ACADEMIC SUSTAINABILITY PROGRAMS OFFICE

ANNUAL REPORT

2016 - 2017

McMaster University

Academic Sustainability Programs Office

A LETTER FROM THE SENIOR MANAGER

This past year, the students, staff, and members of the community that make up and support McMaster's Academic Sustainability Programs (ASP) Office have made great strides to advance the Office's mission to inspire in all students a desire for continued learning and inquiry through experiential education. We have done this by providing students with unique opportunities for interdisciplinary, student-led, community-based, and experiential learning related to sustainability.

Between September 2016 and June 2017, McMaster saw 23 students graduate with an Interdisciplinary Minor in Sustainability; which has been offered at the University for the past three years. The efforts made to enhance the Minor Course List, clarify and streamline associated administrative processes, and expand course offerings of required courses has been successful and I am inspired by the collaboration between staff, faculty, and students to identify and support opportunities for improvement.

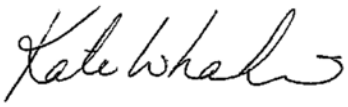
The Sustainable Future Program has also seen substantial growth since its first course was offered in the Winter of 2013. In response to continued growing demand, the Program has been further expanded with the level-two course doubling in capacity. With expansion put in place, we anticipate over 500 students, representing all Faculties, will successfully complete a Sustain course this coming year.

Through the Sustainability Internship Program and Graduate/Undergraduate Collaboration in Experiential Learning Program, we have supported over 30 students in their self-directed learning. Each year, we are excited by their increasingly unique and diverse connections to sustainability. We also continue to enhance our relationship with the broader community, with a focus on fostering deep collaborations, as well as generating action and dialogue among community members through active engagement.

The Community-based Leadership in Sustainability (CLS) initiative has been a conduit to enhance our relationship with the broader community. This past year, through three CLS events, we worked and learned together with hundreds of members of the community including volunteers, speakers, sponsors and donors, researchers, event attendees, and more.

I aspire that this annual report comes to represent more than a collection of accomplishments. I hope you will reflect on the student learning that has taken place and that has enabled students to grow from their experiences, that you acknowledge the diverse collaborations formed and fostered, and that you find inspiration in the stories of the individuals who have shared them with you.

I sincerely hope that you enjoy reading about these projects as much as I have enjoyed working with the individuals who created them.



KATE WHALEN
Senior Manager, Academic Sustainability Programs

MISSION & VISION

OUR MISSION

To inspire in all our students a desire for continued learning and inquiry through experiential education.

OBJECTIVES

To realize our mission, we strive to provide all McMaster students with the opportunity to take part in interdisciplinary, student-led, community-based, and experiential learning focused on sustainability. Key to achieving these objectives is developing and fostering strong community connections, both within the University and the broader city of Hamilton, and supporting students to equip themselves with the knowledge, skills, and abilities to be successful in their learning. This is instrumental to their success as lifelong learners.

PRIORITY PROGRAMS

To achieve our objectives, McMaster's Academic Sustainability Programs Office offers the following programs:

- **Interdisciplinary Minor in Sustainability**: An opportunity for students to choose from a list of sustainability courses from faculties across campus and tailor a minor to complement their undergraduate degree and education.
- **Sustainable Future Program**: A suite of four undergraduate courses focused on sustainability. Courses are open to all students, independent of their home faculty.
- **Sustainability Internship Program**: An opportunity for students to develop and implement a real-world sustainability project and receive course credit from their home faculty upon successful completion.
- **Graduate/Undergraduate Collaboration in Experiential Learning (GUCEL) Program**: An opportunity for students to work in collaboration with undergraduate and graduate students to develop and implement a real-world sustainability project and receive academic recognition upon successful completion.
- **Community-based Leadership in Sustainability (CLS)**: Opportunities to connect with diverse members of the community around local sustainability issues, facilitated through a series of free events and workshops that are open to all.

TABLE OF CONTENTS

INTERDISCIPLINARY MINOR IN SUSTAINABILITY 4

SUSTAINABLE FUTURE PROGRAM 8
- Improving On Campus Bike Share 12
- Cycling Advocacy Week 14
- Cycling Demographics in Hamilton 16
- Hamilton Cycling Gap Analysis 18
- Food Waste in Halton Region 20
- Hydrogen Energy in the 21st Century 22
- Local Food at McMaster: Bridging the Gap Between Farm and Campus 24
- New Fee for Stormwater Management in Hamilton 26
- Sustainability Professionals Network: Sustainability Plan 28
- Sustainability in Action: Supporting Community Campus Partnerships 30
- Active Transportation To and From Elementary School 32
- Athenium Evolution: The New Age of Academic Libraries 35
- Volunteering in Hamilton Through Smart Phone Technology 37

SUSTAINABILITY INTERNSHIP PROGRAM 40
- Role of Public Participation in the Waste Management System 44
- Effects of Infrastructure Improvement on Waste Diversion 45

GRADUATE/ UNDERGRADUATE COLLABORATION IN EXPERIENTIAL LEARNING (GUCEL) PROGRAM 46

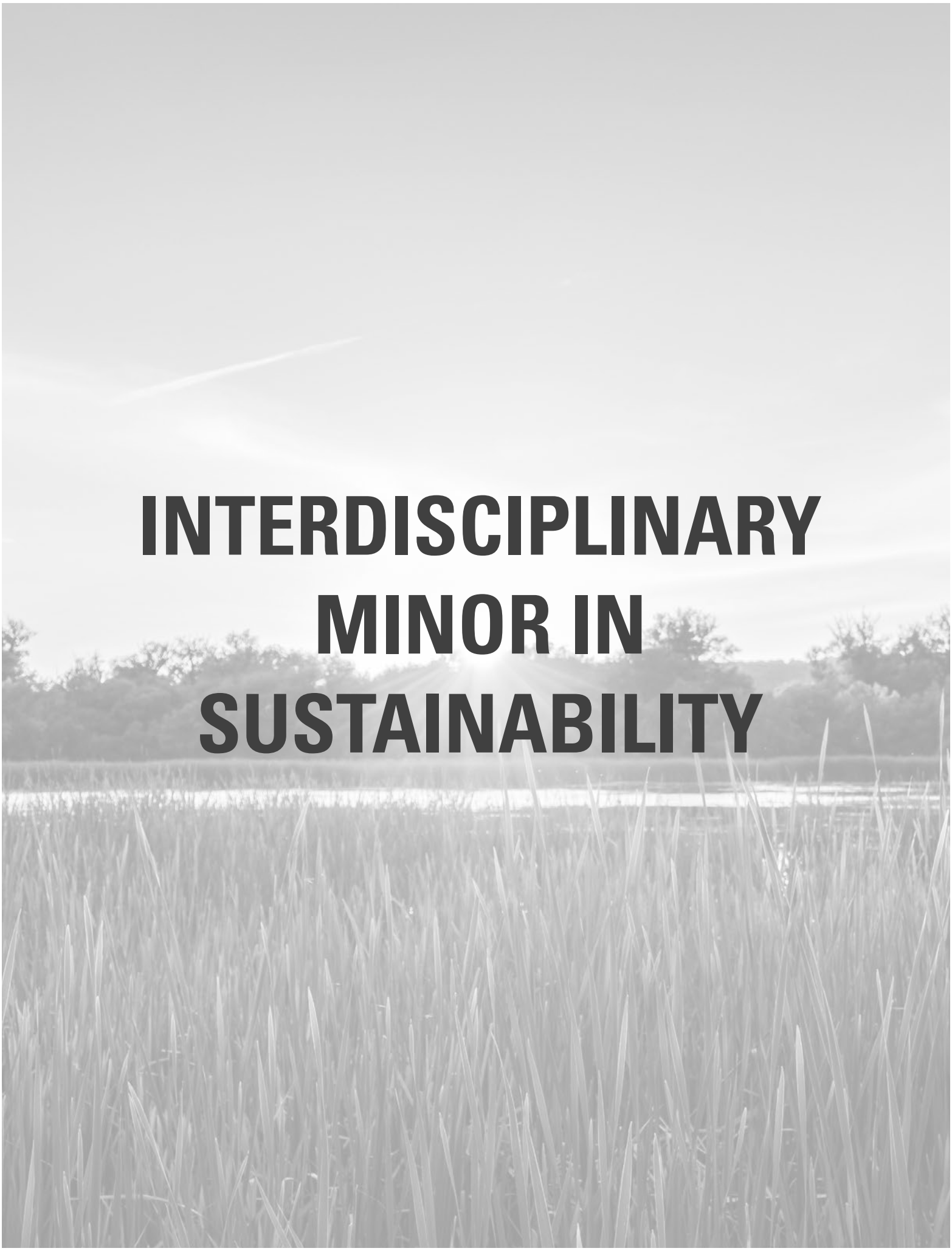
COMMUNITY-BASED LEADERSHIP IN SUSTAINABILITY (CLS) 51

CONNECT WITH US:

asp.mcmaster.ca

@MacSustain

/MacSustain



INTERDISCIPLINARY MINOR IN SUSTAINABILITY

INTERDISCIPLINARY MINOR IN SUSTAINABILITY

Addressing sustainability in our society poses interdisciplinary challenges that require interdisciplinary solutions. McMaster created the Interdisciplinary Minor in Sustainability with the goal of developing students' interdisciplinary knowledge and understanding of sustainability.

To achieve this goal, the minor provides a path for students to study diverse aspects of sustainability by taking courses from different faculties and integrating them into a cohesive whole.

OBJECTIVES

- Encourage opportunities for student experiential learning about sustainability.
- Provide opportunities to meaningfully engage with communities both within and outside of McMaster.
- Offer a wide selection of courses to enable students to choose the sustainability emphasis that is right for them and to pursue courses that will further their individual learning objectives.
- Promote engagement among students, faculty, and staff across all faculties, facilitating interdisciplinary learning.

REPORTING

Through the development and implementation of McMaster's Interdisciplinary Minor in Sustainability, students are now able to choose from over 80 courses from all faculties across campus to gain a truly interdisciplinary perspective of sustainability, as well as tailor a minor that complements their major. In only three years of operation, 40 students have achieved an Interdisciplinary Minor in Sustainability.

COLLABORATORS

First and foremost, we would like to recognize the Arts & Science Program for providing integral support for the implementation and development of the Minor. Specifically, Arts & Science Director, Jean Wilson, and Program Administrators, Shelley Anderson and Rebecca Bishop. The Minor would not be possible without the hard work and dedication of the past and current members of the Interdisciplinary Minor in Sustainability Committee; the Arts & Science Program for providing an administrative home for the Minor; the faculty members who have opened up their courses for inclusion and helped communicate the Minor; the staff members, including academic advisors, who have provided advice and guidance throughout; and the dozens of students who have shown their support by taking the Minor and working with us through its development.

YEAR IN REVIEW

McMaster launched the Interdisciplinary Minor in Sustainability in September 2014 to enable students from all faculties to gain an interdisciplinary understanding of environmental, social, and economic sustainability. Three main tasks have been and will continue to be the primary focus in the early stages of the minor's implementation:

1) Develop the list of available courses from faculties across campus.
2) Refine the administrative processes involved to ensure the minor is accessible to students.
3) Communicate to current and incoming students about the opportunity to pursue the minor.

Enhancing the flexibility and accessibility of the minor, as well as communicating the opportunity to students early on, is integral to providing a positive and meaningful learning experience and to ensure long-term success and sustainability of the minor.

OBJECTIVES

- Maintain the minor course list by reviewing applicable courses from all faculties and incorporating those that support the goals of the minor
- Enhance, clarify, and streamline related administrative processes to ensure that staff can effectively guide students and that students can easily navigate and access the minor
- Promote the minor to incoming and current students through their home faculty

REPORTING

In April 2015, three students graduated with an Interdisciplinary Minor in Sustainability followed by 14 students in April 2016. This past April 2017, 23 students graduated with the minor. We are encouraged by these numbers as they demonstrate growing interest and demand for this minor.

Alongside this early success, improvements have been made to ensure the minor achieves its objectives:

- McMaster's Interdisciplinary Minor in Sustainability Committee members reviewed new and existing courses from their specific faculty. These consultations led to 11 courses from three faculties that were proposed and accepted for inclusion starting in 2017/2018.

REPORTING (CONTINUED)

- Administrative challenges associated with the novelty of implementing a truly interdisciplinary minor arose during the initial two years of offering the minor. Two of these challenges included faculty-specific requirements associated with double-counting courses required for a student's major and confusion regarding cross-listed courses and interdisciplinary programs. Working with academic advisors from each faculty, we were able to gain clarity on these issues, develop messaging that was consistent across faculties, and submit a proposal for the new messaging to be included in the 2017/18 course calendar.

- In response to high demand, Sustain 1S03 (required course for the minor) doubled its capacity in the 2016/17 academic year. Further, the committee broadened the requirement to permit three units of any course in the Sustainable Future Program, rather than specifying Sustain 1S03. As anticipated, increasing the capacity of Sustain 1S03 also led to increased demand for Sustain 2S03, which has since been doubled to satisfy student demand starting in 2017/18. As well, the committee permitted the inclusion of upper year Sustain courses, which will make it easier for students to satisfy the minor requirements because the university limits students to six units of level one courses.

While these efforts have been quite successful, we will strive for stronger representation from all faculties and greater student awareness as led by our committee's student leaders.

