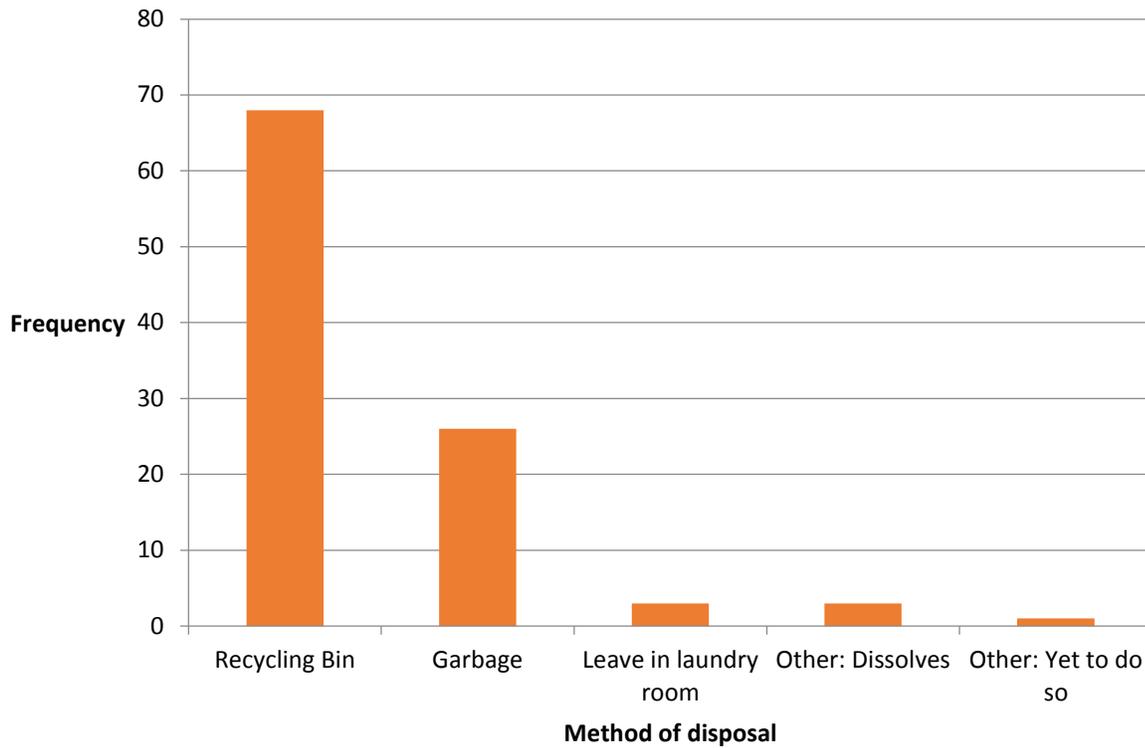


Figure 9: Bar graph that represents the frequency distribution of the categorical responses to the question, “how do you dispose of your container/packaging?”

Table 9: Frequency distribution table for “how do you dispose of your container/packaging?”

Method of Disposal	Recycling Bin	Garbage	Leave in the laundry room	Other: Dissolves	Other: Yet to do so	Total
Freq.	68	26	3	3	1	101
Relative Freq. (%)	67.33	25.74	2.97	2.97	0.99	100

Mode = Recycling bin

10. Is your detergent High Efficiency  (low-sudsing and highly concentrated)? (check ONE)

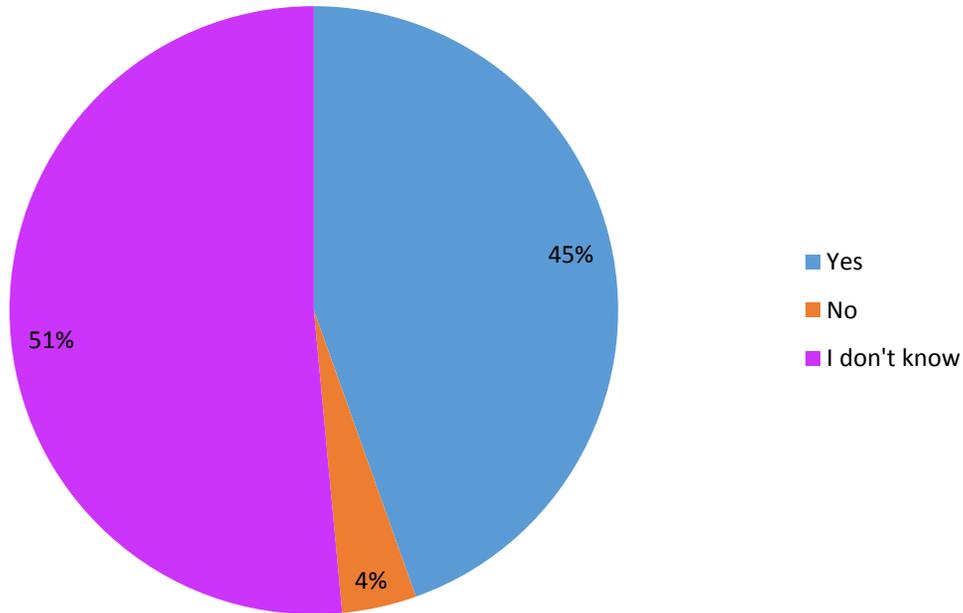


Figure 10: Pie chart that represents the relative frequency distribution (%) of the categorical responses to the question, “is your detergent HE (high efficiency)?”

Table 10: Frequency distribution table for “is your detergent HE (high efficiency)?”

