

Composting for a Greener Campus

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Executive Summary

There is a growing movement towards creating the desire for zero waste societies. This movement aims at reducing the amount of materials entering landfills. This will not only reduce environmental impacts, but also build upon a more sustainable future. Composting is one strategy to achieve these goals. The purpose of this report is to outline the findings of a composting pilot project at Thompson Rivers University.

The composting pilot project was conducted from January 2014 to April 2014 with the intention to reduce the amount of waste generated by TRU from entering the landfill. During this time frame, a co-op research carried out the project while understanding perceptions surrounding composting. Composting was completed using a JORA 5100 in-vessel composter. It is capable of producing cured compost in a matter of six to eight weeks. Results from the pilot project indicated the TRU community was thrilled to be composting and were highly supportive of this initiative. Many of the myths surrounding composting were nullified over the period of the project and proved it was capable of better diverting waste from the landfill. Through the duration of the pilot project, we were able to divert 945.56 kilograms (2084.60 pounds) of material reducing our impact to the environment. The rich material produced has been used on campus to beautify gardens through enriching the soils.

While the program still faces barriers to effective composting, a strong educational component is in development to ensure the TRU community is aware of the program. The goal is to have composting campus wide by September 2014. Regardless, the composting pilot project had a positive impact on the TRU campus. Perceptions of the program morphed as more TRU community members began to use the composting bins. Composting on campus has a real potential to reduce costs associated with waste management. As we divert more materials from the landfill there will be a lesser need for the City of Kamloops to empty the dumpsters as frequently as they currently do. The production and use of compost on campus will also decrease the amount of fertilizers, topsoils, and soil additives purchased on campus; also resulting in costs savings.

Included in this report is a glimpse into the current waste management strategies on campus while plans to move to a Zero Waste program are developed and implemented by September 2014. A composting program would allow for the university to meet their sustainability goals as set out by The Campus Sustainability Action Report and lay the framework for the 2014–2019 Strategic Plan where waste management is an identified priority, including a composting plan.

- TRU Office of Environment and Sustainability

Introduction



Figure 1: Co – op research student, Allysha Sorba, poses with the first batch of compost.

What is Compost?

Composting can be defined as a natural decaying process that results in a nutrient rich soil condition (City of Kamloops n.d.). Like a well balanced diet it requires a balanced proportion of carbon (raw wood pellets, napkins, compostable paper bags) and nitrogen (food scraps) to function properly. It is further enhanced with the introduction of air, allowing for micro – organisms to allow for decompose to occur (JORA 2014). Compost is rich in potassium (K), nitrogen (N), and phosphorous (P). The final product is capable of being used as a P:K fertilizer while the nitrogen is organically bound. Nitrogen releases over time allowing for plants to flourish. Regardless of the soil type, the addition of compost adds nutrients into the soil and can help poor soil be more productive. There are three common methods of composting: windrow composting, vermicomposting, and in-vessel composting. Windrow composting is achieved by placing compostable material in long piles that are manually agitated to allow for aeration (FAO 2003). Vermicomposting is the breakdown of organic matter by using earthworms. Earthworms are very productive and are able to eat their own body weight in organic matter each day. Their excrements, also known as worm tea, are highly rich in nitrates and available forms of phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg), all of which are vital to plant growth (FAO 2008). The Faculty of Science has been vermicomposting since 2008 with two plastic tubs. Worm tea produced from this process has been used to water the various plants within the building. Finally, the third main method of composting is the utilization of an in-vessel composter. In-vessel

composting is completed in large drums or chambers where the material is constantly agitated by large rotors (Ministry of Agriculture and Food 1996). Due to its high technology and low labour need, in-vessel composting is quickly becoming an attractive method for composting compared to other methods (Ministry of Agriculture and Food 1996). Thompson Rivers University (TRU) will use this method and compost made here can be done in four easy steps (Figure 2). The milling unit grinds the materials into smaller pieces while automatically dispensing wood pellets into the mix. Grinding the materials into smaller pieces helps speed the process of composting. From there it lands into Chamber 1. Large rotors turn on a timer and add air to the compost. While it matures (in two to four weeks) it then is transferred into Chamber 2 to continue 'ripening' for another two to four weeks. Compost removed from this chamber can be utilized immediately without any further treatments!

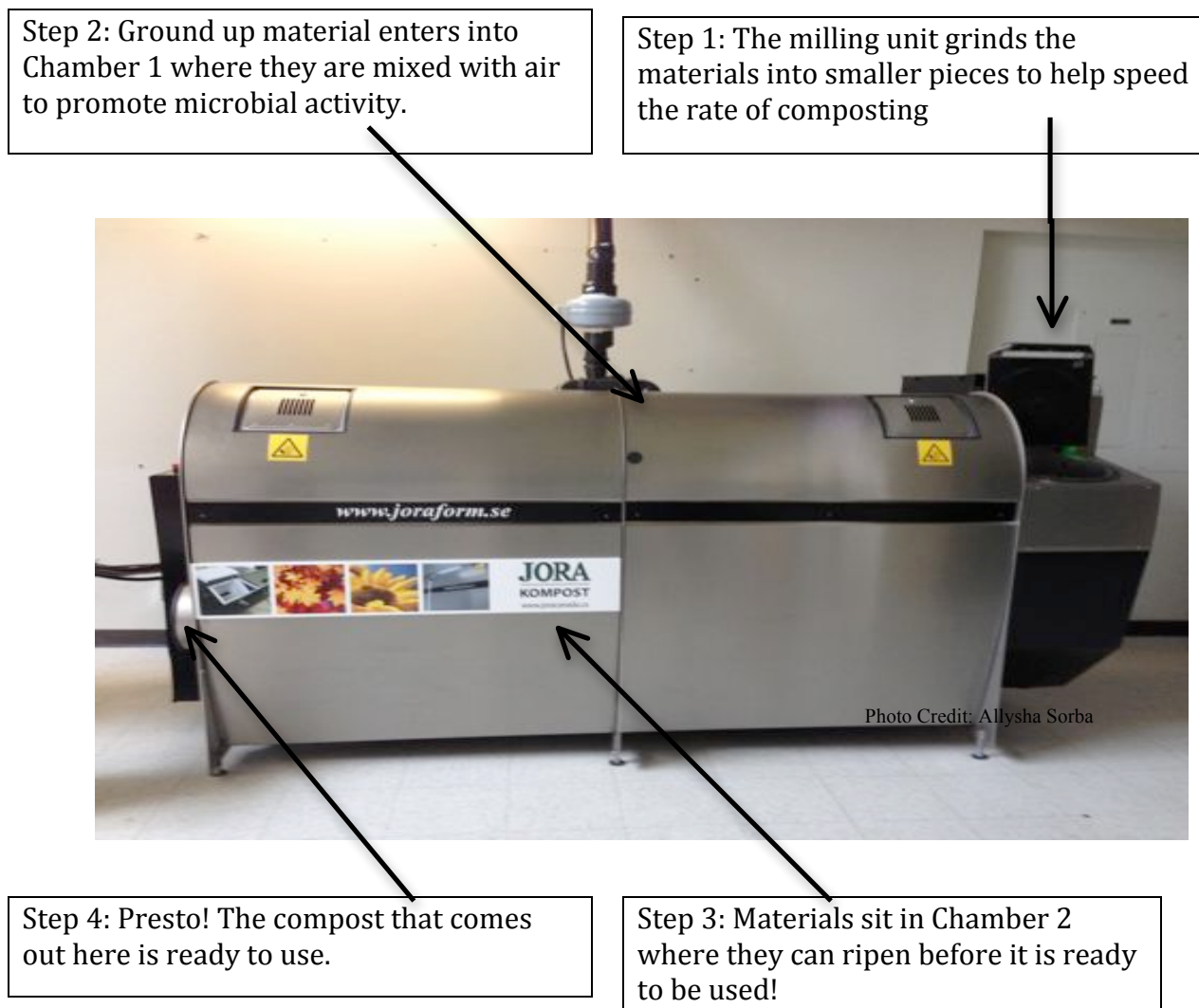


Figure 2: The above image gives a breakdown of each component to the JORA 5100 Composter.