THIS YEAR'S COLLABORATORS

We would like to thank all members of the Interdisciplinary Minor in Sustainability Committee for their support: Brent McKnight, Assistant Professor, DeGroote School of Business; Kate Whalen, Senior Manager, Academic Sustainability Programs Office; Shelley Anderson, Program Administrator, Arts & Science Program; Luc Bernier, Assistant Professor, School of Geography and Earth Sciences; Rebecca Bishop Program Administrator, Arts & Science Program; Cameron Churchill, Director, Engineering and Society Program; Partow Etemadi, Student Representative, DeGroote School of Business; Carlos Filipe, Professor/Chair, Chemical Engineering; Chad Harvey, Assistant Professor, Integrated Science Program; Daniel LaFrance, Student Representative, Faculty of Engineering; John Maclachlan, Associate Director, MacPherson Institute; Judy Major-Girardin, Associate Professor, School of the Arts; Shanti Morell-Hart, Assistant Professor, Anthropology; Dean Mountain, Professor, DeGroote School of Business; Susie O'Brien, Associate Professor, Department of English and Cultural Studies; Maureen Padden, Associate Professor, School of Geography and Earth Sciences; Sandra Preston, Assistant Professor, School of Social Work; Stacey Ritz, Assistant Dean of Educational Services, Faculty of Health Sciences; and Jean Wilson, Director, Arts & Science Program. We would also like to thank the academic advisors and communication teams of each faculty, as well as the countless students, faculty, and staff who have contributed to the development and enhancement of McMaster's Interdisciplinary Minor in Sustainability.

SUSTAINABLE FUTURE PROGRAM

SUSTAINABLE FUTURE PROGRAM

The Sustainable Future Program (SFP) consists of a suite of undergraduate courses focused on providing students with the opportunity for interdisciplinary, student-led, community-based, and experiential education focused on sustainability. Courses in the program are open to students from all Faculties.

McMaster developed the Sustainable Future Program for students interested in learning about sustainability while having the opportunity to engage in experiential learning through developing and implementing real-world sustainability initiatives. The Sustainable Future Program aims to build reciprocal relationships between students, community members, and McMaster University to engage all parties in the journey towards a sustainable future.

OBJECTIVES

- Teach students about sustainability from an interdisciplinary perspective.
- Provide opportunities for self-directed, interdisciplinary, and experiential learning.
- Support student learning within the University and local community.
- Engage undergraduate students in taking part in meaningful, experiential research.
- Foster opportunities for students to place local knowledge and local action within a global context.

REPORTING

Since launching the first course in the Winter of 2013, which had an enrolment of 97 students, the Sustainable Future Program has grown to include four courses and has supported over 450 students in the 2016/17 academic year. By doubling the offering of Sustain 2S03 and enhancing communication efforts, enrolment is anticipated to reach 600 per year starting in 2018/19.

COLLABORATORS

We would like to thank the faculty members, course teaching assistants, and community members for supporting students enrolled in the Sustain courses, as well as for supporting continuous course and Program development. Our sincerest appreciation extends to the hundreds of students who have contributed by taking courses and providing feedback for continuous improvement. We would also like to extend a special thanks to the Faculty of Engineering and Engineering & Society Program for providing guidance and administrative support for the Sustainable Future Program.

YEAR IN REVIEW

Since the first course was offered in 2013, the Sustainable Future Program has grown each year through the addition of new courses, as well as the expansion and enhancement of existing courses. To complete the program by offering a course at each undergraduate level, the development of a level-four, project-based course was the initiative of focus throughout 2015/16, with the first offering taking place in September 2016 through to April 2017. Additionally, the implementation of prerequisites for each Sustain course beyond level-one was approved in order to support students in continually building upon their previous knowledge and experiences, as well as to enable the instructional teams to facilitate learning at the highest level. To assist students in meeting the prerequisites and enable them to enrol in the higher level courses, as well as to satisfy the increasing demand of the level-one course, Sustain 1S03 was doubled in capacity and Sustain 2S03 was evaluated to determine if it would also require expansion.

OBJECTIVES

The specific objectives in program development are as follows:

- Implement the level-four Sustain course.
- Assess the program for the addition of prerequisite courses and proceed with actions based on findings.
- Assess demand for each course in the program and proceed with expansion based on findings.

REPORTING

The implementation of the culminating course of the Sustainable Future Program, entitled Sustain 4S06 - Leadership in Sustainability, was offered for the first time in September 2016. Twelve students from the Faculties of Business, Engineering, Science, and Social Sciences worked in groups with support from members of the community to tackle three different sustainability issues. The issues included youth engagement and volunteering, sustainable use of building space in response to technological advancements and changing client needs, as well as real and perceived barriers to active travel. With support from over 45 individuals and members of the community, the students worked to understand the deep and complex issues associated with the challenges that they were presented with, to create innovative solutions, and to demonstrate leadership towards sustainable change. Projects from the two upper-level courses, Sustain 3S03 and Sustain 4S06, are reported on in the pages to follow.

To date, all Sustain courses have been open, in that students were not required to satisfy any course prerequisites prior to enrolment. However, upon consulting with administrators and members of the course instructional teams, it was felt that if students had a foundation of theoretical knowledge and experience with unique course components such as community-based learning, interdisciplinary group work, project management, and reflection, then instructors would be able to facilitate learning at a higher level. As such, starting September 2017, the Sustainable Future Program will require that students enrolled in Sustain 2S03, 3S03, and 4S06 have completed the previous level Sustain course as a prerequisite.

REPORTING (CONTINUED)

While prerequisites will support the scaffolding of knowledge and experiences, we understand that knowledge and experiences are obtained in many different ways.Therefore, all Sustain courses enable students to apply for course permission to waive the prerequisite requirement if they can demonstrate that they have gained the knowledge and experiences elsewhere.

In an attempt to satisfy the high demand for the level-one course, as well as to enable more students to pursue the Interdisciplinary Minor in Sustainability, the capacity of Sustain 1S03 was doubled. However, the course reached capacity in both semesters and inspired more students to pursue the level-two Sustain course. As a result, Sustain 2S03 also reached capacity and demand for the course exceeded supply. Starting September 2017, the capacity of Sustain 2S03 will also be doubled and the course will be offered both semesters.

THIS YEAR'S COLLABORATORS

We would like to thank all of the students who enrolled in the first offering of Sustain 4S06 for their support and feedback throughout the year. We would also like to thank the staff and community members who supported the students in their community-based and experiential learning in all of the Sustain courses. Specific individuals who supported students' experiential learning projects are highlighted in the pages to follow.

The faculty and staff members who helped to identify, provide, and act as resources to support students in applying their knowledge in novel and real-world settings have been instrumental in enabling us to achieve the diverse learning objectives of our courses.

IMPROVING ON CAMPUS BIKE SHARE

STUDENT AUTHORS:
Zaeem Kibria, Tyler Marr, Mehant Parkash, Erin Sinclair, Angela Xie

OVERVIEW

In 2014, the City of Hamilton, in partnership with Social Bicycles, implemented a community bicycle sharing program, Social Bicycles Hamilton (SoBi Hamilton). Operated by local non-profit organization Hamilton Bike Share Inc., SoBi Hamilton consists of a full fleet of 750 bicycles located at over 110 hubs across the city, including the Downtown, Westdale, Dundas, and Central Mountain areas of Hamilton. The goal of SoBi Hamilton is to promote cycling as a sustainable transportation option, while complementing existing public transit and filling in transit gaps by creating an efficient transportation network. The main goals of this project are to provide insight on student transportation needs and how they can be better met through on-campus bike sharing, and to enhance the perception of cycling as a sustainable and enjoyable mode of travel.

OBJECTIVES

1. Determine current student transportation needs and how they can be better met through an on-campus bike share offering.
2. Increase awareness of cycling and bike share as a sustainable transportation option.
3. Enhance the SoBi Bike Share experience within the McMaster community by actively promoting cycling as an enjoyable and social activity.

REPORTING

Through this project, we learned that the MSU (McMaster Student Union) would be holding a referendum on the implementation of a $15 universal SoBi bike share pass for all full-time undergraduate students. We utilized this opportunity to educate students about SoBi, so they could make an informed vote. Our campaign efforts consisted of class talks, tabling, and social media campaigns on Facebook, Twitter, and Instagram.

IMPROVING ON CAMPUS BIKE SHARE

REPORTING CONTINUED

On November 3, 2016, after 4 days of intensive campaigning, the SoBi referendum was unsuccessful with

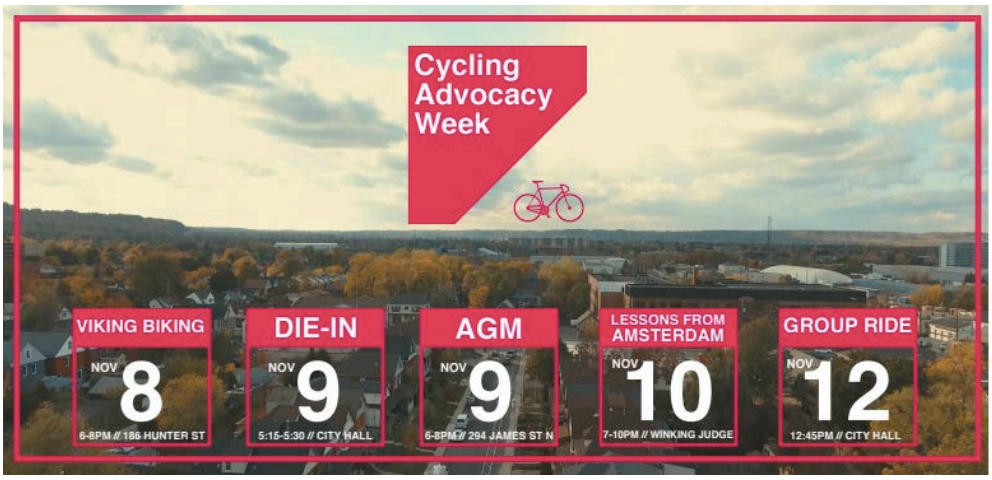
a 46.8% "yes" vote from 4128 people (18.5% of the undergraduate population). Despite our initial disappointment, the results of the referendum demonstrated that our extensive campaign efforts had been successful in garnering attention from the student population. Of all 5 referenda, the SoBi referendum had the highest voter turnout.

Though the SoBi referendum did not pass during the October referenda, we took the initiative to survey McMaster undergraduate students to learn about their attitudes towards cycling. As per our findings from a sample population of 113 participants, alternate transportation options, expensive membership costs and current bike ownership were the top three reasons, respectively, as to why students were not users of SoBi. In addition, students chose the John Hodgins Engineering Building due to its centrality on campus, and the David Braley Athletic Centre as the top locations for a new SoBi hub. We presented this information to our Project Champions to aid in their understanding of students' perceptions of potential barriers to the bike share program. This information will enable SoBi to better tailor the service, address concerns, and to meet the needs of McMaster students.

COLLABORATORS

We would like to thank our Project Champions – Chelsea Cox, Sanathan Kassiedass, and Peter Topalovic – for providing us with information, guidance pertaining to the project, and their continuous support. In addition, we would like to thank Crystal Chan, and Kate Whalen for their invaluable guidance throughout the project, which has been instrumental to this project's success.

CYCLING ADVOCACY WEEK



STUDENT AUTHORS:

Akeel Ali, Danielle de Laat, Zoe Grant, Yasa Ibragimova, Michael Romaniuk

OVERVIEW

The City of Hamilton has made strides to improve cycling in the city, but there are still many areas for improvement. The City created a Cycling Master Plan in 2009, which outlines changes to infrastructure and traffic regulations, includes a list of priority areas of focus, as well as an associated timeline for the plan to be fully implemented. However, while 35% of the Plan's timeline has passed, only 11% of the targets have been achieved*.

Enter Cycle Hamilton: a member-supported coalition of individuals, communities, and organizations that collaborate to promote a safe, fun, healthy and sustainable cycling culture in Hamilton. In 2016, Cycle Hamilton developed the idea of Cycle Advocacy Week (CAW) - a week-long event to generate awareness of the organization and its cause through encouraging active engagement and participation. The goal of this project is to support the successful implementation of Cycle Hamilton's first Cycle Advocacy Week. The importance of the pilot project is critical, as it will set the stage for growing, educating and engaging the City of Hamilton for ultimately the approval from the City of new bike lanes and improved traffic laws.

OBJECTIVES

1. Promote the non-profit organization Cycle Hamilton.
2. Grow the number of individuals associated with Cycle Hamilton, aiming to increase the total number of memberships within the organization.
3. Advocate for a safe, healthy, and sustainable cycling culture in Hamilton.

REPORTING

One project of CAW was a release of the marketing campaign, The Red Bike Project. Three bicycles were spray-painted red, and placed throughout the city asking individuals to answer the question, "Why Ride?" on the bicycle. The Twitter campaign #WhyRide was implemented for one week; over 50 people tweeted #WhyRide, leading to 439 retweets, shares and likes in the Twitter community.

* Cycling Master Plan (2009). City of Hamilton. Retrieved November 30, 2016, from https://www.hamilton.ca/sites/default/files/media/browser/2014-12-17/cycling-master-plan-chapters-1-2-3.pdf

CYCLING ADVOCACY WEEK

REPORTING CONTINUED

CAW became a well-known initiative within the Hamilton community, when featured on *Spotted@Mac*, a community based social media page followed by nearly 25,000 people, and having been featured in a *Raise the Hammer* article. In addition, a promotional video is in the midst of production and will be featured on the Cycle Hamilton website for future promotional purposes.

The Annual General Meeting was a central component to CAW; board members were elected, the organization's future targets were addressed, and Jared Kolb from the City of Toronto was able to present some of the successes of cycling advocacy in Toronto.