High Efficiency Detergent	Yes	No	I don't know	Total
Freq.	45	4	52	101
Relative Freq. (%)	44.55	3.96	51.49	100

Mode = I don't know

Please indicate your level of agreement with the following two statements (11) and (12): (check ONE for each statement)

11. Reducing waste is important to you

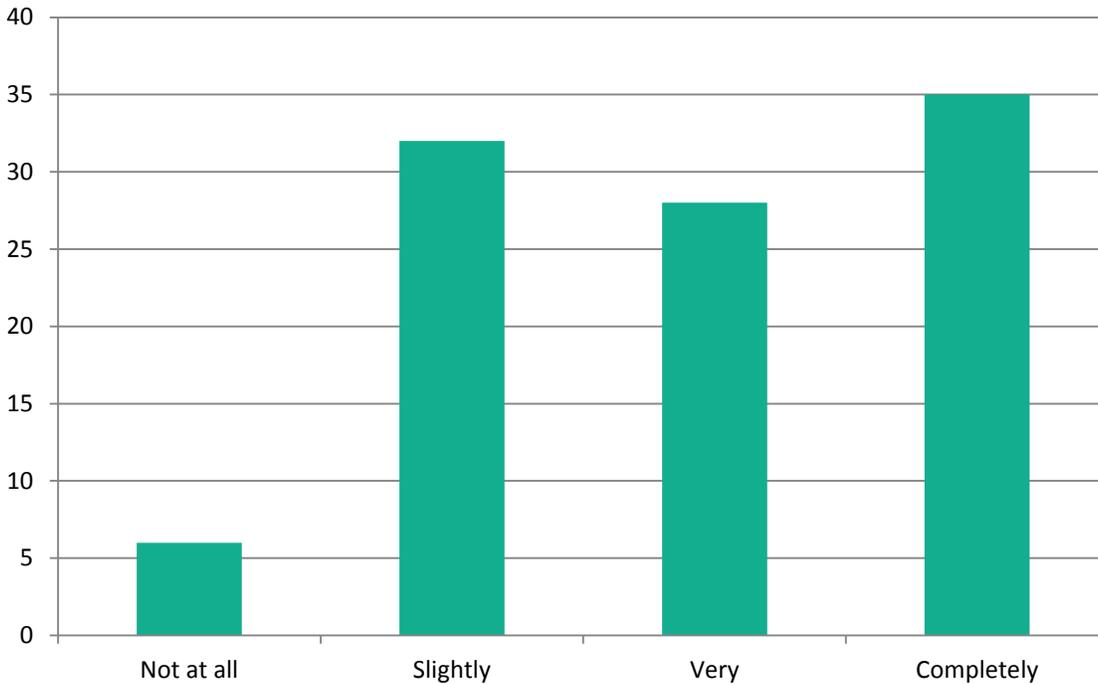


Figure 11: Bar graph that represents the frequency distribution of the participants’ level of agreement to the statement, “reducing waste is important to you.”

Table 11: Frequency distribution table for the statement, “reducing waste is important to you.”

Level of agreement	Not at all	Slightly	Very	Completely	Total
Freq.	6	32	28	35	101
Relative Freq. (%)	5.94	31.68	27.72	34.65	100

Mode = Completely

Median = Very

12. Buying local is important to you

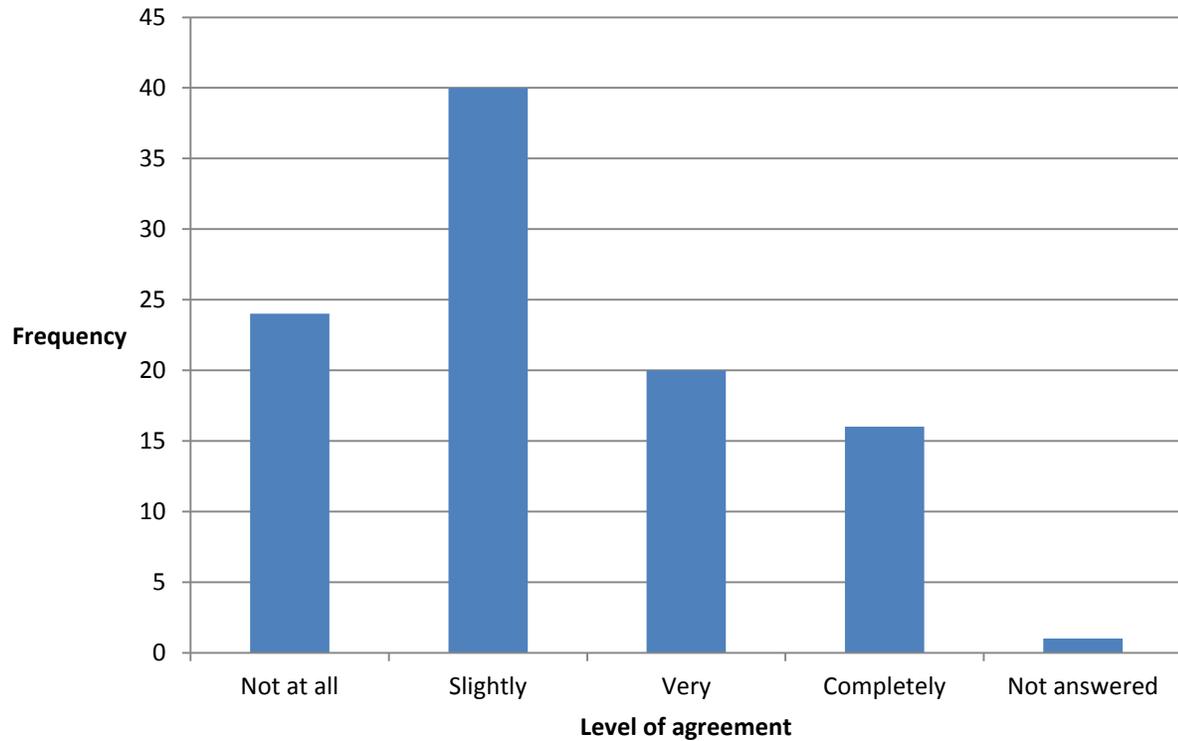


Figure 12: Bar graph that represents the frequency distribution of the participants’ level of agreement to the statement, “buying local is important to you.”