General Benefits of Composting

There are several benefits to composting including but not limited to:

- Improving the fertility of soil by adding additional nutrients back into the soil. This reduces the need for purchasing fertilizers. This will also improve the overall health of any plants allowing for gardens to be vibrant and colourful.
- Improving water retention and drainage. During peak summer hours for example the compost will hold onto any moisture from watering and slowly release it throughout the day. This reduces the amount of watering required and saves water.
- It is capable of suppressing weeds. This saves on time and energy required to maintain gardens and flower beds.
- Composting is environmentally friendly. It reduces the need for pesticides and harmful chemicals (such as those found in fertilizers). Also, it helps to absorb odours, and deter harmful pests.

Benefits to the Environment

Organic waste in the landfill fails to break down properly and creates the chemical compound methane (CH₄). Methane is the most abundant organic compound found on earth and is colourless, odourless, and highly combustible (Lelieveld *et al.* 2003; Withgott *et al.* 2010). Landfills tend to produce large amounts of methane because the organic materials are not able to decompose through aerobic processes. Instead they are covered with other layers of waste and dirt allowing for the methane to form (Hermann *et al.* 2011). Unlike carbon dioxide (CO₂), methane is not naturally absorbed back into the atmosphere. It re-enters the atmosphere amplifying the warming effect of climate change (Withgott *et al.* 2010). Due to its high potency, waste management facilities are looking at options to harness the methane and turn it into a usable energy source. Composting organic waste ensures that methane does not have the choice to re-enter the atmosphere because proper composting ensures oxygen is constantly mixed in to help promote the necessary microbial activity. This helps mitigate climate change at a local level while producing a nutrient rich product that plants love.

TRU's commitment to sustainability is articulated through the 2014 to 2019 Strategic Plan. Achieving environmental sustainability would allow TRU to be on par with other universities in BC and Canada. There is growing evidence that supports a student's choice of an educational institution can be influenced by various green initiatives. The University of Northern British Columbia (UNBC) markets itself as 'Canada's Green University' and has seen student enrollment increase (TRUSU 2013). In a social media production called "It's all TRU"¹ professors identify students abilities to build strong relationships with their professors and faculty because of smaller class sizes. This allows for students to better explore their degree or certificate, gain valuable research skills, and pursue personal research with the guidance from a professor. The options are endless with a university like TRU. Coupled with environmental sustainability, these are very

¹ Can be found on the TRU website at: <http://inside.tru.ca/tru-videos/>

strong selling points to attract new students to TRU. TRU markets itself as a modern university and by reinventing the current waste management system it will then be complying with the best practices to achieve a sustainable campus.

Benefits to the Local Community

Composting full time at TRU is a positive step towards reducing the amount of waste entering the Mission Flats Landfill. The CSAP sets out attainable objectives over a period of time and this program would allow the university to meet one of the objectives listed. The fourth goal of the built environment in the action plan states TRU is committed to reducing waste impacts and materials consumption. Food waste produced generally tends to be the heaviest materials entering into the waste stream. With a newly designed zero waste program being investigated combined with composting, TRU will greatly reduce the amount of waste entering into the dumpsters and in turn reduce the amount of materials entering the landfill.

Benefits to TRU

A composting program would allow for varying faculties and disciplines across campus to collaborate. It can provide an excellent teaching opportunity to not only students but also the City of Kamloops. Community members can stop by and use the composting program system as a template for successful composting at home. This could be an opportunity for the university to offer a simple 'learn to compost' course in the evenings during the summer. This could potentially attract new students, maintain student retention, and market TRU as a green university. For current students, a composting program could provide them with excellent on hands learning about horticulture, soils, gardening, food security, the local food movement, and much more. Interested students would have the opportunity to use the program for directed studies courses, co-op work terms, volunteering opportunities, and in class experience.

Economically, there will be cost savings attached to a more effective waste management system. Limiting materials entering into the landfill will reduce the amount of pick-ups by the City of Kamloops giving the university the opportunity to allocate the money to other sustainability projects or initiatives. Composting at TRU would provide a positive impact to the greater campus and allow for the university to meet and exceed current sustainable goals.

Successful Composting Across British Columbian Universities

Composting has become a social norm for Canadian institutions—especially institutions in BC. In the summer of 2013, Kaitlin Boyd updated a report regarding composting on campus. The report outlined composting across various Canadian institutions, a financial analyses review, along with considerations and the potential barriers to a composting program at TRU. Highlights from her report indicated that most Canadian institutions have some form of composting program in a variety of capacities.

The goal of this section is to provide highlights of various composting programs and their success across British Columbian universities. Appendix A can be consulted for a more detailed analysis for each of the universities.

Table 1: Below is a breakdown of what other institutions across British Columbia’s composting initiatives include.

Institution	Composting Highlights
University of British Columbia, Vancouver	<ul style="list-style-type: none"> • Composting since 2000 with the creation of the UBC Compost Project • In 2004, they purchased an in-vessel composter that processes five tonnes per day • Annually they compost approximately 500 tonnes of material • Built into their Facilities budget the composter is managed by a small group of workers • Maintenance affects their operating budget if there is a problem with the composter • Composting is done on a voluntary basis by staff and faculty
University of British Columbia, Okanogan	<ul style="list-style-type: none"> • Composting began in 2008 in their kitchens and became campus wide in 2012 • Composting is completed in an Earth Tub, a smaller version of an in-vessel composter • Recently purchased a second one to handle the volume of compost they receive • Feature a ‘menu of dirt’ and adjust their compost outcome based on the type of material they require • Facilities is responsible for managing the program
University of Victoria	<ul style="list-style-type: none"> • Composting began in 2003 and heavily credits their Food Services group for their ongoing efforts to reduce food waste on campus • Collection is done at all food locations and provides a popular voluntary office composting program • Since 2010, organic materials being collected have increased steadily • Compost is collected by a third party company and does not come back to be used on campus
British Columbia Institution of Technology	<ul style="list-style-type: none"> • Considered one of Canada’s oldest and largest composting programs; began in 1997 • Composting is done through vermicomposting • Campus waste has been cut by 16 tonnes per year providing fiscal savings • Composting is built into their facilities department and is managed by two people
Simon Fraser University	<ul style="list-style-type: none"> • Like TRU, composting is a new program for SFU • Conducted a pilot project from September 2013 to December 2013 but noted waste management practices improved • Compost is collected by a third party currently with the aim of being able to use it on campus one day

Pilot Project Objectives

The composting pilot project consists of three main objectives investigating current perspectives and barriers that exist with regard to composting and determining a desirable outcome for the

project. Upon completion of the pilot project, a final technical report would be completed outlining the composting pilot project at TRU.

The first objective was to gain an understanding of people's perceptions and concerns regarding composting. The survey created consisted of fourteen questions (Appendix C) and aimed to gain a sense of people's concepts of sustainability and their perceptions on composting in general. It was open to all TRU community members and could be completed in less than four minutes. To encourage participation, an iPad mini was offered as a grand prize to all participants. This survey aims to look at perceptions and concerns before launching a composting program campus wide. This would allow for the office to work towards finding long-term solutions to any perceived barrier and eliminate them.

The second objective was to understand what perceived barriers were associated with composting. Some barriers identified included: smell, nuisance, rodents and fruit flies, associated costs, and time involved for composting.

The third objective was to determine what the outcome for the pilot project. This included evaluating the pilot project by determining associated costs, time requirements, the amount of compost being produced on campus, and examining if those perceived barriers were overcome. A second part to this objective was to incorporate composting into a large waste management regime for the campus. This would explore the concepts of zero waste stations and determine their effectiveness in achieving a zero waste status. Some of the concepts that will be examined will be the best receptacles, their configuration and locations, and the appropriate signage to be used.

Composting Pilot Project: The Study

The pilot project took place from early in January 2014 to April 2014. The JORA 5100 in-vessel composter was installed in the early part of December 2013. This was followed by a training session with representatives from Quebec and Russ Chambers, BC Dealer of JORA composters, on December 17th, 2013. The first two to three weeks of January were used to create a survey, posters, and organize and set up the composting bins and bags. Once the project was underway collection began regularly twice a week. The pilot project officially ended on April 30, 2014, and became a campus wide program starting August 1, 2014.