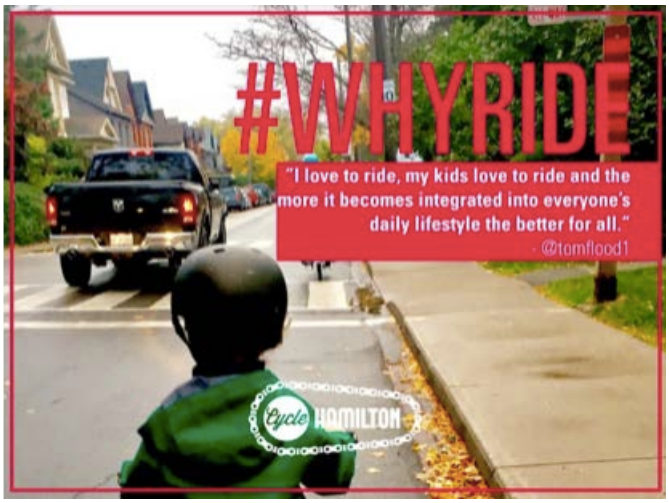
Due to the AGM and events related to CAW, Cycle Hamilton gained 20 new individual members. To further this expansion, we developed a continuous membership growth strategy by creating a database of over 250 potential business sponsors. These establishments were contacted through an initial email proposal, and approximately 15 Hamilton businesses have responded via email expressing interest in partnering with Cycle Hamilton. Through negotiating business partnerships with a target of approximately a dozen central Hamilton businesses (coffee shops, bicycle and parts stores, etc.) Cycle Hamilton has created a system for continuous membership growth and community presence.

The Die-In event involved 12 community members to gather outside City Hall and re-enact a die-in to increase awareness of cyclist's deaths throughout the city. The Group Ride engaged 25 community members to cycle from downtown Hamilton to Dundas, promoting the current petition of '#CycleSafeSydenham.' Clara Hughes and another 624 people so far, have signed the petition to show their support to making Hamilton a safer commute.

COLLABORATORS

Individuals involved with Cycling Advocacy Week include the following:

Project Champions for group project:
Dave Heidebrecht, Benita van Miltenburg, Johanna Bleecker.



Cycle Hamilton members:
Ann McKay, Ian Borsuk, Alexandra Brodka, Angie Bennett, Erin Kennedy, Ned Nolan, Juby Lee, Linda Lukasic, Stephen Bieda, Roman Caruk, Toomas Riis, Cora Muis, Steve Garic

CYCLING DEMOGRAPHICS IN HAMILTON

Campus Bike Library bicycle rack behind Mills Library at McMaster University. Photo credit: Nathania Ofori.

STUDENT AUTHORS:

Robert Etherington, Patricia Kousoulas, Nathania Ofori, Coomal Rashid, Aisha Ikra Saeed

OVERVIEW

According to Statistics Canada, 1.45% of all work trips in Canada are through the means of cycling.[1] Compared to the national average, Hamilton commuter cycling levels are lower at 0.89%.[1] Research on cycling has indicated that females are less likely to cycle than males.[2] Transportation Tomorrow Survey data (2011) revealed that on average, only 30% of Hamilton cyclists were female.[3] By way of an observational survey and a supplementary behavioural survey, we would like to explore the cycling attitudes and behaviours of cyclists at McMaster University. We aim to better understand the barriers cyclists face, in addition to other contributory factors. We would also like to determine whether or not a gender gap exists in this community. By identifying barriers we can begin to find solutions to enable all Hamiltonians to choose cycling as a safe, enjoyable and sustainable mode of transportation.

OBJECTIVES

1. Identify the attitudes and behaviours of all cyclists in general at McMaster University.

2. Identify barriers to cycling.

3. Identify possible actionable and measurable solutions based on identified barriers.Share results using various communication means to inform the community about our findings and collaborate with other groups at McMaster.

4. Share results using various communication means to inform the community about our findings and collaborate with other groups at McMaster.

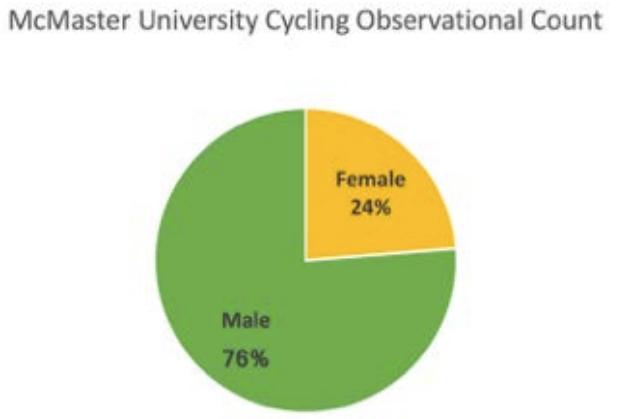
CYCLING DEMOGRAPHICS IN HAMILTON

REPORTING

In order to accomplish these objectives, several steps were undertaken. We completed an observational survey to identify the gender distribution of the cyclists traveling to and from campus over the course of a two week period in late October. We observed over 1000 individuals through the duration of this period. Subsequently, a supplementary behavioural survey was undertaken in-person and online to better understand the barriers that cyclists and non-cyclists faced. We aimed to receive 150 responses and were able to reach this goal. Additionally, the City of Hamilton provided us with detailed information on previous years' activity of cyclists around the McMaster area, which allowed us to compare our results with existing data. To support our understanding, a literature review was conducted offering us different perspectives on the gender gap in cycling, in addition to cycling attitudes and behaviours in other cities such as Toronto and Montreal. We utilized Microsoft Excel to analyze the results of our observational study and survey. Our survey determined the most prevalent barrier for cycling was due to students not having access to a bike. After determining the major barriers to cycling from this analysis, we identified feasible solutions to tackle this issue. We undertook an educational campaign, which included creating an engaging video that incorporated the data we collected, as well as discussed steps individuals could take to promote cycling. We were able to share our results through the McMaster Academic Sustainability Programs Office Facebook page as well as through personal sharing. We then reached out to the Women Gender and Equity Network (WGEN) and other groups on campus asking them to share our video and potentially collaborate with us in the future. In addition, we were able to present our results to City of Hamilton staff. Based on these completed deliverables, we believe that this issue has been brought to the forefront, and we can confidently hand this project to the next cohort. Overall, our team hopes to use this platform to continue promoting cycling on campus to both staff and students.

COLLABORATORS

We would like to express our sincere thanks and appreciation to our Community Project Champions, Janelle Trant and Steve Molloy, from the City of Hamilton, for providing us with cycling data, in addition to their guidance and support. We would also like to extend our thanks to McMaster University's Senior Manager, Academic Sustainability Programs, Kate Whalen, for her assistance and feedback on applying to the McMaster Research Ethics Board. Additionally, we would like to thank the McMaster Students Union's Women and Gender Equity Network for their willingness to collaborate with us on this campaign. Through their efforts to this project, our collaborators demonstrated their commitment to making Hamilton a healthier and safer community for all.



Observational study results; 24% of observed cyclists are female.

References

1. Statistics Canada 2006. "Employed labour force by mode of transportation to work, by census metropolitan area (2006 Census) (Ottawa-Gatineau, Kingston, Peterborough, Oshawa, Toronto)." http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/labr88c-eng.htm.
2. Dickinson, Janet E., Simon Kingham, Scott Copsey, and Deborah J. Pearlman Hougie. "Employer travel plans, cycling and gender: will travel plan measures improve the outlook for cycling to work in the UK?." Transportation research part D: transport and environment 8, no. 1 (2003): 53-67.
3.Transportation Tomorrow Survey 2011. http://dmg.utoronto.ca/pdf/tts/2011/tts 2011_presentation.pdf

HAMILTON CYCLING GAP ANALYSIS

STUDENT AUTHORS:
Robbyn Darling, Waleed Dhillon, Fiona McGill, Rachel Medved, Maria Wolos

OVERVIEW

It is noted that cyclists in Hamilton are at greater risk of becoming victims of motor vehicle collisions than what would be expected from the provincial average.[1] Additionally, the number of cyclist commuters in the city is lower than that of the national mean.[2] These numbers can be attributed to cyclists feeling unsafe on roads hence choosing alternative methods of transportation. Leading research shows that well-developed road infrastructure, including bike lanes, can increase safety and decrease accidents.[3] With a commitment to eliminating cycling injuries[1], the City of Hamilton, supported by local advocacy group: Cycle Hamilton, has taken initiative to map all existing bike lanes in order to locate gaps in the current cycling networks. This project aims to identify gaps from the perspective of a cyclist, in order to recommend infrastructure improvements. Providing high-quality infrastructure and well-connected networks for cyclists will increase safety and support cycling as a sustainable mode of transportation for all.

OBJECTIVES

1. Assess Hamilton bike lanes for safety and connectivity from a user perspective.

2. Determine potential new routes based on a rating system for cyclist safety.

3. Create a comprehensive video from a user perspective displaying the contrast between the top ranked bike lane and bike lanes that need improvement.

HAMILTON CYCLING GAP ANALYSIS

REPORTING

After successfully biking all of Hamilton's bike lanes and rating them based on safety, quality and connectivity, we then compared it to existing information. Data obtained on employment density, and location of schools was correlated with the existing bike lanes map provided by the City of Hamilton. This information, along with data on dangerous roads from Hamilton's Public Works Department, was used to consider what proposed bike lanes should be implemented in the near future.

This analysis establishes that Hamilton already has some high quality bike lanes. 57.55% of the existing lanes were were well rated, with no need for improvement in the near future. Most of these well rated lanes can either be found in downtown or in suburban areas where 96% of these lanes had good quality pavement, which is a key factor when considering bike lane safety. However, this leaves 42.45% of existing bike lanes in poor condition. These roads were poorly rated either due to their pavement quality, safety, lack of proper signage and general appearance. Unlike the well rated lanes, the poorly rated lanes can be found all across the city, but primarily downtown, and lacked connectivity to the rest of Hamilton, such as the mountain.

Our full report and video was shared with the City of Hamilton as well as Cycle Hamilton, and can be found online at asp.mcmaster.ca.

COLLABORATORS

We would like to thank the following individuals for their support: survey implementation was facilitated by the members of this student group. The community project champion, Peter Topalovic, was responsible for advising the group throughout the project. The community mentor, Alex Ricci, provided a map of various bikes lanes around Hamilton. Patrick DeLuca provided assistance with navigating the ArcGIS program and Scholars Geoportal. Dr. Scott provided GIS data on biking patterns. Our academic advisor Kate Whalen interviewed the group progress and provided feedback. Our non academic advisor Vikram Hardatt would arrange the group member meetings and provide us background information as well as feedback on the final report.

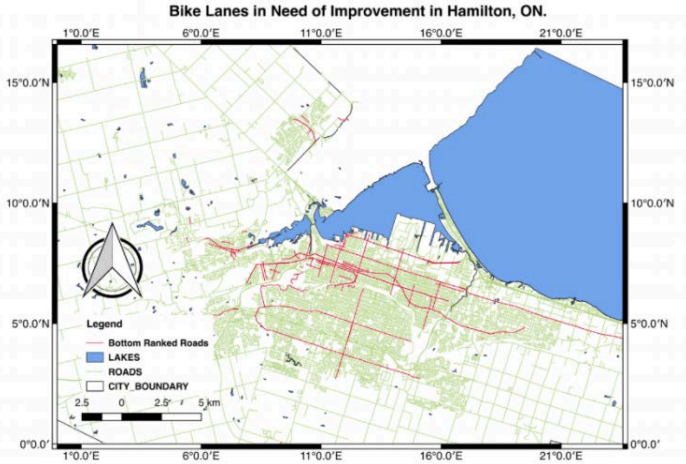


Figure 1: Bike Lanes in Need of Improvement in Hamilton, ON. Based off of Table 2, this is a visual representation of bike lanes that were rated poorly in this study and were found to be need of improvement.

1. Craggs, S. (2013, November 06). Hamilton roads second most dangerous for pedestrians in Ont. - Latest Hamilton news - CBC Hamilton. Retrieved November 07, 2016, from http://www.cbc.ca/news/canada/hamilton/news/hamilton-roads-second-most-dangerous-for-pedestrians-in-ont-1.2415830
2. Stuckless, J. (2010). A Study of Cyclists in Hamilton, Ontario: Perceived Availability of Cycling Facilities and Cyclists Motivations for Cycling.
3. Reynolds, C. C., Harris, M. A., Teschke, K., Cripton, P. A., & Winters, M. (2009). The impact of transportation infrastructure on bicycling injuries and crashes: a review of the literature. *Environmental Health*, *8*(1), 1.

FOOD WASTE IN HALTON REGION

STUDENT AUTHORS:

Dalton Budhram, Amy Dang, Maryam Davari, Jovana Jovanovic, Zarwa Saqib

OVERVIEW

A staggering 1.3 billion tonnes of food is wasted per year, which not only causes major economic losses but also endangers natural resources that humans rely upon to sustain their lifestyles (FAO, 2013). Simply put, food waste occurs when food is left to spoil or is discarded. An estimated 47% of food waste occurs during consumption (Soma, 2016) and the implications are devastating. When food is wasted, valuable resources used in its production such as energy, fuel, time and water put into growing, harvesting, storing, and transporting are also affected. The major barrier associated with tackling issues related to food waste is public awareness (Graham-Rowe, Jessop, & Sparks, 2014). Our project's primary objective is to implement a more effective method of raising awareness of the environmental, social and economical impacts of food waste. We are focusing on public opinions, education and engagement surrounding food waste through the creation of a social media campaign called Sustainable Stories and informational brochure to effectively raise awareness. We aim to inspire residents to reduce food waste and collectively reduce the carbon footprint of the food supply chain to eliminate the economic burden of food waste.

OBJECTIVES

1. Collect, distill, and disseminate data concerning food waste and related initiatives in the Halton region to promote public awareness.