Table 12: Frequency distribution table for the statement, “buying local is important to you.”

Level of agreement	Not at all	Slightly	Very	Completely	Not answered	Total
Freq.	24	40	20	16	1	101
Relative Freq. (%)	23.76	39.60	19.80	15.84	0.99	100

Mode = Slightly

Median = Slightly

13. Would having detergent automatically dispensed in laundry machines interest you? (check ONE)
 Please explain your answer:

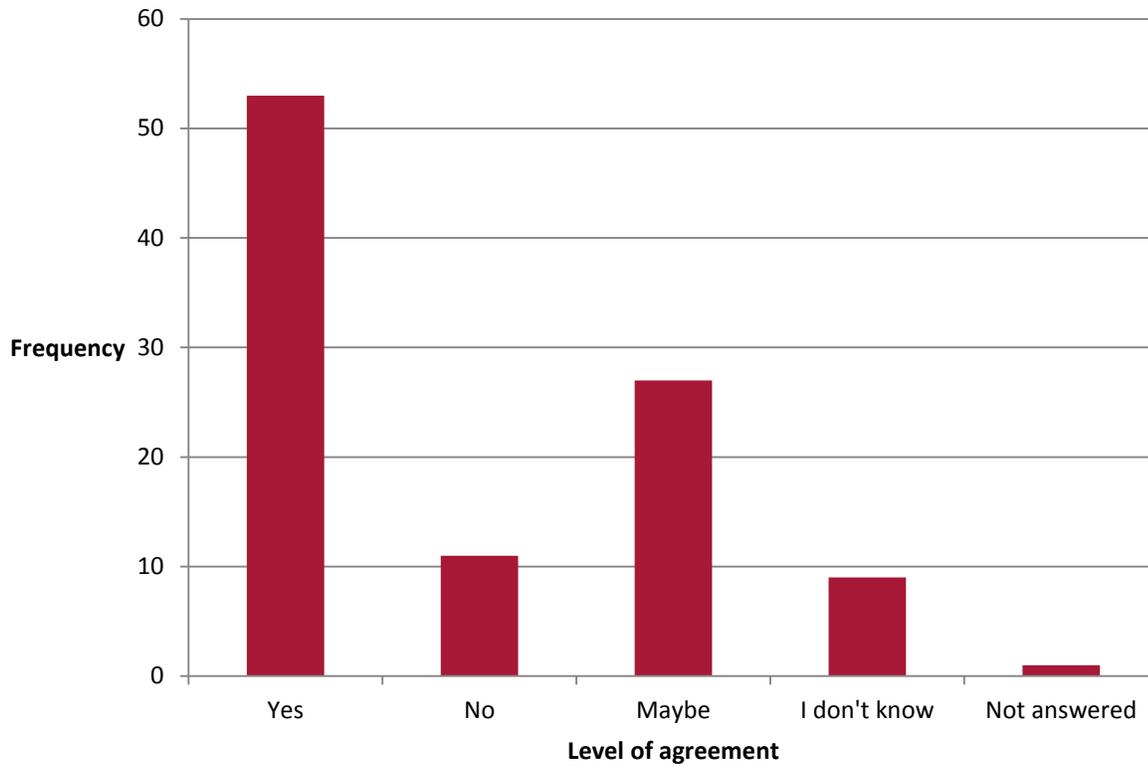


Figure 13: Bar graph that represents the frequency distribution of the categorical responses to the question, “would having detergent automatically dispensed in laundry machines interest you?”

Table 13: Frequency distribution table for “would having detergent automatically dispensed in laundry machines interest you?”

Interest in the service	Yes	No	Maybe	I don't know	Not answered	Total
Freq.	53	11	27	9	1	101
Relative Freq. (%)	52.48	10.89	26.73	8.91	0.99	100

Mode = Yes

Written responses:

Positive Feedback:

“That’s sweet”

“Awesome”

“It’s eco-friendly!”

“Environment!”

“Would not have to bring detergent”

“Much convenient!”

“For convenience sake.”

“Would be convenient and people would use less”

“It would be easier”

“If the intention is be more eco-friendly. I am willing to pay for the extra, but I believe most kids would feel as if they are being more ripped off.”

“This can save the waste of the containers!”

“Absolutely! It would mean less of those huge detergent bottles that most people put in the garbage instead of the recycling bin. And it would encourage more people to do their laundry in residence instead of doing it at their parents or relatives.”

“I think that this is a great idea to encourage everyone to use local, eco-friendly detergent. However, coming from someone who already does this, I probably would want to be able to choose to use my own detergent, as I’m guessing it would be cheaper in the long run.”

“It would only interest me if the dispensed detergent did not increase the price of laundry as is. Otherwise, I’d rather buy my own detergent because I know it will be cheaper than paying, say a dollar, each time.”

Neutral Feedback:

“I do not really care”

“I could care less”

Concerns:

“As long as it smells good and feels good”

“I don't find it inconvenient to get my own detergent and that way I know exactly what the product is I am using. I understand it is a good way to help reduce waste but I am not sure how it will fit into a residence community.”