Introduction

An average day of composting included loading up a yellow wagon with the necessary tools for the collection from the various buildings around campus. Each composting bin was lined with a compostable paper bag and sprinkled with raw wood pellets weighing 0.5 kilograms and 1.0 kilogram, for each of the two composters, respectively. The wood pellets absorb excess moisture and ensure the compost does not smell. The materials are weighed and placed into a milling unit where the composting process begins. This process was carried out by a co-op research student, Allysha Sorba, a third year Bachelor of Natural Resource Science student. She became the face of the project and was responsible for all aspects of the pilot project with guidance from Jim Gudjensen and James Gordon in the Office of Environment and Sustainability. After twelve weeks of regular pick-ups, the pilot project switched gears and worked to incorporate the entire office

staff to model a voluntary composting program. Responsibility of emptying the bins fell to the main contact for the office who would then empty and maintain their kitchen composter, while Allysha would collect from the main green bins. At the end of the summer janitorial staff on campus would then carry out the program.

Compost Collection

Composting occurred twice a week on Tuesdays and Fridays. In order to ensure people’s perceptions were not negative Tuesday’s collection was after the weekend and anything that was missed Friday could be picked up so bins were fresh for the week. Friday’s pick up was to ensure nothing sat over the weekend. There were concerns that fruit flies and rodents may get into the bins so we wanted to avoid this and found this method successful.

On average composting took roughly six hours per day to complete from start to finish. There were days when composting took longer due to the high volume and less time at the beginning. Stopping by composting bins and lunchrooms took very little time with the exception of the Facilities and Science Building. On foot, collection from the Facilities building took a total of 20 minutes to complete–round trip. The Science Building on average took roughly 10 to 15 minutes as the lunchroom is located on the third floor and the main green bin is on the second floor. In all other buildings, the elevator was used to accommodate the yellow wagon. However, the yellow wagon was never used for the Science or Facilities buildings.

Table 2: Below is a breakdown to show the average time spent composting per office lunchroom. Depending on how many faculty or staff uses the lunchroom impacted how much compost was collected and how much time was spent composting.

Number of People	Average Time (minutes)
>5	5
5 - 10	8 - 10
10 - 15	18 - 20
15 - 20	21 - 25

The majority of the time was spent at the composter weighing materials, tidying up the composter, and the task of composting. The more people in the office using the bins meant there was more time spent at the composter (Table 2) sorting to ensure there was no contamination of non-compostable materials or having to clean the milling unit to ensure the blades would spin. If the materials were wet and heavy the compostable bags would have to be done in rounds to avoid overloading the composter. However, as a side note, floors in the BC Center for Open Learning that were behind a locked door took longer on average because of waiting to be let in.

Composting Milestones:

January 16th, 2014 – Composting bins were officially rolled out for use

January 17th, 2014 – The first collection of compost took place weighing in at 16.6 kilograms

January 24th, 2014 – The first official load of organic materials entered the JORA 5100 composter with Matt Milovick, VP of Administration and Finance.

February 5th, 2014 – The first batch of compost was transferred from the first chamber into the second chamber; weighing 163.26 kilograms

February 26th, 2014 – Harvested the first ever batch of ready to use compost! We received a 51% yield of brown gold. We completed our second transfer the same day moving over 185.58 kilograms of organic material

March 5th, 2014 – Gave away 100 bags of compost to the Thompson Rivers University community along with a variety of seed packages

March 24, 2014 – Harvested the second batch of ready to use compost receiving a 41% yield. We transferred 306.93 kilograms of materials from the first chamber into the second chamber.

March 25th, 2014 – The harvested compost was donated to the Horticulture department for their herb garden behind culinary arts

April 16, 2014 – We harvested the third batch of compost; with a 30 % yield. The compost was acquired by the BC Center for Open Learning who used half of the materials to re – pot their plants for Earth Day. Cameron Lindsay obtained the other half from Facilities Services

April 30th, 2014 – The pilot project comes to an end and TRU begins to compost campus wide

Bin Selection and Location

Composting bins appeared on January 16, 2014 for use and utilized two types of bins. The first bin is a kitchen counter composter; perfect for lunchrooms due to their compact size. Each office lunchroom received one bin and depending on the size of the office some eventually acquired more. The second bin was medium sized green bin. These bins were ideal for common areas utilized by TRU community members. Locations were based on high traffic areas including: common areas, classes and near areas where food could be purchased. As the pilot project gained momentum bins were moved and more offices became involved.

In total the pilot serviced twenty locations in ten buildings. Seventeen green bins and kitchen counter composters were used. More composters, of both sizes, were purchased for the end of the pilot project while transitioning to campus wide. Table 3, provides breakdown of the composting bins for each department and common area. Offices that heavily composted acquired the larger green bin while others added an additional kitchen composter. Changing of the bin size for office lunchrooms allowed for more efficient composting with less associated problems like how full they would get.



Figure 3: Allysha Sorba, co-op research student poses with the bins prior to the program rolling out.

Within the first couple weeks of the pilot project it became clear some locations were not ideal. Based on observations, bins began to see more usage from students, faculty, and staff, and were picked up more frequently when moved to more ideal locations. This observation was applied to the Campus Activity Center where minimal pick up's occurred until over half way through the pilot.

Table 3: Below is a breakdown of where composting bins could be found on campus. It shows the number of bins per location and whether or not they were a green bin or a kitchen counter composter.

Department/Common Area	Number of Green Bins	Number of Kitchen Counter Composters
Adventure Guide Program	1	1
Institutional Planning and Analysis		1
Culinary Arts	2	
Executive Offices in Clock Tower		2
Finance		1
Marketing and Communications		1
Old Main Student Street and Terrace	3	
BC Center for Open Learning	1	4
International Building	2	
House of Learning	2	
Campus Activity Center	4	
Office of Environment and Sustainability		1
Science Building	1	1
Day Care Center	1	
Trades Building		2
Facilities		2
Career Education Department		1

Educational Lessons

The pilot project offered many educational lessons for those involved. The following are some lessons learned along the way:

1. Always be prepared: Spills and leaks happen. If the bag looks heavy—it probably is and will likely break and it was best to be prepared. There were plenty of tools available to help clean up accidents including: a brush, dust pan, cleaning clothes, all purpose cleaner, blue totes, and plastic bags. In case of an accident with wet and heavy compost, a spare set of clothing was kept in the office.

2. Plastic bags will save the day: Originally, the project started off with two-ply compostable paper bags for the green bins. They worked well for the time frame between pick-ups and were easy to collect. However, once out, in an effort to save on costs, we switched to one ply compostable paper bags. Even with the wood pellets to absorb the moisture, these bags did not hold well over a two to four day period; they broke easily leaving behind a large mess. The introduction of a recyclable plastic bag ensured easy and clean collection of the compost. Any of the materials that soaked through the paper bags were caught. This reduced the amount of time spent cleaning the bins (especially when access to a janitorial room was limited). Once the materials had entered the composter, bags were rinsed and recycled.

3. Student engagement and support is vital: Staff and faculty proved they were keen to compost. Conversations with students hinted they were ready for a positive change and this included composting on campus. On January 10th, 2014, the Office of Environment and Sustainability managed a booth during orientation day and asked students to participate in a quick survey. One question asked:

“In your opinion, what do you believe are the top three environmental sustainability issues that the TRU Office of Environment and Sustainability should concentrate on over the next year or two?”

Composting ranked highly among their top three issues. Once the pilot project was rolled out campus wide, composting bins located in common areas were severely underused. This raised the question—why? With slightly over 13, 000 students on campus, there is a great ability to generate large volumes of compost; though, data values collected indicated otherwise. Attempts made to engage students varied and often limited due to time constraints. Some of these attempts included:

- Standing at composters during peak hours (lunch or transitions between classes) and guiding students, staff, and faculty through the system and talking about the pilot with them.
- Standing in the Culinary Arts and Campus Activity Center during lunch periods, 11 a.m. to 1 p.m. to physically block the garbage receptacles and talk with TRU community members about what items were compostable on their plates. Deemed unpopular by some TRU community members, this initiative helped divert organic matter from the landfill and reinforced the benefits of composting.
- Completed a ‘whiteboard blitz’ during Reading Week to encourage students, staff, and faculty to visit the Environment and Sustainability TRU webpage and complete the

composting survey. The motive behind a 'whiteboard blitz' was while students were waiting for class they would see the board and create more buzz regarding the pilot project. The number of participants for the composting survey increased.