2. Publish collected data on social media through the creation of an interactive Facebook campaign.

3. Achieve public awareness regarding food waste through promotion of the Facebook interactive campaign.

4. Produce informational brochures on food waste targeted for students in grades four to six in the Halton region.

FOOD WASTE IN HALTON REGION

REPORTING

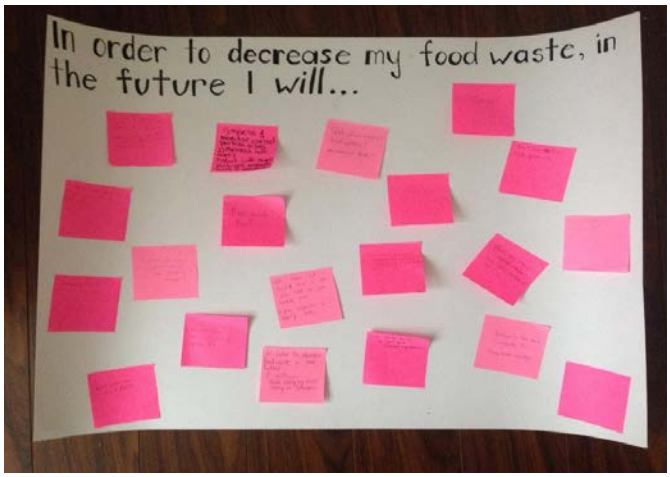
An integral aspect of the project was the collection of public opinions regarding food waste with the purpose of successfully raising public awareness. In relation to the first objective, anecdotal evidence was compiled from McMaster University students through qualitative surveying of public opinion on food waste. Individuals were asked to provide written responses for their opinions on the following 3 questions: What steps do you take to reduce food waste in your daily life? Which of the following environmental issues is most significant to you? (Climate change, food waste, air pollution, animal speciation, water shortage). To decrease my food waste, I pledge to _____. These surveys reflect the participant's understanding of food waste, what changes they hope to see in the future, and what they believe their role in this issue is. Overall, a sample of 60 responses to each of the questions were gathered, which were analyzed and presented in the Facebook campaign and informational brochure, achieving project objectives two, three and four.

The campaign also housed various infographics and videos compiled by our team, targeting the first objective. Through the use of these visuals, information was presented on the Sustainable Stories page and in the informational brochure to inform the audience on food waste facts and related initiatives.

The response to the campaign was remarkable. The Facebook page reached out to approximately 1000 residents and students with over 150 Facebook likes, meeting our predefined expectations of success. This page is in collaboration with the Halton Food Council to ensure that it will be maintained after the end of the semester. Moving forward, the informational brochure will be distributed by our community project champions (CPCs) to 12 schools in the Halton region with a goal of reaching over 1000 students in grades 4-6.

COLLABORATORS

The success of this project would not have been possible without the assistance, guidance, and encouragement of our CPCs Anna DeMarchi-Meyers and Adeline Cohen from the Halton Food Council (HFC) and Kate Whalen, the Senior Manager of the Academic Sustainability Program at McMaster. Finally, many thanks to the amicable Samaritans of Halton and Hamilton who have agreed to partake in the Sustainable Stories initiative.



1) FAO - News Article: Food waste harms climate, water, land and biodiversity – new FAO report. (n.d.). Retrieved September 29, 2016, from http://www.fao.org/news/story/en/item/196220/icode/

2) Graham-Rowe, E., Jessop, D. C., & Sparks, P. (2014). Identifying motivations and barriers to minimising household food waste. Resources, Conservation and Recycling, 84, 15–23. https://doi.org/10.1016/j.resconrec.2013.12.005

3) Soma, T. (2016). The Tale of the Crying Rice: The Role of Unpaid Foodwork and Learning in Food Waste Prevention and Reduction in Indonesian Households. In J. Sumner (Ed.), Learning, Food, and Sustainability (pp. 19–34). Palgrave Macmillan US. Retrieved from http://link.springer.com/chapter/10.1057/978-1-137-53904-52

HYDROGEN ENERGY IN THE 21st CENTURY

STUDENT AUTHORS:
Raisa Ahmed, Natalie Cranston, Dalia Nasser, Emily Urban, Shira Weiss

OVERVIEW

Canada is one of the world's leading countries in research and development of hydrogen energy technologies but most of these advances are implemented elsewhere as Canadian hydrogen energy adoption had been slow. The world currently relies on non-renewable resources that are unsustainable. Traditional energy sources, including coal and electricity, are major contributors to climate change. Hydrogen energy is not harmful to the environment and has the potential to replace traditional energy in many applications. The increased amounts of CO_2 and other greenhouse gases produced from these sources has encouraged discussions of alternative energy sources.

Grand & Toy is a Canadian subsidiary of Office Depot that specializes in business solutions and supplies. Their vision is "powering the potential of Canadian businesses to lead the journey towards sustainability".[2] As an initiative of thought leadership efforts by Grand & Toy, the purpose of this project was to explore hydrogen as an alternative source of energy to accompany the needs of the 21st century, specifically for industries within Canada.

OBJECTIVES

1. Develop an understanding of current uses of hydrogen energy as well as the advantages and disadvantages of using it as a fuel source.

2. Understand hydrogen energy from the perspective of Canada's business leaders.

3. Share findings to support the discussion of hydrogen energy as a viable energy source for businesses.

REPORTING

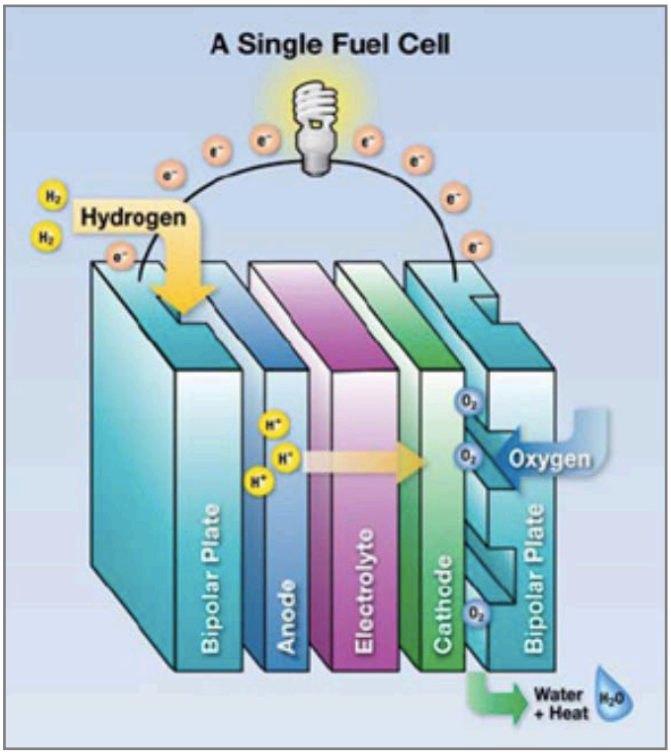
Through our research on hydrogen energy, focusing on the pros and cons of its use in business, we developed a deep understanding of the emerging technology and its potential applications. Notably, we learned from our research that a major application of hydrogen energy is in the form of hydrogen fuel cells. We were also able to discern some of the advantages and disadvantages of this energy source from both research and acquired interview data.

We were specifically interested in the viability of the use of hydrogen energy sources in Canadian organizations. To gain a business perspective, we interviewed representatives from Wajax Corporation. We found that these businesses used hydrogen energy in a very positive way as a clean and efficient source of energy. For example, hydrogen-powered forklifts are significantly more convenient and cost effective than electric-powered forklifts or propane forklifts. According to interviewees, disadvantages of hydrogen energy include the high cost associated with implementing the technology, which was consistent with our literature review findings. Some participants also had concerns with the high pressure storage capacity that is required for proper hydrogen flow since pressurized hydrogen is dangerously flammable, however, our research showed that hydrogen fuel cells are very safe under normal conditions.

The research and data we collected was analyzed to determine the most relevant and interesting information. We were then able to draft a professional report on the use and applications of hydrogen energy as it pertains to Canadian businesses. This draft was sent to Grand & Toy for review. We look forward to our findings being reviewed and published in the Grand & Toy *Insights* report.

COLLABORATORS

We would like to thank our Community Project Champions: Serguei Tchertok, Sustainability Manager at Grand & Toy, and Hannah Hinchey, Sustainability Intern at Grand & Toy for helping this project move in the right direction and providing feedback for our ideas. We would also like to thank Kate Whalen for support and guidance when going through the ethics approval process.



Fuel Cell Basics. (2016). *Fuel Cell & Hydrogen Energy Association.* Retrieved from http://www.fchea.org/fuelcells/

1. *Global Greenhouse Gas Emissions Data.* (2016). *Epa.gov.* Retrieved from https://www.epa.gov/ghgemissions/global-greenhouse-gas emissions-data
2. *Corporate Profile.* (2016). *Grandandtoy.com.* Retrieved from https://www.grandandtoy.com/en/sites/core/aboutUs_corporateProfile.aspx

LOCAL FOOD AT MCMASTER: BRIDGING THE GAP BETWEEN FARM AND CAMPUS

Photo credit: Aedammair Dunleavy

STUDENT AUTHORS:

Aedammair Dunleavy, Rhys Thomas, Vyshnavi Mahendran, Shaera Rahim, Louise Twells

OVERVIEW

Local food production and distribution has recently been emphasized as a method of increasing food sustainability in the 21st century. At McMaster, Mac Farmstand was established in 2010, selling local produce and other goods to students during the summer and fall months. While a great initiative, there is still much work to be done in order to establish a sustainable food system at McMaster. Through an experiential 'local food outing,' the project aimed to increase awareness and knowledge surrounding local food in the Hamilton region. Furthermore, in preparation for the expansion of Mac Farmstand, the group investigated local food initiatives at other Ontario universities and created a thorough report outlining clear and specific recommendations for McMaster going forward.

OBJECTIVES

1. Provide an opportunity for students to see firsthand where local food comes from.
2. Increase awareness and knowledge surrounding the importance of supporting local food initiatives such as Mac Farmstand.
3. Investigate the progress of other Ontario universities and outline clear steps going forward with regard to local food initiatives at McMaster.

LOCAL FOOD AT MCMASTER: BRIDGING THE GAP BETWEEN FARM AND CAMPUS

REPORTING

A trip to a Dyments farm in Dundas was organized to showcase local food in its production phases. We found that there is a community of people at McMaster who are passionate about local food, and the farm trip was successful in bringing some of this community together. The outing was enjoyable and educational, as a number of those on the trip had never visited a local farm. With a turnout of 18 people, the trip was definitely a success! The group enjoyed exploring the farm, picking pumpkins, and many purchased various goods from the market. Following the visit to Dyments, the group made a stop in the heart of Dundas, home to various local food stores, restaurants, and cafes. Most of the group enjoyed a meal at Detour Cafe, which sources most ingredients locally. The group was also able to explore Picone's Fine Foods, and Mickey McGuire's Cheese store. All three locations accept the new Local Food Discount Card, and so visiting these places was a great (and delicious) way to promote local food around McMaster.

Promotion more generally was a key aspect of this project. Beginning in September, our group volunteered at the Local Food Fest, organized by Mac Farmstand. We engaged with students on the topic of local food, and helped distribute and promote the new Local Food Discount Card, which offers students a 10% discount at 11 locations in Hamilton that source ingredients locally. In collaboration with Mac Farmstand, we were able to advertise the local food outing. Through social media, we spread the word and encouraged people to sign up for the trip.

Our investigation into local food initiatives at other Ontario universities was interesting and inspiring. Queen's, Guelph, Western, and Brock have taken further steps in establishing local food programs, and McMaster could certainly learn from what they are doing.

In writing a report summarizing our findings, we analyzed projects that have worked for other universities and predicted which initiatives may be successful here at McMaster. Sharing the report was another step. While our project has a limited time frame, increasing the availability and accessibility of local food at McMaster is a long term goal. Through sharing our report with important stakeholders at the university, we will hopefully facilitate future progress in food sustainability at McMaster.

COLLABORATORS

We would like to give a special thanks to our project champions Chris Roberts and Wayne Terryberry, as well as our student mentors Adam Chiaravalle and Kaitlyn Deans. We would also like to thank all those who participated in our excursion, and the volunteers at Mac Farmstand who helped us share and promote the event!

NEW FEE FOR STORMWATER MANAGEMENT IN HAMILTON

STUDENT AUTHORS:
Daljeet Cheema, David Gowland, Sophia Silverton

OVERVIEW

The occurrence of more frequent extreme precipitation events is increasing due to climate change and poses a significant problem to stormwater management systems in urban areas. Hamilton's stormwater management system currently does not have the capacity to withstand intense weather events. Consequences of this include, but are not limited to, increased pollution in the Hamilton harbor as a result of water runoff, and the increased risk of severe flooding and property damage.

Current funding for stormwater management originates from property owners who are charged a fee based on water usage, as displayed on their utility bill. This does not accurately reflect the impact of a property on Hamilton's storm water management infrastructure. The largest contributor to increased costs is the use of impervious surfaces, such as paved parking lots, which prevent natural water absorption.

More funding is needed for the stormwater management system, but it is not equitable to charge residents large stormwater fees based on their water usage. In response, the non-profit organization, Environment Hamilton has been campaigning at Hamilton City Hall for a restructured stormwater management fee system that is equitable, transparent, promotes awareness of stormwater management, and encourages implementation of green infrastructure.

OBJECTIVES

1. Organize a body of knowledge to justify the improvement of the Hamilton stormwater management infrastructure.

2. Create a compelling case for an equitable and transparent stormwater management fee structure.

3. Concisely disseminate relevant information regarding the issues, risks, and benefits associated with changes in stormwater management for the competent authorities.