“It would, as long as the price was relatively low (at cost), the detergent worked effectively, and the option to use your own detergent was still available.”

“It would probably too expensive”

“Laundry is expensive enough”

“But it depends on the extra cost that will be added to the spin. Otherwise I would like to use detergent of my choice”

“Depends if it would cost more to have it done, and if it did how much”

“Because I have to buy detergent only once for a semester probably it would not make much of a difference”

“I'll buy my own”

“I think I would like to choose my detergent”

“Because the machines ruin some of my clothes, thus not knowing what detergent is used could mess up my clothes even more.”

“Sometimes I'm a little sketchy about certain detergents ruining my clothes.”

“I like to choose my own detergent. I also use a very small amount and would not be alright with a machine calculating what I need. Soft laundry is an art.”

“I want to decide how much detergent to use myself”

14. How much EXTRA would you be willing to pay for a load of laundry if detergent was included? (check ONE)

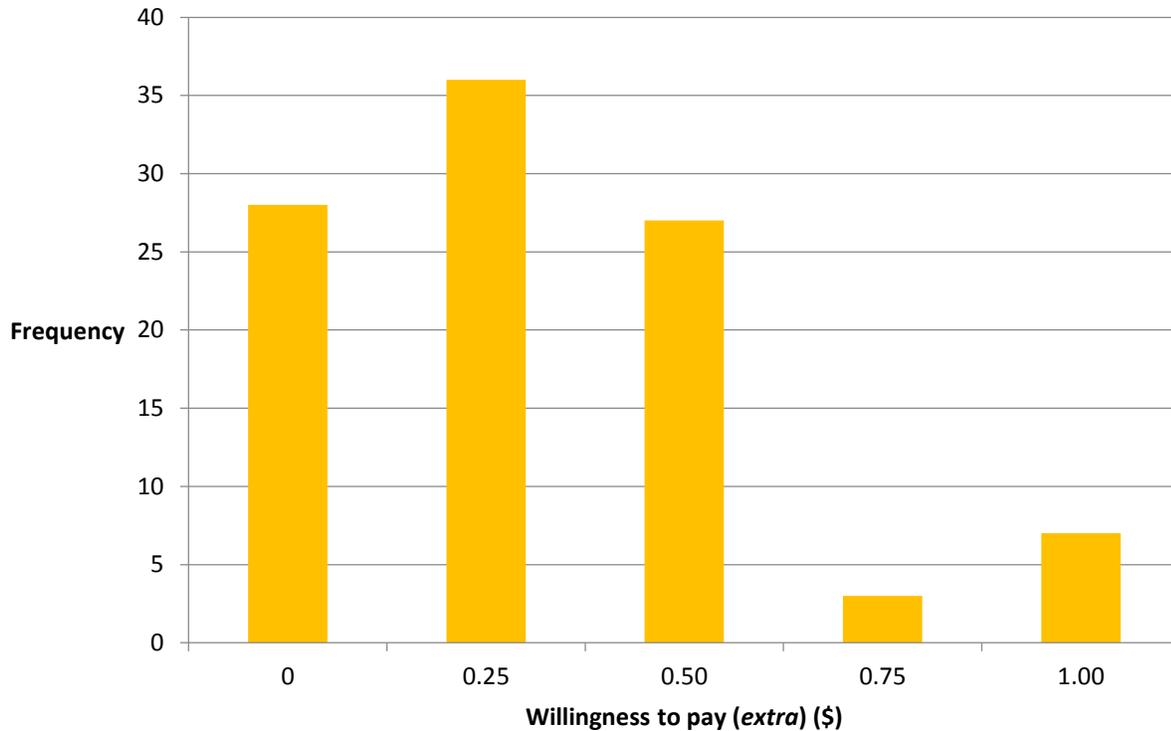


Figure 14: Bar graph that represents the frequency distribution of the categorical responses to the question, “how much EXTRA would you be willing to pay for a load of laundry if detergent was included?”

Table 14: Frequency distribution table for “how much EXTRA would you be willing to pay for a load of laundry if detergent was included?”

Willingness to pay (Extra) (\$)	0	0.25	0.50	0.75	1.00	Total
Freq.	28	36	27	3	7	101
Relative Freq. (%)	27.72	35.64	26.73	2.97	6.93	100

Mode = \$0.25

Median = \$0.25

Mean = \$0.31

15. Is there anything else you would like to add about laundry and detergent use in Howe Hall?

Written responses:

Positive Feedback:

“If auto dispensed, that would be amazing”

“Less detergent is better, better for your clothes, better for the fish, better for you.”

“This is a great idea; I hope this happens next year”

Improvements and concerns:

“The main point I think that will help an idea like this is to not try to sell the idea exclusively as a way to reduce waste. It needs to also be shown as a more convenient way to do laundry, and if it can be also shown to be more cost effective it will certainly be a win-win for all involved.”

“Don’t cheap out on the proportion/quality of the detergent”

“Make it Dal-card accessible”

“Laundry should be card accessible”

“Howe is expensive to live in; laundry should be included (not charged per load)”

“Expensive”

“Why isn’t it included?”

“It would be nice if it was free”

“Free”

“Cheaper..”

“Make it cheaper”

“Laundry costs should be reduced.”

“1.25 is a lot for laundry I believe, we already have to buy our own detergent and we pay so much to go here.”

* Several comments were made that were irrelevant to the study i.e. cleanliness and efficiency of the machines, quantity machines, stolen items in laundry rooms.