- Two to five minute presentations were completed during class time, to a variety of programs, to encourage students to be involved in the composting program. This was beneficial in opening up the dialogue about student eating habits. It was noted that food purchased on campus is already prepared with very little organic materials being leftover. Similarly students who bring their own food from home prepare it there. The composter was only used if students had unfinished food items. If they were unsure whether or not it could be composted, it went into the garbage.
- Tent cards were designed for the Culinary Arts dining area to highlight the composting pilot project. The goal is while people are eating they will glance over the tent card and will be more likely to compost. They will be on tables beginning in September 2014.
- There was a compost give-away after the first batch was harvested. It was used as an educational tool and an opportunity to gain momentum regarding the pilot project among the TRU community.
- Lead by example. Student engagement with the project could be much higher if they see staff, faculty, and administration participating in the program with full enthusiasm in the common areas. Composting campus wide will require everyone's participation and in the long run will benefit our goal to achieve a zero waste status.
- Peer shaming can be effective. Studies have shown that participants who feel pressure by their peers will more likely compost compared to those who do not feel pressure (Sussman and Gifford 2013; Sussman *et al.* 2013). A prime example of this occurred during Natural Resource Science 4210, Conflict Resolution, where a student had a banana peel and had the intentions of tossing it into the garbage. A peer of this student loudly asked if they were going to compost it; everyone in the class turned to stare. Feeling pressured, the student asked where the nearest bin was and composted their banana peel. This may not work in every case; however, it reinforces proper waste management among TRU students.

Based on survey results, there was a general consensus among the TRU community that this pilot project was not advertised to its fullest potential. Moving forward based on these comments, an educational awareness package is being designed to meet these needs. It will be implemented beginning September 2014 incorporated through the green guide.

4. Pictures are worth a thousand words: TRU is fortunate to have such a high diversity of students from around the world. After speaking with a handful of international students it was noted that not all students move to Canada with English as their first language. A poster crowded with text can be quite daunting and with limited timeframes between classes coupled with unfamiliar wording, images are an effective method to alleviating confusion.

5. Good compost does not smell: There is a social stigma that composting is affiliated with a certain scent. One of the barriers, compost smells, was quickly disproved. The reason being is the addition of oxygen. Oxygen helps to promote micro bacterial organisms present to break down the organic matter and create usable compost. When the compost sits for too long without mixing that

is when an unpleasant odour can be noticed. We did experience an issue with odour on two different occasions. As mentioned above, these two issues were quickly dealt with and were not experienced at any other point during the pilot project.

Composting Collection and Harvest Values

Organic materials collected were weighed to track the pilot projects process. The first collection occurred on January 17th, 2014, after one day of exposure. Figure 4, outlines the progress of the pilot project over thirteen weeks. As the pilot project gained momentum the values of materials being picked up increased. This is evident when comparing the first week's pick up to the second week. In the first week of the pilot project there was only 16.6 kilograms of materials. The second week there was over 70 kilograms of organic material picked up. Week 6 of the pilot project was Reading Week and saw very little activity accounting for low values. Though, by the end of the thirteenth week, there was over 100 kilograms of organic waste picked up. Values will most likely decline during the summer months, as there are lower enrollment numbers during this period and pick up again in September.

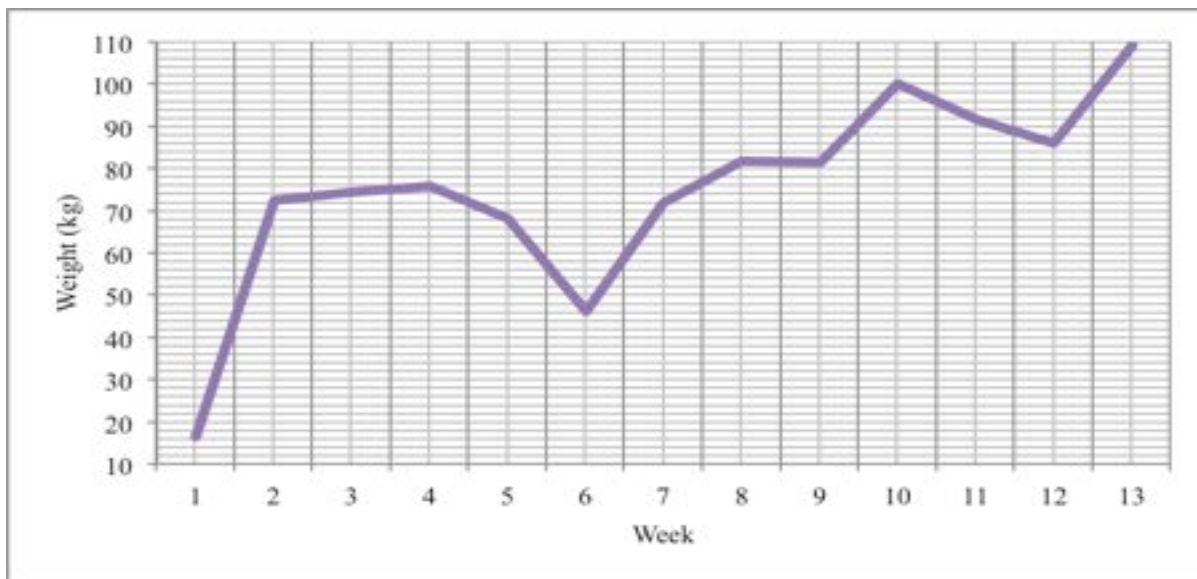


Figure 4: Above shows the weekly weights of composted collected over a thirteen weeks. As the pilot project progressed the amounts of compost collected increased. Note: 1 kilogram is equal to 2.2 pounds.

During the course of the pilot project compost was harvested three times (Figure 5). Yields were calculated by taking the weight of the compost harvested and dividing it by the weight of the compost that was transferred from Chamber 1 to Chamber 2 and multiplied by 100 to get a percentage. The first time compost was harvested it achieved a 51 percent yield. This is partly due to the high number of raw wood pellets that lined the bottom of chamber 1. This compost produced was very woody and was suitable as mulch. This batch of compost also had less organic material present because of how new the project was. The weight for March 24, 2014, is lower than the other two days because we transferred less material that time. Regardless we experienced a 40 percent yield that day which is ideal according to the experts at JORA. The third harvest on April 16, 2014, was the largest batch retrieved but the lowest percent yield (at 30 percent). One reason for this low percentage is the amount of compost that did not get pulled out

of the composter. It was estimated that roughly ten to twenty percent remained at the bottom of Chamber 2. Based on reading the manual and discussions with JORA, we were aware there would be some remnants of compost at the bottom, but did not figure it would be this high. Looking at the design of the composter had the hole for where the compost exits been lower and slightly larger it would be easier to remove more of the contents.

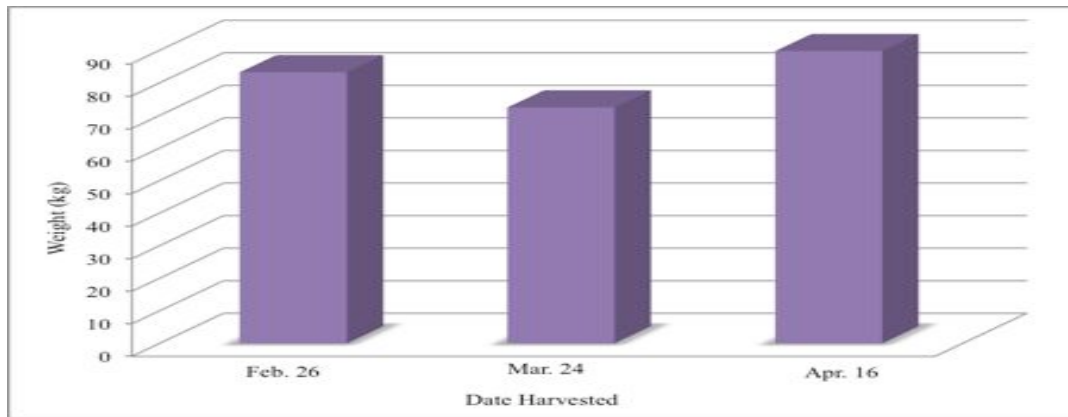


Figure 5: The three values above indicate the day's compost was harvested from the JORA 5100 composter. The weights of the compost were converted to produce a percent yield to show the percentage of compost produced compared to what was placed into it.