NEW FEE FOR STORMWATER MANAGEMENT IN HAMILTON

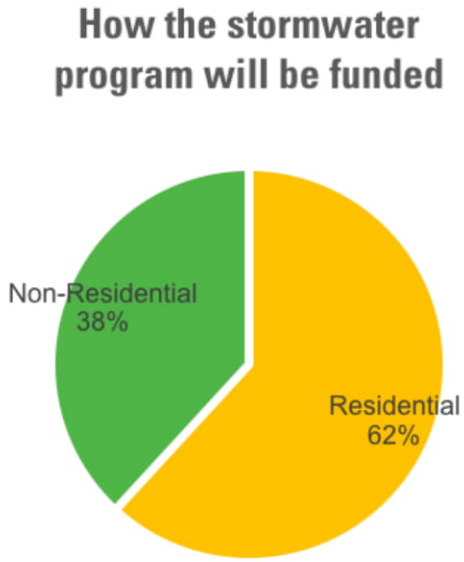
REPORTING

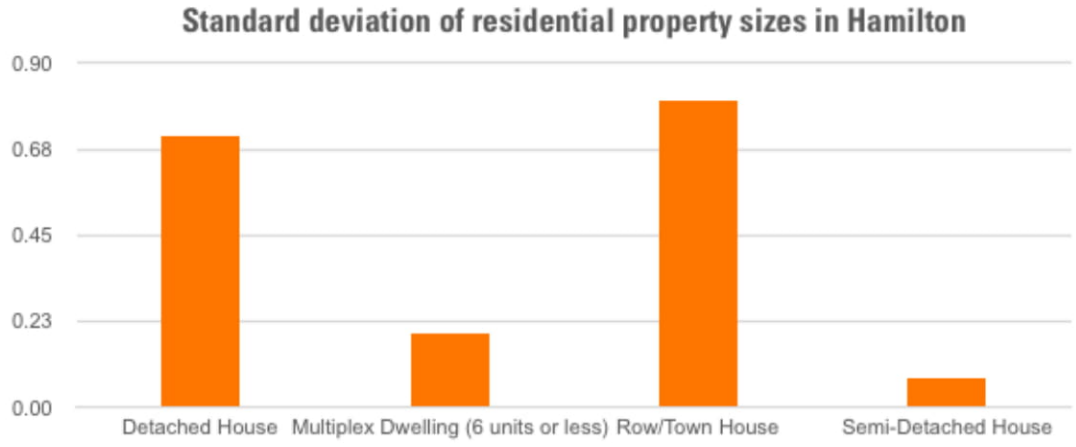
We worked closely in consultation with the knowledgeable team at Environment Hamilton to produce a resource that would be of value to them and their efforts to change stormwater management fees. We created a summary report on previous stormwater management fee arrangements in the City of Hamilton and a comparison report on stormwater management fee systems used in peer cities like Mississauga. We then constructed a compelling case for the new structure by: performing valuations on potential costs of flooding, determining effective stormwater mitigation practices, and valuing the costs of implementation. Following this research-heavy project component, we then designed a new fee structure through detailed data analysis of over 160,000 Hamilton properties.

Through the process of research, we discovered existing resources on stormwater management are technical, lengthy, and repetitive. In our report we ensured that information would be accessible to those who have no prior knowledge of stormwater management. Our final product compiled all of the above information into a concise and convincing final report that can be referenced by Environment Hamilton and City Councillors.

COLLABORATORS

We would like to thank our Community Project Champion, Ian Borsuk from Environment Hamilton, along with others members of the Environment Hamilton community who supported our work. We would also like to thank our course instructional team for Sustainability 3S03.





Interesting Excerpt from Data Analysis: Our data proved our thesis that residential properties are very similar and can be grouped based on their categories. The standard deviation of residential property sizes in Hamilton is very low in comparison to non-residential properties, and this is a significant reason behind the chosen fee structure described in our final report.

SUSTAINABILITY PROFESSIONALS NETWORK: SUSTAINABILITY PLAN

HIVEX conference, concurrent session led by Hamilton SPN
Photo credit: Peter Topalovic

STUDENT AUTHORS:
Dina Hamed, Danielle Hudson, Matthew Li, Isa Mulder, Nicole Vasarevic

OVERVIEW

Sustainability issues are complex, and global efforts to solve these problems are being made. However, it is easy to overlook the most effective local platform for action, the community. Communities provide an opportunity to make small scale changes, which then contribute to global impact. The key is to act local, and through that, make global change.

The Hamilton Sustainability Professionals Network (SPN) does this by filling the gap between sustainability professionals and the broader Hamilton community. SPN encourages networking, provides tools for education and inspires action in Hamilton's communities during events and workshops. Additionally, the SPN provides volunteer opportunities and accessible research reports. Since 2013, the SPN has grown in size and impact and has identified the need to redefine their core focus and direction for future growth.

OBJECTIVES

1. Recommend options for a revised core focus and organizational structure.
2. Develop a strategy for maintaining an executive board and the general membership.
3. Provide recommendations to improve Sustainability Professionals Networks' online presence.
4. Outline the financial implications for each of the recommended organizational structures.

SUSTAINABILITY PROFESSIONALS NETWORK: SUSTAINABILITY PLAN

REPORTING

The goal of this project was to provide the SPN Executive Board with a report outlining a redefined direction for future growth. Through research and consultations we compiled a report of recommendations summarizing SPN's core focus, three different options for organizational structures, membership plans, enhancement of online presence, and plans for financial sustainability.

Our first objective was to revise SPN's core focus and organizational structure. Through research, interviews with industry professionals, and further discussions with the SPN board members, our team compiled a written report outlining three potential organizational structures for the future SPN: incorporated not-for-profit, charitable organization, and an acquisition or partnership with Evergreen Hamilton. For each option we explored benefits, challenges, and opportunities, then outlined practical steps required to adopt each recommended structure.

Next we created a strategy for recruiting and retaining members for SPN. We used research to compile recommendations for a membership structure that would facilitate SPN's future executive board succession. The succession model outlined each board member's term length, responsibilities, and the pathway to holding an SPN executive chair position.

Our third priority was to provide SPN with recommendations that would improve the appearance of their online presence. We did this by researching "best practices" for website and social media platform synchronization. As well as developed a plan to give the website design a new and contemporary look. These recommendations were critical for membership recruitment and keeping the SPN relevant and connected with the community.

Lastly, we highlighted the financial implications associated with each of the three options for organizational structure. Each "financial implications" section outlined key strategies to keep SPN financially sustainable.

The final report, titled *Direction for Future Growth*, was presented to the Executive Board, which then took our recommendations under consideration. Our recommendation will allow SPN to continue functioning as a networking hub for the environmentally conscious, engage the Hamilton community, and remain sustainable for years to come.

Hamilton SPN Executive Board, from left: Liz Nield, Maria Topalovic, Jay Carter, Kate Whalen, Peter Topalovic, Jayde Liebersbach, Janelle Trant
Photo credit: Adam Moniz

COLLABORATORS

We would like to thank our Community Project Champions: Maria Topalovic, Peter Topalovic, and Liz Nield. As well as the rest of the SPN Executive Board members: Jayde Liebersbach, Jay Carter, Janelle Trant, and Kate Whalen. In addition, thank you to Lynda Lukasik and Jay Carter for taking time to meet with our team to share their insights and information. Every individual mentioned above provided their enthusiasm, support, and guidance to make this project a success, thank you.

SUSTAINABILITY IN ACTION: SUPPORTING COMMUNITY CAMPUS PARTNERSHIPS IN SUSTAINABILITY

STUDENT AUTHORS:

Natalie Charette, Jeevika Goyal, Bakht-Awar Khan, Jacob Lee, Natalie Phung, & Carol Tang

OVERVIEW

Cities have the ability to positively impact our environment, economy, society, and overall sustainability (Newman, 2006). For cities to achieve this, various groups within the city must work together towards common goals. Change Camp Hamilton is a partnership between Hamilton's educational institutions, the City of Hamilton, and local community organizations. Its goal is to connect post-secondary students with members of the community and local organizations in a joint effort to pursue the City of Hamilton's Our Future Hamilton visioning initiative (Change Camp Hamilton, 2016). In adherence to this goal, the objective of our project was to actively engage the Hamilton community through ChangeCampX, a Change Camp Hamilton workshop. The purpose of ChangeCampX was to build partnerships for future collaboration, clarify the expectations of student participation, and establish the foundation for individuals to commit to making a positive impact on sustainable development in Hamilton.

OBJECTIVES

1. Promote ChangeCampX workshop on the themes of "Building Environment & Infrastructure" and "Clean & Green" to connect Hamilton students with local community organizations to address sustainability issues.

2. Plan and implement ChangeCampX workshop to facilitate engaging dialogue and action plans.

3. Share findings, results, and recommendations with Change Camp Hamilton stakeholders.

SUSTAINABILITY IN ACTION: SUPPORTING COMMUNITY CAMPUS PARTNERSHIPS IN SUSTAINABILITY

REPORTING

Our project involved creating topics for roundtable discussions in order to connect members of the Hamilton community and define opportunities for them to collaborate on local initiatives.

ChangeCampX took place on November 24th and featured community projects relating to the themes of "Clean and Green" and "Built Environment and Infrastructure." In total, 55 participants attended the workshop and partners from 9 community organizations agreed to act as workshop facilitators. Facilitators and guests with similar interests were seated at the same roundtables to create specific action plans.

To promote ChangeCampX, we created and distributed infographics, posters, e-blasts, and posted consistently on Facebook and Twitter. Relevant local organizations, students, and residents within the Hamilton community were invited via email to attend or facilitate the workshop.

During the workshop, our team delivered a presentation to welcome the attendees and introduce Change Camp Hamilton. Guest speakers then presented their community organizations and explained how to successfully implement change following the Stages of Change model. To encourage a sustainable event model, we reached out to local food catering options. Mes Amis Catering provided catering for the event, including locally produced food and fair trade coffee and tea. We concluded the event by having all participants write a postcard to themselves, to be mailed to them by Change Camp Hamilton in the near future, as a reminder of their commitment to an action plan they developed at the workshop. We distributed feedback surveys to all attendees to assess the outcome and successes of ChangeCampX. Based on our preliminary analysis, 31% of attendees found the roundtable sessions useful, and 31% found it useful to use the template we provided to guide the direction of discussion and formulate action plans. Attendees were from various backgrounds: university student, resident, and community organization.

All attendees formed at least one new connection at the event and felt encouraged to take part in existing sustainability initiatives in Hamilton. We consolidated the preliminary data to create a workshop outcome report template. The report summarized the overall outcomes of ChangeCampX (the group planning process, workshop execution, recommendations for future events, etc.) to serve as a guide for future Change Camp Hamilton events.

COLLABORATORS

We would like to thank our Community Project Champion, Dave Heidebrecht, Coordinator of the Office of Community Engagement, McMaster University, for providing us with information and resources, acting as a liaison with others at Change Camp Hamilton, and offering feedback, and mentorship throughout. Additional thanks goes to Christine Yachouh and Crystal Chan, Teaching Assistants for Sustain 3S03, and Kate Whalen, Senior Manager, Academic Sustainability Programs, McMaster University, for their support. Finally, thank you to Mes Amis Catering and all ChangeCampX participants, community organizations, roundtable facilitators, and volunteers!

ACTIVE TRANSPORTATION TO AND FROM ELEMENTARY SCHOOL: A FOCUS ON THE USER EXPERIENCE

STUDENT AUTHORS

Syed Ali Haider Zaidi, Life Science
Sandra Hernandez, Commerce
Hayya Usmani, Material Science and Engineering
Jasmine Wong, Kinesiology

A happy family
Image Credit: Simon Wilson. April 2013

OVERVIEW

The benefits of active transportation, such as walking and biking, are widely agreed upon. Active travel has a lower carbon footprint compared to motorized modes, [1] results in improved mental health, [2] enhances cognitive processes, [3] and is less costly to municipalities that maintain road infrastructure [4].

Bike for Mike, a non-profit community group with a mission to "create and empower a new generation of Hamilton bike riders", has worked for over 6 years to provide over 2,250 youth and their family members with bikes, safety equipment, and cycling education [5]. In the fall of 2016, Bike for Mike began working with Bennetto Elementary School located in Hamilton's North End. Through this partnership, 500 members of the Bennetto community were outfitted with a bike and safety equipment.

Bike for Mike recognizes that even though individuals may be equipped with the appropriate gear, skills, and knowledge, other factors may influence one's decision to ride. The goal of this project was to work with parents to understand the barriers of children cycling to school and to offer recommendations to overcome the barriers identified.

OBJECTIVES

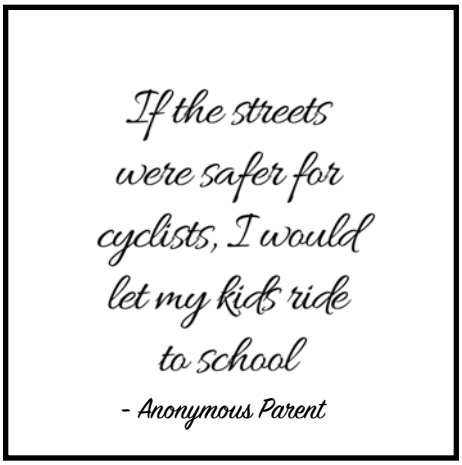
1. Understand attitudes of parents regarding barriers to their children cycling to and from school.
2. Recommend solutions with an action plan to address the barriers identified through research.
3. Share study findings and recommendations with members of the community.

REPORTING

Hard copy surveys were distributed through 515 children from Bennetto Elementary School to their parent(s), and 155 surveys were received for analysis.