Demographic Questions:

Sex:

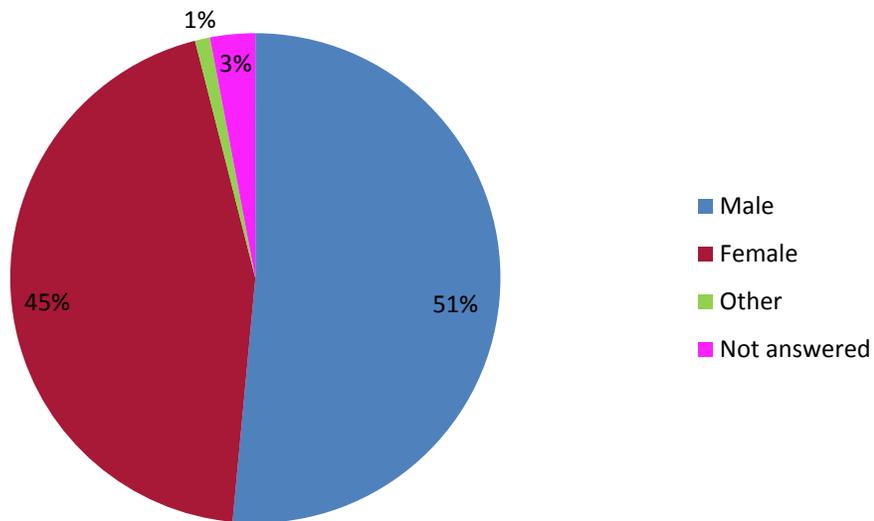


Figure 15: Pie chart that represents the relative frequency distribution (%) of the sex of the participants.

Table 15: Frequency distribution table for “sex.”

Sex	Male	Female	Other	Not answered	Total
Freq.	52	45	1	3	101
Relative Freq. (%)	51.49	44.55	0.99	2.97	100

Mode = Male

What is your year of study?

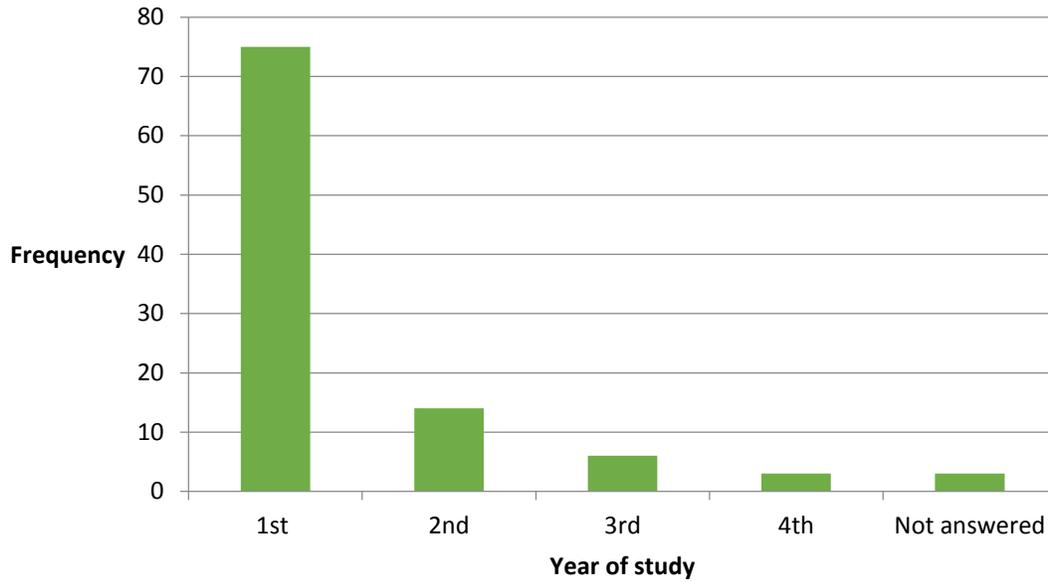


Figure 16: Bar graph that represents the frequency distribution of the categorical responses to the question, “what is your year of study?”

Table 16: Frequency distribution table for “what is your year of study?”

Year of study	1st	2nd	3rd	4th	Not answered	Total
Freq.	75.00	14.00	6.00	3.00	3.00	101
Relative Freq.	74.26	13.86	5.94	2.97	2.97	100

Mode = 1st year

Median = 1st year

What is your Major/Faculty?

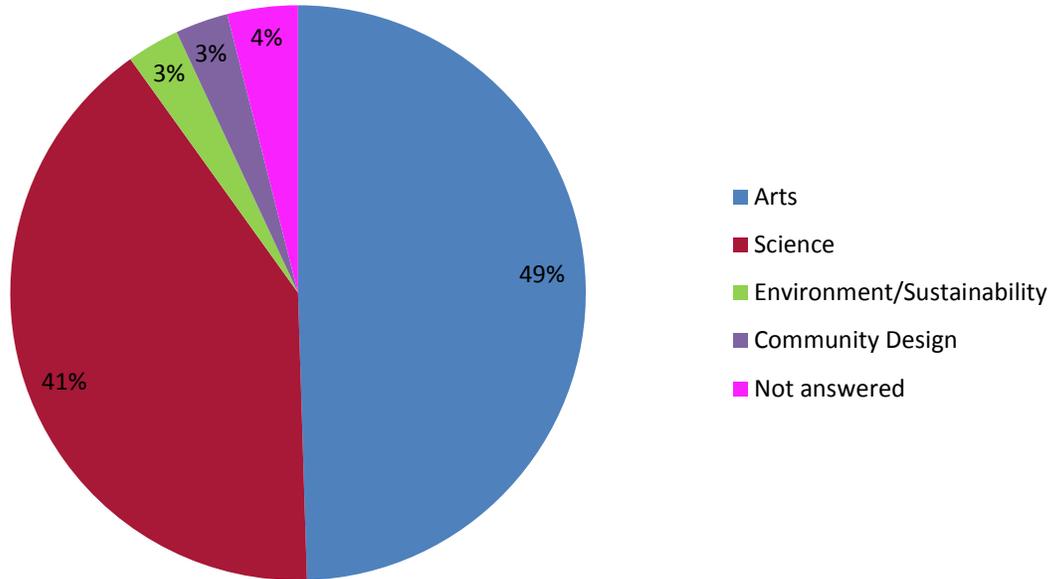


Figure 17: Pie graph that represents the frequency distribution of the categorical responses to the question, “what is your major/faculty?”