The Survey

A survey was created to better understand TRU's perceptions surrounding composting. This would provide valuable insight and guidance as composting became campus wide. The data provided from the survey will be analyzed upon the closing date (April 30, 2014), however, has been extracted early for the purpose of this report.

The creation of the survey took two weeks to complete before it was made available online through Vovici. Between the dates of January 15, 2014 and April 23, 2014, 564 participated. The survey included students, staff, and faculty at the TRU campus, TRU Williams Lake campus, and Open Learning students and staff. Even though the campus at Williams Lake and Open Learning students do not utilize the Kamloops campus, they would still provide positive insight on whether or not they incorporated sustainability into their daily lives, believed composting campus wide would be beneficial, and provide insight into barriers that may be encountered throughout the program. This portion of the report looks to examine trends found in the survey while we continue to strengthen our commitment to environmental stewardship through better waste diversions.

Participants and Sustainability

Student participation was overwhelming large for this survey accounting for 83.9 percent of the responses received. Staff followed at 10.5 percent and faculty at 5.7 percent. In certain buildings faculty and staff had access to both types of composter. Our participation rate exceeded our goal of 350 participants.

Table 4: Below is a breakdown the number of people who participated in the survey.

Participant	Number	Percentage (%)
Student	473	83.9
Staff	59	10.5
Faculty	32	5.7
Total	564	100.0

Participants agreed that sustainability was a priority in their daily activities (Figure 6). Only 20 percent of participants were neutral, disagreed, or strongly disagreed with this statement exhibiting that 80 percent of responders considered the environmental impacts of their daily choices.

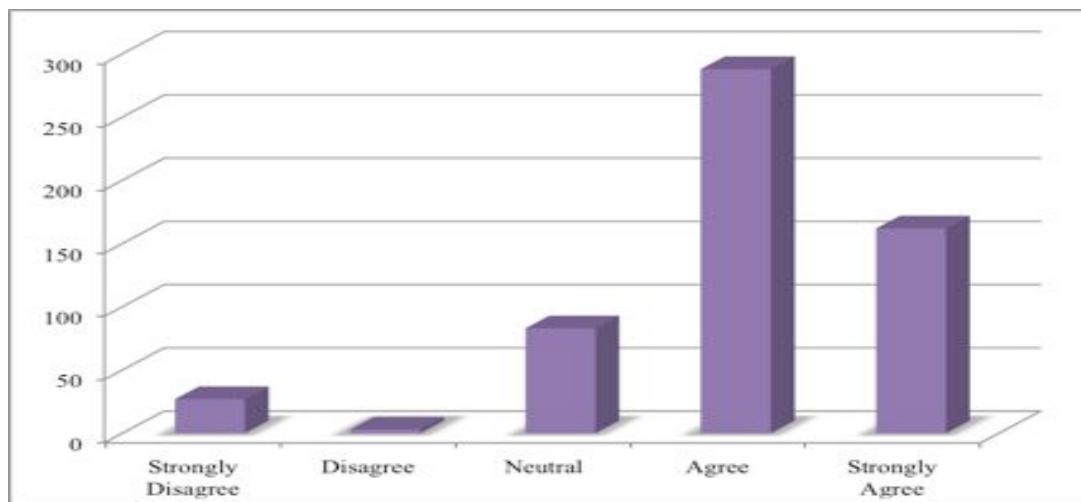


Figure 6: Above shows how participants responded to “I consider sustainability a priority in my daily life”. Majority of the participants agreed they place an importance on this while very few do not consider it to be a part of their daily lives.

Composting

The next few questions asked participants about their composting habits both at home and on campus. Some questions further inquired as to why participants did not compost at home or at TRU and allowed for feedback.

Participants were asked if they felt they understood how to compost properly. While 39.5 percent agreed and 19.7 percent strongly agreeing they understood how to compost properly 22.5 percent were neutral. In this case, neutral could mean they have a basic understanding. 18.2 percent of participants felt they did not have a good understanding of composting. There could be many reasons as to why, however, this was not addressed. Speculation surrounding possible reasons includes: lack of interest, lack of composting education, or it may be a new concept.

When asked if participants composted at home, the responses varied. As seen in Figure 7, all responses appear to be very close with sometimes and never having higher values.

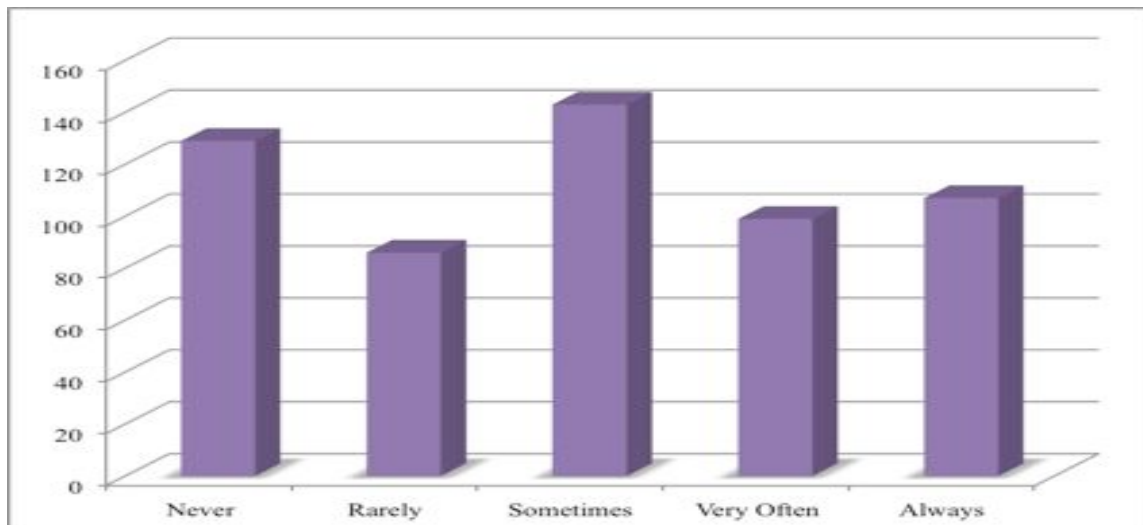


Figure 7: There was a range of responses when participants were asked whether or not they composted at home. The most common response was sometimes followed by never. Research into why participants did not compost at home shed light into personal habits and are carried over to the campus.

Even though many participants feel they have a good understand on how to compost, it appears not all are composting at home. Most of the time was a way to group the responses sometimes, rarely, and never. While looking at the survey results, the number one response was that participants did not have access to a composter at home (37.4 percent). This was followed by a lack of knowledge on how to compost (23.8 percent). Other responses included that it was too much of a hassle, it attracts rodents and insects, causes unpleasant odours, or they were simple not interested in composting. Participants were provided with the option of 'Other' where they could express a reason that was not listed. Glancing through the responses it made it clear that people want to compost, however, they are limited due to certain constraints. This includes: concerns dealing with bears, their current composting system only accepts yard clippings and stratified homes that all have limited space or no backyard. Speaking with TRU community members who listed these as problems openly admitted to bringing their compost to campus in an attempt to reduce their landfill waste impact. Of the participants who compost at home and did not have a composting bin in the facility/building they worked or took classes in, very few, 10 percent always or very often, saved their compost to compost at home. A staggering 62.8 percent never saved their organic waste to be composted at home; most likely using the garbage receptacles found in their respective building.