The leading modes of transportation used on a daily basis were walking (60%), followed by bussing (43%), and cycling (2%). When asked how comfortable parents would be towards letting their child cycle to school on a sunny day, most parents were either very comfortable (36%) or somewhat comfortable (29%).

Regarding the parent's level of comfort, 46% of parents were comfortable with children cycling accompanied by an adult starting in Kindergarten or Grade 1, and 21% of parents were comfortable with their child cycling unsupervised starting in Grade 5.



Parent feedback through survey response

We were successful in collecting 386 narratives within the survey's comment sections with insightful information regarding barriers and recommendations, where many responses described safety issues (33%). Roads such as James St, Simcoe St, and Barton St, were identified to have "heavy traffic" (7%) with minimal supervised crossings (2%). Distance was the second most common barrier identified (26%), followed by weather (16%), and age (10%). Strategies suggested by parents included educating children about road safety (19%) and providing adult supervision to prevent incidents while cycling alone (8%).

Through a detailed report including findings and recommendations addressed by parents, and research expressed with an infographic, we provided Bike for Mike with credible information to further develop the Daily School Ride. This includes improving the Daily School Ride in the fall, collaborating with the City of Hamilton to implement changes, developing curriculums to address barriers, and engaging other schools to adopt the program. Sharing the collective voice will catalyze action and positive change in the North End community and in the broader city of Hamilton.

COLLABORATORS

Many thanks to our project collaborators, Bike for Mike representatives, Mark Chamberlain and Alex Ricci; Bennetto Elementary School principal and vice-principal, Mary Finstad and Joanna Gibson respectively; and the Bennetto Elementary School teaching staff. We also appreciate our Academic Sustainability Programs Office liaison Kate Whalen for her continuous mentorship and support. Subsequent acknowledgement goes out to the staff of the McMaster Research Ethics board, Karen Szala-Meneok and Michael Wilson, and EBEST Research Officer of Wentworth School Board, Anne McKerlie, for their advice and guidance throughout the duration of this project. A very special thanks to the students of Bennetto Elementary School and their parents for participating in our research and providing valuable feedback.

REFERENCES

1. "Benefits of Cycling." Benefits of Active Transportation. Web. 10 Mar. 2017. <http://www.walkandrollpeel.ca/about/benefits.htm>.

2. "Cycling - health benefits." Better Health Channel. Victorian Government. Web. 10 Mar. 2017. <https://www.betterhealth.vic.gov.au/health/healthyliving/cycling-health-benefits>.

3. Andrews, L. (2015). Bicycling Can Sharpen Your Thinking and Improve Your Mood. Psychology Today. Retrieved 6 March 2017, from https://www.psychologytoday.com/blog/minding-the-body/201505/bicycling-can-sharpen-your-thinking-and-improve-your-mood

4. Road to Health – Improving Walking and Cycling in Toronto. (2012) (1st ed.). Toronto. Retrieved from http://www.toronto.ca/legdocs/mmis/2012/hl/bgrd/backgroundfile-46520.pdf

5. "Bike for Mike- What We Do." Web. 10 Mar. 2017. <http://bikeformike.org/>.

ATHENIUM EVLUTION: THE NEW AGE OF ACADEMIC LIBRARIES

STUDENT AUTHORS

Areeba Amer, Life Science
Mohamed Mahfouz, Life Science
Agamsharan Patel, Life Science

Sign advertising Connections Room

OVERVIEW

With changes and advancements in technology, specifically with the addition of access to information, more and more people are finding information online, rather than through hardcopy text. This is particularly important to a university for two reasons: (1) more and more research is taking place across disciplines, and (2) most universities have multiple library buildings that have been built to store information in hardcopy, often organized by discipline [1]. As such, the role of the university library needs to evolve to meet these needs. In particular, with a focus on sustainability, the question about how we can best utilize our university resources to best serve our students, faculty, and staff is of primary importance. This project was inspired by our own library experiences as undergraduate students, which are similar to the views presented by [2] about students' desire for additional study space as opposed to repository for book. We feel that other students may share these perspectives and also have recommendation on how to improve their campus library.

OBJECTIVES

1) Understand student attitudes and behaviors regarding university libraries.
2) Share findings and provide recommendations on more efficient practices within the library.
3) Implement a sustainable change within the library

REPORTING

To gain an understanding of the attitudes and behaviors of our fellow students, we administered a survey asking for feedback about challenges and opportunities for improvement to Mills Library. Our findings show that 60% of respondents said that finding study space was their biggest challenge. As such, and with a focus on sustainability, we set out to provide more study space for students through more efficient use of current library space.

REPORTING CONTINUED

Guided by our research, we worked in collaboration with the leadership team of Mills Library to identify under-utilized areas. While a number of rooms were identified, they lacked suitability because of expensive technology and poor visibility for safety and security. However, the Connections Room matched all our criteria – it was under-utilized, only available to University staff or private bookings, in use for ~18 hours per week and for party sizes of 3-4 people per hour, and it also had decent capacity for 45 seats. Furthermore, it costs the library $155,000 annually on electricity, heating, and cooling. This is equivalent to releasing 874,000 pounds of CO_2 emissions.

Before and after photos of students using the Connections Room

Beginning April 4th, 2017, a pilot program was implemented to extend the Connections Room's hours of operation for an additional 30 hours each week, designated solely for student use. Students were previously unable to use the Connections Room, and because the room became so heavily used during the pilot, with an average of 30 students at any one time, this project resulted in supporting an additional 900 student-hours each week. We look forward to working with Mills Library to investigate making these changes permanent.

COLLABORATORS

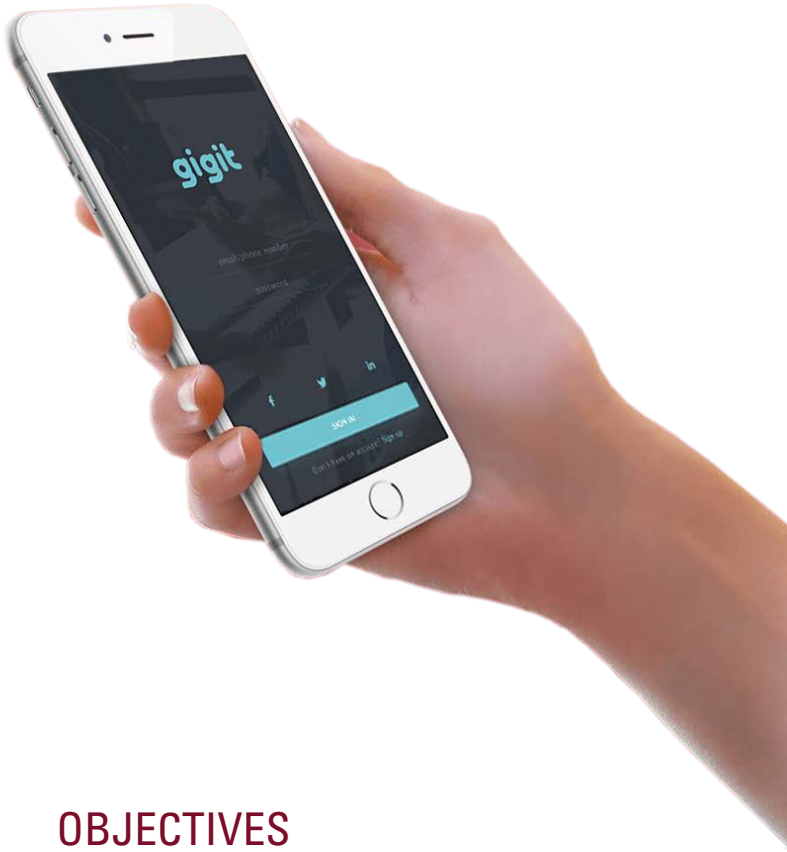
We appreciate support from: Anne Pottier, Associate University Librarian; Lynne Serviss, Services Librarian; Kathy Ball, Director of Assessment and Accountability; and our Sustain 4S06 Course Instructor, Kate Whalen. Special mention goes to our Sustain 4S06 class for always willing to help us when need be and to all the students who took the survey.

REFERENCES

1. Crowley, B., & Tarulli, L. (2015). Differing mental models and the futures of libraries, librarians, and readers' advisory. Reference & User Services Quarterly, 55(2), 91–97.

2. Hall, K., & Kapa, D. (2015). Silent and Independent: Student Use of Academic Library Study Space. Partnership: The Canadian Journal of Library and Information Practice and Research, 10(1). https://doi.org/10.21083/partnership.v10i1.3338

VOLUNTEERING IN HAMILTON THROUGH SMARTPHONE TECHNOLOGY



STUDENT AUTHORS:

Adam Chiaravalle, Political Science
Manprit Kaur, Life Science
Midhat Malik, Commerce
Andre Marini, Commerce
Edwin Wong, Life Science

OVERVIEW

In 1999, the Ontario Ministry of Education incorporated 40 hours of mandatory community service into the secondary school curriculum. This requirement is commendable given the positive outcomes shown to result from volunteering, including development of skills, higher self-esteem, and increased civic responsibility.[1] However, nearly half (46%) of secondary school students report having difficulty finding relevant volunteer positions; indicating a disconnect in communication between volunteer-based organizations and potential volunteers.[2] One reason for this disconnect may be the difference in methods of communications used by today's youth and older generations.[3] While younger generations primarily use social media and their phones for immediate sources of information, our research shows that volunteer-based organizations continue to rely on website postings, email application, and/or online forms. With advances in technology, changes in methods of communication, and expectations for real-time information, volunteer-based organizations may need to adapt if they want to be sustainable as an organization. The goal of our project is to connect potential volunteers with volunteer-based organizations by using smartphone technology to showcase the skills, abilities, and experiences gained by participating volunteers.

OBJECTIVES

1. Support volunteerism locally by assisting in the development of a fully functioning and user friendly smartphone application that is made in Hamilton
2. Market key features to community organizations in Hamilton through consultation and feedback loops to fit the needs of their volunteer recruiting requirements
3. Engage potential volunteers to use the application and provide feedback

REPORTING

Upon accepting this project in September 2016, Gigit was in its infancy. A basic online platform had been developed to bridge the communication gap between volunteers and volunteer-based organizations. The challenge presented was three-fold: what do organizations need from the smartphone application, what do volunteers need, and how can we create an application that serves both parties. We began by consulting volunteer-based organizations in Hamilton to better understand their challenges and opportunities for how Gigit could compliment their existing strategies for volunteer recruitment. From the valuable feedback provided by these organizations, Gigit underwent multiple iterations before it was adopted for their use. As a result of these efforts, we achieved our goal of five organizations actively using Gigit as a volunteer recruitment tool before our soft-launch during the Charity Ball gala on January 25th, 2017. Charity Ball gave us exposure to over 2,000 undergraduate students where we presented the benefits of volunteering as well as demonstrated the application's functionality in real-time using iPads. In addition to our soft-launch at Charity Ball, we also engaged in three other events, which enabled us to speak about Gigit and our goal to gain community feedback to enhance the application's functionality for use in Hamilton. Through these events, we connected with over 300 people and built a mailing list of over 100 potential volunteers who we were able to communicate with to gain their feedback and to share project updates. These events included: Hamilton SPN's, Engage Your City event; Hamilton HIVE's HIVEX Conference; and COPE's: A McMaster Student Mental Health Initiative. Through helping to launch this application and making connections, we have taken the first steps to revolutionizing the way we make meaningful volunteering connections, develop skills, and ultimately serve our communities. To learn more about Gigit, please visit api.gigitmarketplace.com.

Photo Credit: Staged and timed by Andre Marini
From left: Andre Marini, Midhat Malik, Edwin Wong, Manprit Kaur, Adam Chiaravalle
Gigit booth displayed at the 2017 Charity Ball, hosted annually by the McMaster Students Union. The gala is attended by over 2,000 guests, which are mainly undergraduate students.

COLLABORATORS

We would like to express our sincere thanks and appreciation to our Community Project Champions from Gigit – Chris McIntosh, Co-founder and Lily Beaul, Lead Developer, and to our Course Instructor, Kate Whalen, for their guidance and support throughout the past year. Furthermore, we would like to thank Hamilton SPN, Hamilton HIVE, Volunteer Hamilton, McMaster Student Success Centre, A Day On The Bridge Inc, Good Shepherd Hamilton, and Ronald McDonald House who supported the development of Gigit's functionality. A special thanks goes to Matteo Patricelli, Executive Director, and Kaitlyn McDermott, Volunteer and Youth Program Coordinator, of Volunteer Hamilton and Michael Parente, Chair, and the team from Hamilton HIVE for their ongoing feedback and connection to their broader networks. Additionally, we would like to thank Hamilton HIVE, McMaster University Campus Events, and COPE for providing platforms for promotional events.

REFERENCES

1. Jeffrey Bennett, "The Impact of Mandatory Community Service and Social Support on Urban High School Seniors' Civic Engagement Orientations," *Theory & Research In Social Education* 3, no. 37 (January 2009): 361-405, accessed March 13, 2017, http://dx.doi.org/10.1080/00933104.2009.10473402.

2. Volunteering Peel. "FAQ," Volunteering Peel, accessed March 13, 2017, http://volunteeringpeel.org/faq.php

3. Ryan Jenkins, "Aspects that highlight how generation z is different from millennials," *Ryan Jenkins,* June 8, 2015, accessed March 13, 2017, http://www.ryan-jenkins.com/2015/06/08/15-aspects-that-highlight-how-generation-z-is-different-from-millennials/.

SUSTAINABILITY INTERNSHIP PROGRAM

SUSTAINABILITY INTERNSHIP PROGRAM

McMaster's Sustainability Internship Program was created in 2009 by McMaster's Academic Sustainability Programs Office in collaboration with a group of highly engaged faculty members and their students. The program was developed with the purpose of enabling all students to apply their theoretical knowledge of sustainability to address a real-world problem.