Table 17: Frequency distribution table for “what is your major/faculty?”

Major/Faculty	Arts	Science	Environment/ Sustainability	Community Design	Not answered	Total
Freq.	50	41	3	3	4	101
Relative Freq. (%)	49.50	40.59	2.97	2.97	3.96	100

Mode = Arts

What House do you live in?

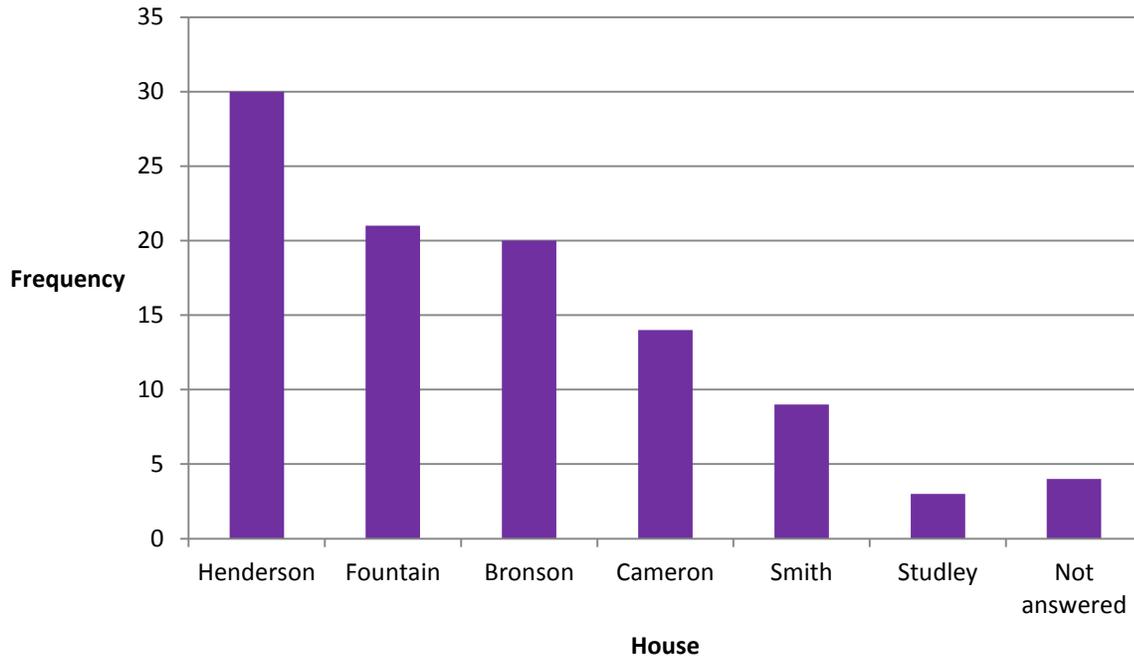


Figure 18: Bar graph that represents the frequency distribution of the categorical responses to the question, “what house do you live in?”

Table 18: Frequency distribution table for “what house do you live in?”

House	Henderson	Fountain	Bronson	Cameron	Smith	Studley	Not answered	Total
Freq.	30	21	20	14	9	3	4	101
Relative Freq. (%)	29.70	20.79	19.80	13.86	8.91	2.97	3.96	100

Mode = Henderson house

APPENDIX G: Interview Questions

Howe Hall Residency Facilities Manager: (Mateo Yorke, the facilities manager for Risley Hall was interviewed due to Maryanne Barkley's unavailability)

What type of laundry machines are in residence?

Are they all the same?

What type of laundry detergent is required, i.e. high efficiency (HE) detergent?

What are the cold and hot water options and/or defaults of the machines?

What are your opinions of idea of integrating automatically dispensed laundry detergent into laundry washing machines?

How many coin slots are there for laundry machines?

Are there open coin slots available on washing laundry machines?

What are the potential price options for adding automatically dispensed laundry detergent?

How many washing machines are there in Howe Hall and the Halifax campus residences?

Is there on-site maintenance or contracts that pertain to laundry services for Howe Hall and/or Halifax campus?

Do you know the approximate use of washers? (number of loads)

Do you have any other ideas, concerns, challenges, considerations concerning laundry services and/or this proposal?

Bebbington Industries - Down East: (Tony Bebbington, owner and founder of Bebbington Industries)

What are the benefits for Down East laundry detergent? i.e. what are the environmental benefits?

How does Down East detergent compare to other brands/types of detergents?

Does this company use, install, clean and/or service equipment?

If yes to above, are there other local company that manufactures EcoLogo certified detergent in bulk and provides services to install, clean and/or service equipment?

Is the equipment compatible with front load washers?

What water temperature(s) are required for your laundry detergent?

How is the detergent packaged? (i.e. plastic, cardboard)

Are the containers refillable? (bulk sales)

Does Down East transport the detergent and supplies?

Once the equipment is installed, how many loads can be done before a refill is required?

Is there a way to know when the laundry detergent needs to be refilled? If so, how?