A positive outcome of the survey indicated that TRU community members felt that composting would be beneficial on campus. There was a half a percent difference between participants who agreed and strongly agreed, giving them a combined percentage of 80.1 percent (Figure 7). While some participants were neutral or disagreed with this statement, it may have been due to their geographical location or whether or not this project affected them directly. With the concept of sustainability becoming more increasingly important it was evident that participants felt that a campus wide composting program would advocate and show case a more sustainable campus. 45.6 percent strongly agreed, while 41.8 percent of the participants agreed, indicating that a green and sustainable campus is an important value. The Campus Sustainability Action Report outlined reducing waste management as one of their key initiatives and a composting program combined with a proper waste management program would allow the university to achieve their targets.

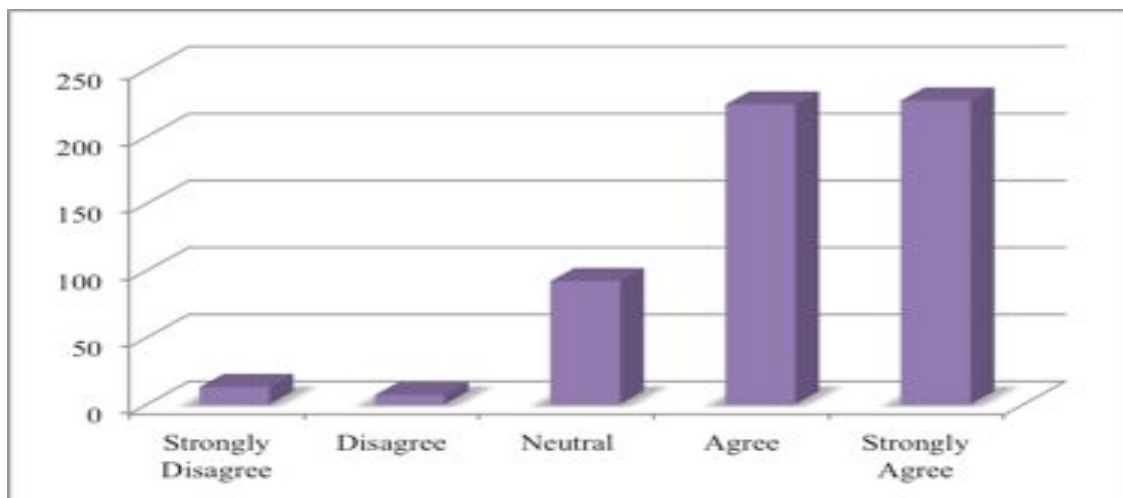


Figure 8: Above shows the results to whether or not participants felt that a composting program would be beneficial to TRU. As seen, there is strong evidence to support a composting program.

Barriers to Composting

One barrier to composting that was inevitable was contamination of non – compostable materials and this was identified in the survey as the number one barrier to successful composting at TRU (72 percent).

At the beginning of the pilot project contamination rates were high, which were be expected, and steadily decreased as students, staff and faculty became more familiar with composting. A poster was placed above each composter with the “Do’s” and “Don’ts” of composting (Appendix B) along with a sticker for the top of the lid to reinforce what was acceptable in the bins. During random peak lunch hours, someone stood near the bins and informed TRU community members on proper composting habits.



Figure 9: Picture of a composting bin contaminated with Tim Horton’s product.

Over the course of the pilot project, contamination rates still remained an issue, however, with the increase in composting education, they reduced. With composting being new to the university, it will take some time for the TRU community to adapt to the new changes and eventually contamination rates will decline.

The second most noted barrier was people’s lack of knowledge on proper composting (65.2 percent). With our best attempts to educate the TRU community, the pilot project did increase awareness regarding proper composting. The slow decline of contamination, increase in proper signage, and talking with community members during events or while monitoring bins made a difference. The Office of Environment and Sustainability has been investigating into making a

green handbook and would have a section on composting. It would be handed out to all new students, made available online for current students, and would help to increase public awareness.

The composting survey indicated there is a perception that composting attracts insects and rodents (37 percent). During the pilot project, we experienced fruit flies on the rare occasion; approximately five times. One method to coping with the fruit flies is through a simple fruit flytrap. This consists of a bottle with small holes pierced through the top. The mixture inside the bottle would consist of apple cider vinegar and liquid dish soap. The apple cider vinegar is a sweet scent that would attract the flies while the dish soap would anchor them down into the mixture. These traps would need to be changed once a month or as needed. A second solution to fruit flies was changing the composting bins more frequently. A third solution to this would be to remove the bins from the location for the summer months (May to August) and reinstate composting for that area beginning in September. We never experienced any problems with rodents during the composting pilot project. For the purpose of this report, rodents are defined as a gnawing mammal distinguished by strong constantly growing incisors and no canine teeth. This includes: rats, mice, squirrels, porcupines, or their relatives (Merriam Webster's Online Dictionary 2014). Bears were a common response among those who completed the survey. Since the composting bins and the in-vessel composter are located inside, this should never be an issue.

The composting pilot project did not cover all buildings on campus and were not present on all floors of buildings that were part of the pilot project. This left some respondents feeling as if there was a lack of convenience to the composting bins (41.5 percent). Other universities, including UBC Okanogan, have found that composting can be successful with the bins being solely on the main floor. Their rationale behind this concept was (a) convenience for facilities personnel, and (b) students who use the upper floors in a building will eventually come down to leave and can stop by the composting unit at that point. According to Allen King, Facilities at UBC-O, this practice has become successful over the past few years. At TRU, we felt that this model could be useful and attempted to follow it for the common green composting bins. Though, where food could be purchased on the second floor of certain buildings, green composting bins were placed nearby. This encouraged TRU community members to compost rather than throw their leftovers into the garbage. With the project moving forward, the level of convenience for composting on campus has increased.

Not all who participated in the survey were in favour of a composting program at TRU. Some respondents noted that there could be a lack of interest in composting (34.9 percent) and for others it would be too much of a hassle (27.8 percent). Like all new programs, there is a grace period where composting will not be the norm. The inclusion of the new waste management systems should encourage those people to dispose of their waste appropriately. In the new system a composting bin is built into it, making composting easy and accessible – less of a hassle. Individual responses varied and included: financial constraints, the worry of passing on any associated costs to students, staff and faculty, lack of endorsement from upper administration and the president of TRU, and some felt there were other ways to make TRU more efficient and sustainable.

Funding of a Composting Program

Running a composting program will require funding and the survey asked TRU community members whether or not they would support paying into a fund specifically for a composting

program. An overwhelming 66.8 percent of participants were against any form of tuition increase or pay deduction. It is evident that TRU community members want to see the funding found through other avenues. Interestingly enough, of the 33.3 percent who would be willing to pay into a fund specifically for composting 45 percent would be willing to pay \$9 to \$10 annually for the program. The second most common price bracket was \$5 to \$6 annually at 28 percent of those who would agree to an increase in tuition or pay deduction.

Students feel that their tuition is already high enough and continues to rise annually (41.7 percent). For students who receive funding or have student loans, this small increase could affect how they budget for the following year. Other reasons included financial pressures (26.5 percent) and some respondents hinted at looking for funding from elsewhere (17.9 percent). This could be through government grants, funding from the university, funding from the revolving energy fund, or partnering with the community to offset costs. There was an opportunity for participants to provide alternative responses. Some of these responses included: did not work at the TRU campus and therefore should not have to take a pay deduction, the program should be self-sustaining, using funding from parking fees (parking fee increases already support the Sustainability Grant Fund), international students feel they already pay high enough fees compared to domestic students, and TRU should consider looking for volunteers to run the program (like a student club or green team).

Volunteers can be an integral part to any function or program. Participants were asked if they would be willing to volunteer their time to any aspect of the composting program and 36.7 percent said they would be willing too while 63.3 percent said no. One reason for this high percentage of those not willing could be due to the high number of participants who are Open Learning students and do not attend the TRU Kamloops campus. Though, of those who are willing to volunteer, it appears that most would be willing to volunteer one to two hours of their time. Volunteering opportunities could include: standing at zero waste stations and talking about how they are used properly, standing at high volume areas with composting to highlight the program, and volunteering at events.