OBJECTIVES

The objectives of the Sustainability Internship Program are as follows:

- Engage all Faculties in working together to provide opportunities for undergraduate students to gain academic credit for experiential learning.
- Support collaboration between students, faculty, staff, and the broader community.
- Highlight the achievements of students who have successfully completed their sustainability internship.

REPORTING

Through annual revision and enhancement, the Sustainability Internship Program has has evolved over the past eight years and has supported more than 100 students in experiential learning at McMaster. Starting in 2013, all ASP Annual Reports include a full section highlighting the work of students who have successfully completed their Sustainability Internship.

Past reports can be found at asp.mcmaster.ca/publications

COLLABORATORS

The Sustainability Internship Program is made possible through collaboration with faculties from across campus with support from faculty, staff, community members, and especially the students who devote their time and energy into self-directed, community-based, and experiential learning about sustainability.

YEAR IN REVIEW

During the initial offering of the Sustainability Internship Program, there were approximately 8-10 students taking part each year. However, with the development of the upper year Sustain courses, which all include a community-based experiential learning project, we now see between 2-5 students taking part in the Internship Program each year. We still welcome and encourage students to pursue an internship through our department, but fewer students in the program is a positive shift because it suggests that the courses are satisfying a latent demand for this type of learning on campus. While the Sustain courses provide richer opportunities for interdisciplinary learning between student classmates, the Internship Program offers greater flexibility and the opportunity for more independent study and robust research. The goal in recent years is to support student-directed learning of various forms and also support students in gaining meaningful learning experiences that are unique to other courses and programs offered at McMaster.

OBJECTIVES

The objectives of the program are as follows:

- Maintain flexibility in program structure to support student-directed learning.
- Develop resources to support student-directed learning and inquiry.
- Provide opportunities for mentorship throughout the student's learning process.

REPORTING

This past year, three students took part in the Sustainability Internship Program. One student was in level three and two students were in level four. All three students were from the Faculty of Science.

Two student interns, Wayne Cutinha and Samantha Chow, chose to work on projects related to waste at McMaster's Mills Memorial Library. Wayne chose to focus on the impact of placement and type of waste and recycling infrastructure, while Samantha chose to focus on the impact of education and human behaviour. Wayne and Samantha were able to work together to collect baseline measurements of the amount of waste produced by shadowing custodial staff while conducting room-by-room visual audits of waste, recycling, and levels of contamination. They each had their own unique project goals, objectives, and process for study design and project implementation, but they were able to work with and learn from each other to gain a broader perspective of the waste system.

REPORTING (CONTINUED)

The third intern, Danielle Hudson, collaborated with graduate student Reyna Matties to form a Graduate/ Undergraduate Collaboration in Experiential Learning (GUCEL) partnership, which is reported on in the GUCEL section to follow.

THIS YEAR'S COLLABORATORS

The individual student interns designed, developed, and created fantastic work through their self-directed learning. Integral support was provided by the Faculty of Science, as well as the students' Academic Supervisors, Community Project Champions, and project mentors, who are each mentioned in the pages to follow.

ROLE OF PUBLIC PARTICIPATION IN THE WASTE MANAGEMENT SYSTEM

STUDENT AUTHOR:

Samantha Chow

OVERVIEW

In Canada, as is the case in many other industrialized nations, our high rates of consumption and past decades of environmental ignorance have resulted in an over-reliance on landfills to dispose of our waste. As a society, we must make every effort to educate, share information, and create awareness about sustainable waste management. The purpose of this research is to explore how effective waste management programs are at McMaster University and to increase awareness and understanding of such programs on campus. Public participation is at the center of the investigation since success of waste reduction, reuse, and recycling is reliant on participation at the individual level. Specifically, this study will provide a deeper understanding of the reasons why some students do not fully participate in the current waste management programs in place at Mills Memorial Library and will also provide information for the design and implementation of a more effective waste management educational program on campus.

OBJECTIVES

1. Understand the process of waste flow in Mills Memorial Library
2. Determine weak points in the process and where improvements can be made
3. Understand human interaction with point of weakness
4. Implement an educational campaign addressing identified problems and areas of

REPORTING

To understand the process of waste flow and assess the effectiveness of the current waste management program, a series of waste audits were conducted on specific floors of Mills Library to evaluate the percentage of contamination in each of the three bins – waste (33%), containers (31%), and paper (28%). Furthermore, the audits showed that coffee cups were the main source of contamination in all bins. To learn more, booths were set up in Mills Library to assess students' knowledge of how to properly dispose each component of a coffee cup (lid, cup, and sleeve). I chose to use a coffee cup for two reasons: 1) it was the most common source of recycling bin contamination, and 2) because, if recycled properly, each component of the cup should be placed in a separate bin (containers, waste, and paper, respectively).The results showed that the majority of students were unable to correctly dispose the three components of the coffee cup, demonstrating a lack of knowledge about proper recycling practices and posing a significant problem in the waste system. To address this lack of knowledge, an educational campaign, which included posters, videos, and activities, was implemented to help students understand proper recycling practices. Following the campaign, another set of waste audits were conducted and it was found that contamination within the waste bin and containers bin had decreased from baseline values, by 22% and 12% respectively. These results suggest that the educational campaign was successful in helping students to develop proper waste and recycling practices and habits This project has allowed me to develop a deeper understanding of the human interaction involved in developing sustainability-oriented behaviour as well as an increased awareness of the importance of participant engagement and education.

Collaborators: Samantha Chow led this project with support from student colleague, Wayne Cutinha, academic supervision, Dr. Bernier, Professor: and non-academic supervisor, Kate Whalen, Senior Manager, Academic Sustainability Programs. Key collaborators include Anne Pottier, Associate University Librarian; Library Services; Facility Services.

EFFECTS OF INFRASTRUCTURE IMPROVEMENT ON WASTE DIVISION

STUDENT AUTHOR:

Wayne Cutinha

OVERVIEW

Solid waste management is a growing concern in society. The disposal of municipal solid waste has traditionally been a concern to society due to environmental liability and availability of land. To minimize the impact of waste management on society, waste reduction is a very useful strategy. Therefore, the overall aim of this research project is to identify waste reduction strategies that should be promoted in Mills Memorial Library at McMaster University, one of the busiest libraries in Ontario. Being one of few libraries allowing the consumption of food, excessive waste generation is becoming a major problem. Therefore, this research project will focus on the relationship between current infrastructure and how that will affect waste disposal strategies among students.

OBJECTIVES

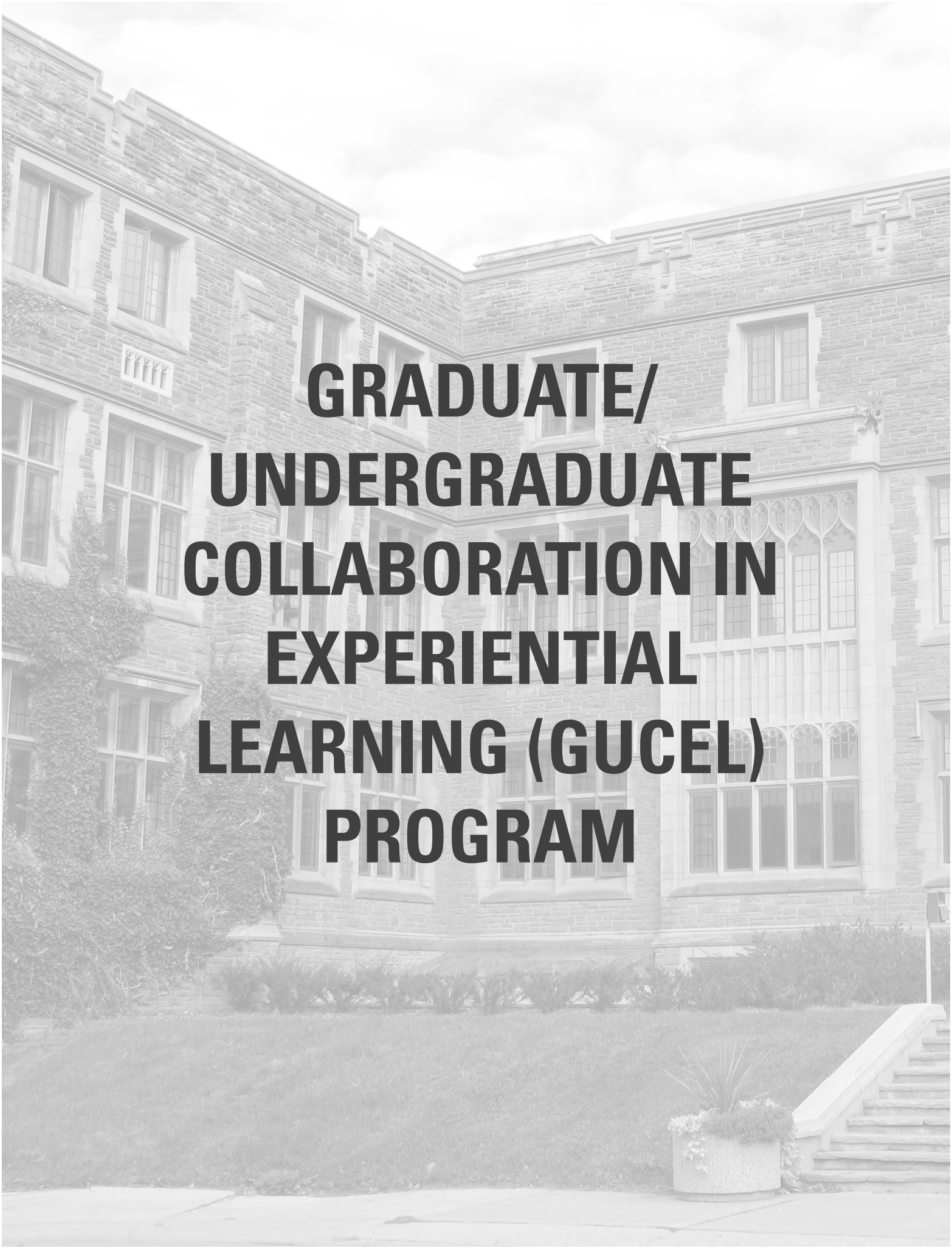
1. Observe current patterns of students regarding interactions with infrastructure
2. Locate, categorize, and log waste infrastructure in all individual and common areas in the library
3. Investigate and potentially source new receptacles
4. Recommend infrastructure improvements to the current system and implement at least one change

REPORTING

To get an idea of the current waste infrastructure in Mills Library, I made a map of the current locations of all the waste bins on floors one to four. I then quantified the traffic flows numerically. I did this because certain areas of the library are a lot busier than others and mapping this provided a good representation of where students are disposing of their garbage the most. Each floor was mapped with the original location of the waste receptacles as well as levels of student traffic. From this map, it was evident that there were not enough receptacles for the amount of student traffic, and the current receptacles were not in their triple configuration, being paper, garbage, and plastic. Locations for the bins were then determined based on amount of traffic and moved around so they would all be in the triple configuration to promote proper recycling. New bins were also sourced and placed in other locations of the library to help increase recycling. Assessing student interaction with the current infrastructure allowed us to place bins in more ideal locations, so that recycling and proper waste disposal is more convenient. In addition, I worked in collaboration with Samantha Chow to help educate students on proper recycling and waste disposal strategies as this would further minimize contamination to each waste bin (See p. 44). By doing so, we were able to successfully reduce the amount of contamination in comparison to baseline values collected at the start of the project. Through our efforts, we were able to provide the right infrastructure in the right locations, as well as to better educate students and faculty on recycling and proper waste disposal and ultimately make a positive change in the environment.

Collaborators: Wayne Cutinha was the key facilitator of this project with support from student colleague, Samantha Chow, academic supervision, Dr. Bernier, Professor: and non-academic supervisor, Kate Whalen, Senior Manager, Academic Sustainability Programs. Key collaborators include Anne Pottier, Associate University Librarian; Library Services; Facility Services.

YouTube Link: https://www.youtube.com/watch?v=DBOqfxtwLRc



GRADUATE/ UNDERGRADUATE COLLABORATION IN EXPERIENTIAL LEARNING (GUCEL) PROGRAM

Graduate/Undergraduate Collaboration in Experiential Learning (GUCEL) Program

The GUCEL Program encourages graduate and undergraduate students to work together on an interdisciplinary project, resulting in the creation of novel intellectual communities. This dynamic interaction facilitates the development of an intellectual community through the exchange of ideas, knowledge, and perspectives. Furthermore, students have the opportunity to expand their existing intellectual community to include individuals from across campus, representing a variety of disciplines and levels of study.

OBJECTIVES

The objectives of the GUCEL Program are as follows:

- Enhance the student experience by contributing to an intellectual community and encouraging engaged scholarship.
- Encourage interdisciplinary and multi-level collaboration between graduate and undergraduate students.
- Foster a culture of collaboration among students, faculty, staff, and members of the broader community.

REPORTING

The GUCEL Program is approaching its fifth year of operation. During this time, the program has provided an opportunity for McMaster's graduate students to take part in experiential learning through working with undergraduate students, faculty, staff and members of the community. In four years, the GUCEL Program has supported six graduate students in the Faculties of Business, Science, and Social Sciences. Starting in 2013, all published annual reports from the ASP Office include a full section highlighting the work of students who have successfully completed their GUCEL projects. Past reports can be found at asp.mcmaster.ca/publications.

COLLABORATORS

The GUCEL Program was developed by past graduate student, Melissa Gallina. The Program would not have been possible without Melissa and the support from the School of Graduate Studies. A special thanks also goes to the students, staff, faculty, and members of the community who have and continue to support the GUCEL Program.