What are the costs involved with buying detergent, the services involved, maintenance and retrofitting machines, etc.?

Do you currently have a contract, or sell regularly, to another university residence or similar institution?

APPENDIX H: Interview Summaries

Interview summary with the facilities manager of Risley Hall, Mateo Yorke:

Please note that prior consent was asked and given to record the meeting before the interview was conducted.

“Hello my name is Peter Moore and I along with my colleagues of the Environmental Science class 3502 at Dalhousie University are determining the feasible and desirable of improving the waste reduction and scent-free policy efforts pertaining to on-campus laundry facilities at Dalhousie residences. What is being proposed is to retrofit the current Howe Hall washing machines with an automatic laundry detergent-dispensing apparatus, utilizing an eco-friendly, hypoallergenic and locally manufactured laundry detergent from Bebbington Industries. As the facilities manager of Risley Hall (Mateo Yorke), on behalf of my fellow colleagues, I would like to ask you a few questions regarding the laundry facilities at Howe Hall.”

The types of washing machines in Dalhousie residencies have all been replaced in the last two years, with front loading, high efficiency washers except for Henderson and Studley House as their laundry rooms are too small for front loading washers and therefore still use the older top loading washers. The model number for the top loading machines at a total of eight in Howe Hall is #MAT14PDAXWI. The model number for the front loading machines at a total of twenty in Howe Hall is #MHN30PDAXWO. These washing machines are not defaulted to use cold water and have the option to utilize either hot or cold water or both.

Mateo had expressed an enthusiastic response to implementing the proposal stating

“It’s a novel idea” and “It would make total sense” as they have a similar system of an automatic dispensing laundry detergent on the industrial side of Dalhousie’s operations. However, there would be an additional cost that would have to be passed on to the user for this service. As well as the cost incurred by Dalhousie of changing the washing machines that are coin operated, which would be done via the company Cal-Tech, based out of Spryfield, Nova Scotia to which Dalhousie has a long term contract in place for maintenance purposes. Although it is important to note that most machines at Howe Hall are now Dal card operated.

Interview summary with the Owner of Bebbington Industries, Tony Bebbington:

Please note that prior consent was asked and given to record the meeting before the interview was conducted.

“Hello my name is Peter Moore and I along with my colleagues of the Environmental Science class 3502 at Dalhousie University are determining the feasible and desirable of improving the waste reduction and scent-free policy efforts pertaining to on-campus laundry facilities at Dalhousie

residences. We are proposing to retrofit the current Howe Hall washing machines with an automatic laundry detergent-dispensing apparatus, utilizing your eco-friendly, hypoallergenic and locally manufactured laundry detergent. As the owner of Bebbington Industries (Tony Bebbington), on behalf of my fellow colleagues, I would like to ask you a few questions regarding your Down East laundry detergent product.”

Bebbington Industries the maker of Down East laundry detergent has been produced locally in Nova Scotia for almost twenty years and was the first laundry detergent in Canada to be Eco-logo certified meaning it is environmentally preferable or less environmentally hazardous than other similar products. It abides by Environment Canada’s standards of being biodegradable (liquid laundry detergent), having low environmental toxicity, low human toxicity, free of carcinogens and its packaging is all recyclable.

Bebbington Industries offers complete cradle-to-grave services by buying back used containers in an effort to minimize waste and energy costs of producing new containers. Alternatively, the company will offer refills of their empty contains, if preferred. Tony was adamant on focussing his company on doing the best they can as an environmental steward, rather than focusing on the competitors citing “Sustainability is about not sacrificing the future in order to meet today’s needs.”

The vast majority of Bebbington’s packaging for their products, such as their four litre containers, is locally produced, while the three litre bottles are imported from Ontario due to Nova Scotia not being equipped to produce the bottle design. Most of the labels are printed in Truro and all of the boxes are produced by Maritime Paper. The majority of the design work is done locally as well, because it is important to Tony that his company supports local business whenever possible, stating “we are a small local manufacture and it would be somewhat hypocritical of us, if we didn’t support people like us” further citing that “I have people calling me from the Philippines offering to do my design work for five dollars an hour compared to what I pay here at around eighty dollars per hour”.

The company has the equipment necessary for retrofitting front loader washers with an automatic liquid laundry detergent dispensing apparatus. Something the company has a long history of doing with regional restaurants and hotels such as White Point and Liscomb lodges located in Nova Scotia. Furthermore Bebbington Industries has an established delivery system that ensures supplies do not run out, in addition to offering servicing of their equipment. The most suitable containers for Dalhousie residencies would be either the twenty litre pails could do about four hundred, fifty loads of laundry or the fifty five litre drums that could do about one thousand to eleven hundred loads. The laundry detergent is suitable for all temperatures allowing the detergent to be utilized by every machine regardless of default or preferred settings.

APPENDIX I: CORRESPONDENCE WITH WAYNE SHELTON, DIRECTOR OF CAMPUS SUSTAINABILITY AND ENVIRONMENTAL SAFETY, SALISBURY UNIVERSITY

-----Original Message-----

From: Kelli Smith [mailto:KSMITH7@DAL.CA]

Sent: Wednesday, February 20, 2013 6:39 PM

To: Wayne Shelton

Subject: Research Data and Contact concerning on-campus laundry

Hi,

I'm an environmental science undergraduate student at Dalhousie University in Halifax, Nova Scotia. I am working on a group project for a class (ENVS 3502 - The Campus as a Living Laboratory).

The topic of our proposal and report concerns on-campus laundry; we are researching the feasibility, desirability, and environmental benefits of Dalhousie fitting washing machines with equipment to automatically dispense detergent into each wash.