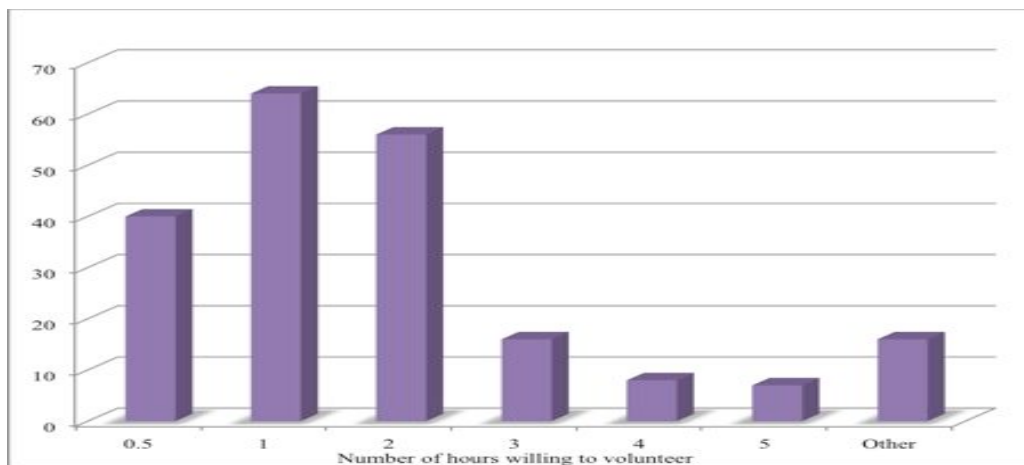


Figure 10: Above indicates that participants would be willing to volunteer with a composting program in some capacity. It appears that most participants would be able to spare at least an hour of their time while others would be willing to volunteer longer.

At the end of the survey there was a section for participants to leave their name and email address to be used for contacting volunteers and for the iPad mini draw.

Associated Costs

Like all projects, there were some associated costs with the pilot project (Table 5). To run the composting pilot project successfully without any complications various items were required.



Figure 11: Harvested compost from the first batch is ready to be given away to the TRU community.

Short Term Costs

Accurately determining the weights of materials entering the composter required two scales. Organic materials from the kitchen counter composters (7.5 L Organic Waste Bin) were not heavy enough to register a reading on the large scale. This indicated that the materials were less than one kilogram in weight and required a smaller scale to obtain those values. A stainless steel composter was purchased for the president's office on the third floor of the Clock Tower and is regularly used by all members on that floor. Tongs and plastic totes were very useful during the pilot project. The tongs allowed for quick and easy sorting of organic materials before entering into the composter. This ensured no contaminants were mixed in. The plastic totes were used for transporting the final product. For a complete breakdown of costs, please see Appendix C.

Long Term Costs

Items including: clear bags, hardware bags, grocery bags, and composters will be continuous costs incurred throughout the life of the composting program. Composting bins will only need replacement if they are broken or experience stress from wear and tear. However, this should not be on a yearly basis, rather a two to three year time frame if they are properly maintained. Hardware bags and grocery bags only need to be replaced once they have run out. In a four-month period, only half of the grocery bags were utilized. As these bags are used for common areas they

will need to continue to be purchased. This will be the same case for the clear bags found in the common green composting bins.

Maintenance Costs

Over the life span of the in-vessel composter, it will require some maintenance work. Table 5 indicates the pieces of the composter that will require maintenance in the future. The composter comes with a two-year warranty; then a maintenance package can be purchased through Russ Chamber's (JORA representative) at varying levels. This will need to be examined in the future as a possibility.

Table 5: Cost analysis for the various pieces of mechanical equipment associated with the JK 5100 in - vessel composter that will require maintenance.

Equipment	Associated Cost*	Additional Notes
Milling Knives	\$36.00	Should be done once every 18 months
Ventilation System	Under Warranty	Should be vacuumed twice a year
Rotors (Chamber 1 and 2)	Under Warranty	
Motors (Chamber 1 and 2)	Under Warranty	
Motor Gears (Chamber 1 and 2)	Under Warranty	
Wood Pellet Hopper	Under Warranty	
Electrical Box	Under Warranty	

* Prices vary per region.

Future of Composting at TRU

The future of composting at TRU is positive and will continue into the future. Composting on campus provided so many wonderful benefits for those involved and the TRU community. Without realizing it, many people helped mitigate their impact on climate change. Simply by tossing out a banana peel or apple core, for example, the landfill receives less organic materials and in turn creates less methane. Over the course of the pilot project perceptions morphed from negative into positive thoughts. The continuation of a full scale-composting program can be done with minimal costs incurred through varying grants and faculties working together.

Perceptions

Perceptions shape how we think about the world and it can stem from our experiences. Based on peoples experiences with composting there were many perceptions that surrounded the pilot project. It was perceived that composting at TRU would be similar to how people compost at home and it conjured up ideas of fruit flies, rodents, and a strong odour. This left some participants very skeptical about composting. Fortunately, this changed over the course of the pilot project. For example, in both the Registrars office and Finance department staff that was certain the compost would smell and attract unwanted pests. As time progressed those skeptical admitted they did not notice the composting bins. One member from Finance was shocked how there was no scent even if the lid was left open. Reasoning behind for this is from the raw wood pellets providing an 'outdoorsy' scent and the compost having a regular pick up schedule. Even once each department began emptying their own bins there were no comments regarding odours from the bins. Some TRU community members who stopped by to look at the composter in Culinary Arts thought there

would be a strong odour from the composter. They were generally amazed by the pleasant scent. This is partly due to Culinary Arts students who ensured the building always smelled great and from the composter’s rotors turning on a regular basis combined with the ventilation system. There was also a lot of worry surrounding whether or not the odour would attract rodents. Some departments expressed their concerns early on in the project; however, in 13 weeks there were zero reports of rodents from any department. It was encouraging and positive to see these perceptions morph over the course of the pilot project. As composting moved to become campus wide, it built excitement for those buildings where there were previously no composting bins. Based on this, the future of composting at TRU looks promising and will get them on par with other institutions across not only BC, but Canada.

Costs Analysis

Costs associated with the composting program will be minimal on a year-to-year basis. The purchase of the composter is a one time deal and will cost the university \$40, 000. This project is mostly being paid out of the revolving energy fund. This included installation, training, and a two-year warranty on all mechanical equipment. Below (Table 6) is an outline of the yearly costs associated with running the composting program. Materials including plastic bags and grocery bags were purchased in a high volume and were only purchased once every four months. In a four-month period (one semester) the pilot project went through five bags of raw wood pellets and as composting becomes more of a social norm there could be a need for more than five bags per semester. This cost will fluctuate the most of any costs incurred during the program. It is projected the yearly cost for running this program is \$520.32. There is still the option of purchasing an extended warranty package for the composter.

Table 6: Cost analysis for a composting program annually. The cost to run this program is negligible and will be self sustaining.

Material	Base Cost (\$)	Yearly Cost (\$)*
Raw wood pellets	5.99	89.85
Plastic bags	27.09	81.27
Grocery bags	104.40	313.20
Sharpening milling knives	36.00	36.00
Total	173.48	520.32

* Prices do not include the applicable taxes.

Funding the Program

One goal of the composting program is to make it self-sustaining. One way of achieving this is to improve efficiencies on campus. Reducing the workload for the janitorial staff is a prime example. By removing waste receptacles from classrooms and having one zero waste station for every six classrooms they are able to save time and can be applied to the picking up of compost. This will not add extra time to their day or require them to hire additional staff. There will also be an increase in efficiency in waste management campus wide. With the newly designed zero waste systems there will be less waste entering the dumpsters and increase the diversion rates for

composting and recycling. This will decrease the number of times the City of Kamloops stops by to pick up garbage. This reduces the tipping fees for the university and the money saved here can be applied to the external costs of running a composting program. As of May 1, 2014, TRU's pick up schedule will be reduced for the summer equating to a savings of roughly \$14, 000. This leaves ample funding leftover and can be saved for when maintenance work is required on the composter or more composting, bins are needed.

Other possible sources of funding for a composting program could be through government funding, institutional funding, and even through environmental grants. It was evident the TRU community did not want to pay specifically into a fund to support a composting program. They believed the funding should be found through other means, as many of the respondents were students. Students may be on tight budgets due to loans, personal financial constraints, or other personal reasons. However, due to the large savings associated with reducing the amount of garbage pick-ups by the City of Kamloops, there should be no need to re-allocate funding from other budgets.