YEAR IN REVIEW

While we anticipate that only one or two graduate students will take part in the GUCEL program each year, and while did have a number of students show interest in the program last year, we did not have any graduate student formally take part in the program during the 2015/16 academic year. Some students who showed initial interest did pursue their project in a less formal way, and others chose to focus their attention fully on their graduate work. Due to the casual nature of the GUCEL Program, in that it does not require formal enrolment as the undergraduate Internship Program does, we anticipate a greater degree of fluctuation between initial interest and formal committed participation. We see this ability for exploration and flexibility at the graduate level as a positive aspect of the program and are supportive of students investigating the program and requirements to get a sense of what is involved before making a formal commitment. To increase interest from incoming graduate students, we have increased our presence at graduate events and worked with the School of Graduate Studies to also disseminate information about the GUCEL Program.

OBJECTIVES

The Program objects for this past year are as follows:

- Increase communication to graduate students and presence at graduate student events.
- Maintain flexibility for graduate students to explore the GUCEL Program.
- Ensure graduate students find a project that is valuable to them.

REPORTING

Although we increased our communication to graduate students and enhanced our presence at graduate student events, our success in connecting with graduate students was not directly related to these efforts. We were successful in connecting with four graduate students who showed interest in the program. Two students approached the ASP Office after hearing about the office through word of mouth, and two others were aware of the program by meeting a member of the ASP team at an event not specifically geared towards graduate students. After working with the interested students, one student, Reyna Matties, chose to pursue her project after meeting an undergraduate student, Danielle Hudson, who had similar project interests and was eager to collaborate. Reyna and Danielle are both from the Faculty of Science and were supported by Reyna's Master's Supervisor, Dr. Susan Dudley. Reyna and Danielle worked closely together on their project, Parking to Paradise, which is report on in the pages to follow.

PARKING TO PARADISE: COMMUNICATION AND COMMUNITY ENGAGEMENT

STUDENT AUTHORS

Reyna Matties, M/Sc/ Candidate, Biology
Danielle Hudson, 3rd year Biology and Environmental Science

Black-eyed susan in bloom along the edge of the extended riparian buffer at parking lot M (July 2016). Image Credit: Reyna Matties

Overview

With 54% of the world's population living in cities, there is a growing demand for sustainable urban infrastructure. [1] Ecosystems in cities are fragmented by buildings, roads, and parking lots. These impermeable surfaces block rain from moving into the soil, and cause rain to move into drains that often empty directly into nearby waterways and can negatively impact neighbouring ecosystems through contaminants the rain picks up. Alternatively, green infrastructure (e.g. green roof, riparian buffer) utilizes soil and plants to purify stormwater and simultaneously provide habitat for plants and animals. Humans can experience aesthetic, economic, and health benefits associated with green infrastructure.

Parking Lot M, on McMaster University's west campus, was built with traditional stormwater infrastructure. Rain moves across the parking lot, picks up contaminants, and then enters pipes directed into Ancaster Creek. The Ancaster Creek ecosystem provides habitat to hundreds of plant and animal species, along with connecting three environmentally-significant areas: The Niagara Escarpment, Dundas Valley, and Cootes Paradise.[2]

Due to urbanization and development, only 17% of the creek watershed area remains natural.[2] In 2014, green infrastructure was introduced by depaving a section of the parking lot to create an extended riparian buffer for Ancaster Creek.

An outreach project called Parking to Paradise was initiated in Fall 2014 to educate and involve the community on the buffer restoration and urban sustainability.

Objectives

1. Make evidence-based scientific information accessible to the general public
2. Educate a wide range of people by utilizing multiple methods of delivery
3. Support active public engagement through on-site and community participation

Reporting

To help advance the project's objectives, Danielle Hudson and Reyna Matties have worked in collaboration to develop an educational walking tour at Lot M; create and deliver an engaging presentation; lead hikes and volunteering events; and create a social media presence.

Walking Tour

The tour includes 15 stops, each supported by educational signage. Site history and ecology are highlighted, along with an introduction and exploration of green infrastructure, concluding with opportunities for individual action. Signs are at the design stage with installation to follow.

Reyna and Danielle organized a trial walking tour for project stakeholders with four printed sign drafts in June 2016. Leadership across campus and those already working in connection to the restoration provided insight into creating accessible and engaging signage.

Educational Presentation

To accompany the walking tour, Danielle developed a short, interactive, and multi-purpose presentation for ten undergraduate courses. The purpose was to build awareness about the Lot M restoration project, promote the benefits green infrastructure, and provide the opportunity for undergraduate students to get involved with P2P or sustainability-focused projects. Through these talks, more than 650 students were reached.

Hikes and Volunteering Events

Reyna helped organize and lead ten hikes and seven volunteer events at Lot M. Hike structure ranged from open invite to tailored class hikes. Three volunteer events were MacServe days, where students participated in restoration work on the buffer to: build four turtle nesting habitats (2014), hand seed native species (2015), and create an outdoor classroom (2016). Other volunteer events involved tree planting, seeding, litter removal, and invasive plant removal.

Feedback from these events is extremely positive. A common sentiment from participants is that they enjoy being in nature and are happy for an opportunity to experientially learn outdoors.

Social Media

In May 2016, Reyna created both an Instagram and Twitter account under the name @MacP2P. In only 8 months on Instagram, @MacP2P has posted 57 photos, gained 53 followers, and received 353 likes. On Twitter, @MacP2P has tweeted 70 times, gained 47 followers, and received 42 likes.

Collaborators

Reyna and Danielle would like to thank the many individuals who have provided input on and support for their project.

Project Supervisors: Dr. Susan Dudley, Professor, Biology, Academic Supervisor; and Kate Whalen, Senior Manager, Academic Sustainability Programs Office and Non-Academic Supervisor.

Walking Tour Stakeholders: Gord Arbeau, Office of Public Relations; Seanna-Lin Brodie-Keys, Research & Facilities, Faculty of Science; Dr. Robert Baker, Vice-President Research; Wayne Terryberry, President's Advisory Committee on Natural Lands; Dr. Yiping Guo, Professor, Civil Engineering; Terry Sullivan, Security & Parking Services; and Dean Mougenot, Security & Parking Services.

Class Talks: Dr. Susanna O'Brien, Associate Professor, English and Cultural Studies; Dr. Sigal Balshine, Professor, Psychology, Neuroscience, and Behaviour; Greg Zilberbrant, Sessional Faculty, Sustainability; Luc Bernier, Assistant Professor, School of Geography & Earth Sciences; and Dr. Lovaye Kajiura, Professor, Biology.

Hikes or Volunteer Events: Randy Kay, Restore Cootes and Coordinator of Volunteers, Ontario Public Interest Research Group; Wayne Terryberry, President's Advisory Committee on Natural Lands; Krupesh Patel, President's Advisory Committee on Natural Lands; Sigal Balshine, Professor, Psychology, Neuroscience, and Behaviour; Dr. Mike Waddington, Professor, School of Geography & Earth Sciences; McMaster Student Success Centre; Hamilton Naturalist's Club; Hamilton Conservation Authority; and Evergreen Canada.

This project is funded in part by the RBC Water and Health Initiative, made possible by a generous gift from the RBC Foundation.

References

1. Hamilton Conservation Authority. (2008). Ancaster Creek Subwatershed: Stewardship Action Plan.
2. World Health Organization (2014). Retrieved from

http://www.who.int/gho/urban_health/situation_trends/urban_population_growth_text/en/

COMMUNITY-BASED LEADERSHIP IN SUSTAINABILITY (CLS)

Community-Based Leadership in Sustainability (CLS)

The CLS initiative was created in the fall of 2014 as a joint initiative between a number of groups and organizations with the goal to develop a culture of sustainability through education, community engagement, and collaboration that inspires practical implementation. The central focus of the initiative was to host a series of educational and networking events each year. The events were designed to take a unique approach to teaching and learning about, as well as engaging in, sustainability that would provide value to individuals, groups, organizations, institutions, businesses, and the City of Hamilton alike. Furthermore, we hope that through this initiative, connections were made, and new ideas generated that may provide benefit to the city a whole. One of the main objectives of the CLS initiative was to offer these educational and networking events without barrier. The events were open to all and free of charge*.

OBJECTIVES

- Develop a culture of sustainability through education, community engagement, and collaboration that inspires practical implementation.
- Form and foster a collaborative and formal working relationship between individuals, groups, institutions, and organizations who share a common mission to advance sustainability within the city of Hamilton. Offer opportunities for sustainability education and involvement that is inclusive of various groups and individuals within the city's diverse and unique communities.
- Communicate and report on the outcomes of each event and the initiative as a whole.

REPORTING

In the three years since launch there have been 11 events in total, all of which have been hosted at local and accessible locations. Through these events, we engaged over 953 individuals, including 37 speakers, and 168 volunteers. Over $21,000 in sponsorship and donation has been generously provided to enable us to continue to offer these engaging, community-based, and barrier-free events.

PROGRAM COLLABORATORS

The CLS initiative is a product of the hard work and dedication from the Hamilton Sustainability Professionals Network Executive Board members; various individuals and departments of McMaster University; our volunteers, speakers, sponsors, and donors; as well as the engaged community members who supported the initiative by attending and investing their time through active participation in the various events.

*To ensure attendance, a $10 deposit was put in place for the Green Jobs event. All those who registered and attended, were refunded their deposit.

YEAR IN REVIEW

Continuing with the recent shift in how we delivered the CLS events, we moved away from the lecture-style delivery that we initially started with in 2014 and instead continued to place emphasis on participant engagement through active participation. To support the continued shift to a higher degree of participant engagement, we relaxed our objectives to maintain the large number of attendees at our events and to focus on quality of engagement over quantity of people.

OBJECTIVES

The objectives of the CLS Program are as follows:

- Ensure each event maintains a focus on participant engagement through active participation.
- Experiment with new event formats to increase participant engagement.
- Focus on quality of participant engagement and learning rather than quantity of event attendees.

REPORTING

Through the summer of 2016, the CLS working group identified a need to educate and engage people on the topic of volunteering in Hamilton. The group created a workshop entitled Engage Your City: Growth through Action, that focused on how to choose and make the most of your volunteering experiences as well as enabling participants to engage with volunteer-based organizations to learn about opportunities available in Hamilton. This workshop was delivered twice at two separate venues. The first workshop was a formal CLS event offered for free and hosted at a local and accessible location in central downtown. The second workshop was delivered as a concurrent session for the annual HIVEX young professionals conference. While the first workshop was advertised mainly to secondary and post-secondary school students and to community members, the HIVEX workshop was advertised to young professionals working in Hamilton. Approximately 90 participants attended these two events, and support was provided by 25 volunteers and 3 speakers at each event.

Maria Topalovic, SPN Chair, Speaking about the importance of learning through experience and communicating your skills and abilities

The third event focused on piloting a new format for participant engagement, which included a high degree of hands-on learning about green cleaning products. On February 16, 2017, 25 participants and 10 volunteers traveled to the Evergreen Collaboration Station on James St. North to learn about the health and environmental impacts of traditional household cleaning products and about sustainable alternatives, as well as for the opportunity to make their own. The feedback from both participants and volunteers made it clear that while the number of attendees is much lower for such an interactive session, the engagement was much much higher.

The fourth and final event was the annual Green Jobs Networking event, which was hosted at One James North on the morning Friday April 7th, 2017. The event highlighted a keynote speaker and 16 sustainability professionals from across Hamilton. A highly engaged group of 5 volunteers supported the 55 attendees who joined us in facilitated roundtable discussions about green jobs in Hamilton.

REPORTING CONTINUED

Each of the events listed above focused on offering participants more access to event facilitators and/or volunteers and included a larger focus on facilitated discussion and participant engagement. For example, last year our Green Jobs Networking saw 80 attendees and 13 sustainability professionals, a 6:1 ratio between participants and professionals. This year, with 55 attendees and 16 professionals we were able to offer participants greater access with each professional engaging in discussion with only 3-4 participants at one time. Survey feedback confirmed that attendees noticed the comfortable environment that was created.

Our attempt to experiment with different event format to increase participant engagement was highly successful through the Green Cleaning Workshop. Survey response was overwhelmingly positive with participants noting the value of being able to make something that will help them action sustainability in their daily lives.

Through feedback surveys, following each event, we found that, on average, 55% were Very Satisfied, 45% Satisfied, and less than 1% Neutral. This is an improvement from last year's response of 42%, 49%, and 9% respectively. No respondents report being Dissatisfied or Very Dissatisfied. Furthermore, many of the open responses mentioned the interactive components as well as the comfortable and/or engaging atmosphere as things they enjoyed most. Finally, 99% said they would attend another CLS event in future. Again, this is an increase from 98.4% last year. A full reporting of each event in the 2016/17 CLS series can be found at asp.mcmaster.ca/cls.

McMaster Students at HIVEX

We look forward to further enhancing this our approach to providing opportunities active participant engagement within our 2017/18 CLS event series.

THIS YEARS COLLABORATORS

We would like to thank the Hamilton SPN Executive Board members who also make up the CLS working group; our volunteers, speakers, and neighbourhood and community leaders; the HIVEX planning team; the many partners who have provided financial or in-kind support, which include the City of Hamilton's Economic Development Department, Smart Commute Hamilton, McMaster's W. Booth School of Engineering Practice and Technology, McMaster's Student Success Centre, McMaster's Centre for Continuing Education, and Evergreen Hamilton. Last, but not least, we thank the engaged community members who supported the initiative through attending and investing in a sustainable Hamilton through active participation in these events.

McMaster University

Academic Sustainability Programs Office

CONNECT WITH US TO LEARN MORE:

asp.mcmaster.ca

@MacSustain

/MacSustain