I am researching the implementation at other institutions. I discovered that your campus uses a process similar to what we are investigating.

I am looking for research data as a reference for our proposal and report. We may also like to conduct an interview with someone in the next 4-5 weeks, if possible.

I think I have the right contact information for this topic; if not would you mind emailing me the correct information, or would you forward this to the appropriate person?

Thanks,
Kelli Smith

Quoting Wayne Shelton <WXSHELTON@salisbury.edu>:

[Hide Quoted Text]

Hi Kelli,

Our conversion to front-load washing machines and automated detergent dispensing was a decision by the director of housing after due consideration. I don't know if there was any research presented to him at the time. The company we use for the process is Mac Gray and I suspect they have this type of information for sales purposes. Their system has the ability to visit a web page to see what machines are in use, time left (processing bar), and available machines. The cost of the machines is included in student housing fees.

From my perspective as Sustainability director, the program is important because it reduced use of water, electricity and waste from detergent containers. The director of student housing is Dave Gutoskey (dpgutoskey@salisbury.edu) and you might contact him if you are interested in his perspective.

Thanks,

Wayne Shelton, CHMM
Director of Campus Sustainability & Environmental Safety
Salisbury University
410-546-6485 (office)

Please consider the environment before printing this E-mail. Thank you!

Hi Wayne,

Thank you for your prompt reply, and for the information. It's great to hear the perspectives of people with experience with a system like that we are researching. Thank you for your perspective and the contact information for Dave Gutoskey. I will email him as well.

With much appreciation,
Kelli Smith

APPENDIX J: Sample Site (Howe Hall, Studley Campus, Dalhousie)

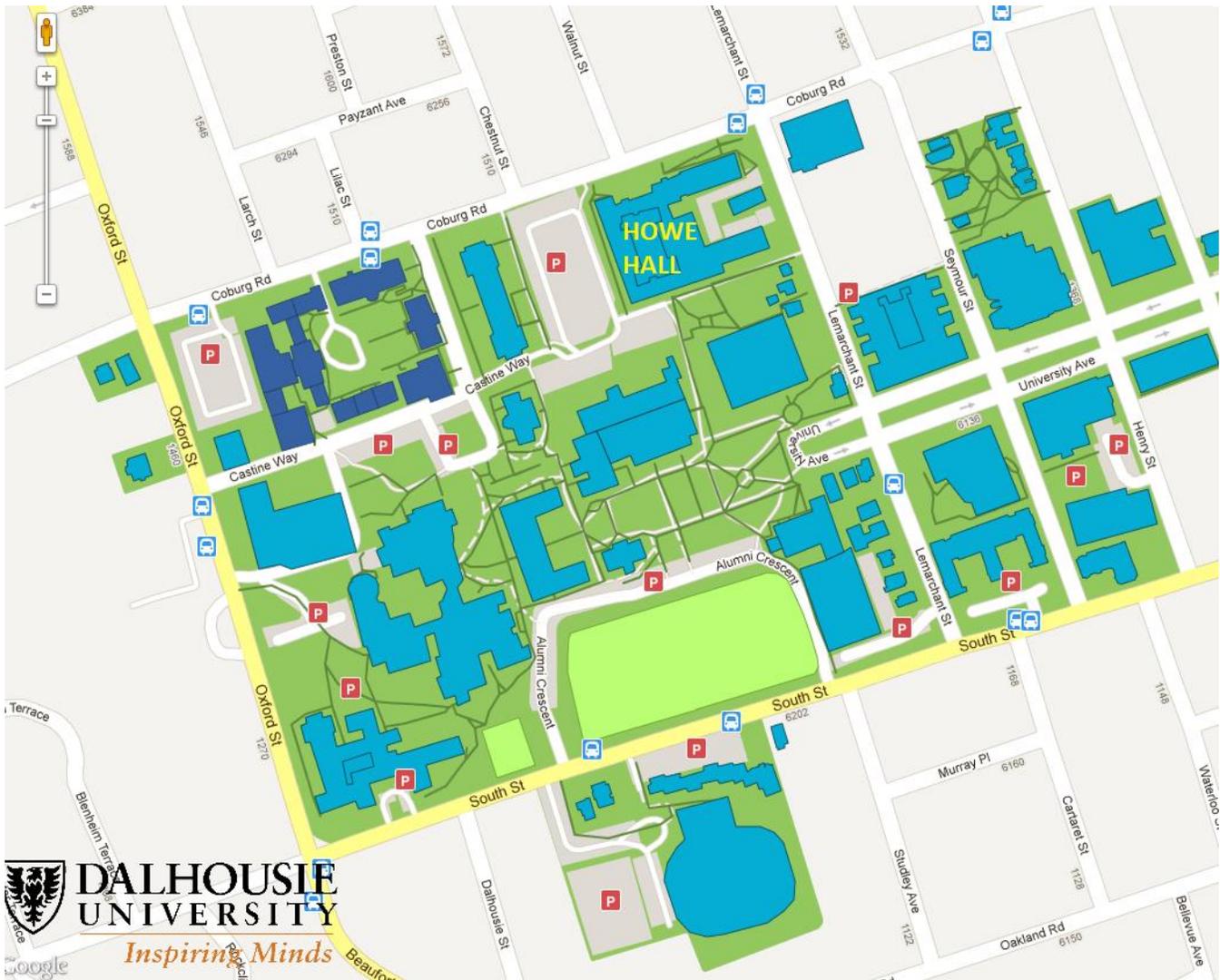


Figure 19: Sample site of student survey. Howe Hall, Studley Campus, Dalhousie University (Dalhousie Campus Map, 2013).