Waste Management Audit

The current system set in place on campus is sporadic and confusing. As seen below, Figure 11, the current system lacks cohesion and does not encourage proper waste disposal. In many areas of the campus, recycling, refundable bottle, and garbage cans stand-alone or are poorly configured. There is no environmental or sustainable benefit to the current system. As seen in the picture on the right of Figure 12, there is one garbage can accompanied by two refundable bottle bins. If a person wants to recycle or compost, they must walk to those bins they are looking for, as seen in the picture of the left of Figure 12. At this point, most people would not source out the appropriate bin and would place their waste in whatever bin was nearby.



Figure 12: This is a current snapshot of the waste management system at TRU. Both images are from the first floor of Old Main. Both images highlight the confusion TRU community members face when looking to properly dispose of their waste.

The Office of Environment and Sustainability has purchased four Busch waste management systems (Figure 13, on the left) and can be observed on the second floor of Old Main. The Busch waste management systems are part of a larger waste audit that will take place over the summer 2014. For the purpose of this report, a small-scale audit took place to compare the current waste management system at TRU to the newly proposed 'Zero Waste' system.



Figure 13: On the left is a make – shift zero waste station located in the cafeteria of the Campus Activity Center while the right side showcases the new Busch zero waste system.

Waste Audits

Throughout the month of March, mini waste audits were conducted in Old Main, International Building and Arts and Education to determine contamination rates with the current system. The methodology used was simple. Materials in the recycling and garbage bins were emptied into a blue tub and were counted. Items were categorized by: landfill waste, compost, recyclable materials, and refundable bottles and a percentage were created to conclude a contamination rates.

Table 8: Contamination rates from a waste audit for the first and second floor of Old Main. Rates are based on how many of the items in that bin did not belong.

Old Main, Second Floor	Contamination Rates (%)	Student Street	Contamination Rates (%)
Garbage	80	Recycling	24
Garbage	52	Garbage	80
Garbage	60	Garbage	56
Garbage	61	Recycling	55

Contamination rates for the current system were very high (Table 8). The second floor of Old Main garbage bins had contamination rates of higher than 50 percent and the same was true for garbage bins on the first floor. Recycling bins had lower contamination rates, however, they had the potential to have no contamination. Many of the recycling bins on campus fail to accept all

recyclable materials because they have signs stating they either take paper or bottles only. TRU follows the same recycling program set out by the City of Kamloops; therefore, if it can be recycled at home it can be recycled on campus.

Table 9: Contamination rates experienced with the newly designed zero waste systems by Busch. The values are much lower compared to the current system as it encourages TRU community members to properly dispose of their waste.

Location	Contamination Rate (%)				
	Recycle	Compost	Refundable	Plastic Bags	Landfill Waste
Office of Environment and Sustainability	0	0	0	8.3	4
OM 2621	0	0	0	0	10
Revvup	0	0	16	0	15
OM 2771	0	33	0	0	13

On the other hand, a quick waste audit was conducted for the new Busch waste systems. It followed the same methodology for the current system. Looking at Table 9 it is evident that contamination rates are much lower. It appears that these bins are convenient and encourage proper waste disposal. Above each bin is a sign that uses a combination of pictures and words to outline what is acceptable in each bin. Even though there is still contamination in the landfill waste bin, there is less than 20 percent contamination. This is a positive step towards a more sustainable campus.

Benefits to a Zero Waste Campus

Campus waste management efficiency can be improved and save janitorial staff time if we were to remove waste receptacles from classrooms. It is postulated one zero waste station could service every four to six classrooms in each building. This would then encourage students, staff, and faculty to properly dispose of their waste reducing the amounts entering into the dumpsters. This also would mean that janitorial staff would cut down on the amount of plastic bags being used and allow for them to allocate the time saved to other projects, along with the cost savings associated.

Ideally, to reduce the amounts of materials entering into the landfill, there needs to be a movement towards creating a campus wide Zero Waste program. The ideal bin configuration would incorporate all the important aspects of waste management including: composting, recycling, refundable bottles, soft plastics, and landfill waste. This can easily be achieved using existing infrastructure until all zero waste centers can be replaced with state of the art zero waste centers.

Recommendations

The following recommendations are based on the experiences incurred during the pilot project combined with conversations with other universities. Speaking with other universities who had established composting programs provided the TRU composting pilot project to shape it's future.

1. Composting become a voluntary program for faculty and staff to get involved with.

Solution: It may not be economical to continuously hire someone to deal with the composting program, therefore, presenting an opportunity for TRU faculty and staff members to become involved. Following models set out by other institutions; a designated person from an office would be responsible for walking their compost to a common area for emptying. During the summer, the co-op research student would complete collections until janitorial staff took over beginning in August 2014.

2. Search for a meaningful way to continue composting while saving time, energy, and funds.

Solution: Some buildings were further away than others and added additional time. The Facilities building took the longest of all buildings to collect from. There is a potential to save time if they were to have mail service bring the bins to the Old Main mailroom and trade them for new composting bins. The new bins would be placed in the mailroom the night before the exchange. By having the compost bins brought down the hill it can save up to 30 minutes.

3. A more intensive educational component needs to be designed and implemented starting September 2014.

Solution: Survey results indicated that people were willing to volunteer and they would be beneficial in conveying information regarding composting on campus. Some ideas surrounding composting education included: having a map showing the locations of composting bins and zero waste stations for each building, having volunteers stand at composting bins to talk about the program, have a composting education day with a booth at varying event days, better marketing campaign, and classroom visits to discuss the program. There is a green handbook being devised to outline the composting program.

4. The bins need clear marking to ensure the TRU community understands what belongs in the composting bin.

Solution: A proper sticker should have been completed in the beginning of the project rather than printing off stickers that only stated TRU was composting. The current stickers wash off easy and because they were on the side of the green composting bins were not easily identifiable. With this now better understood, it is recommended that before printing anything it be considered whether or not it will be effective. The posters used to talk about what was acceptable also should morph as the program continues. Having stickers that have pictures indicating what is acceptable should still be partnered with a poster indicating what is not acceptable. This list should be more explicit in items that do not belong in the composter.

5. Culinary Arts and Campus Activity Center should be more involved with the composting program.

Solution: Both locations provide on campus dining and have the potential to generate large amounts of compost. The waste center in the Culinary Arts building is poorly designed to encourage composting. Even with increasing the number of composting posters in the area it had high contamination rates and low weight values. A make shift zero waste station was introduced to the Campus Activity Center in late March and proved to be effective. Prior to this almost everything was disposed of in the garbage, which does not meet sustainability goals for the

campus. Now with a new system in place, achieving a zero waste campus is more attainable. The Culinary Arts building produces large amounts of organic materials that could be better utilized. Tent cards could be used to introduce composting while people are eating, while large signs could be placed right beside the garbage can with an arrow pointing to the composter.

Conclusion

Overall the composting pilot project was successful! Promoting best practices for an effective waste management program includes composting. As the university continues to strive to become more sustainable as laid out by current policies and framework, it will be able to meet many of the goals surrounding waste management. It will also be able to meet their founding goal in the 2014 – 2019 Strategic Plan to become more environmentally sustainable. A more environmentally conscious university will be attractive to future students and help retain current students.

There are many benefits to composting. Composting will reduce the amount of materials entering the landfill while mitigating harmful climate change effects. The final product produced is full of vital nutrients needed for plant growth and can be used directly on the campus' gardens. It can also provide an educational component for TRU community members along with the general public. It was rewarding to help people learn about composting and hear from community members who would start composting at home because of the composting pilot project.

The pilot project overcame the barriers that were perceived around composting. With high concerns regarding odours and pests, the pilot project was able to better understand the barriers and work towards sensible solutions to prevent them from occurring in the future. As the program gains more momentum, composting will become a social norm on campus. Contamination will remain a problem until a solid educational package can be established, but did drop dramatically over the course of the pilot project. The future of composting at TRU is promising and a positive step towards creating a sustainable future.

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Appendices

Appendix A: Detailed outline of the various institutions and their composting programs.

University of British Columbia, Vancouver Campus

The University of British Columbia (UBC), located downtown Vancouver, has been composting since 2000 with the creation of the UBC Compost Project. This project was created in an effort to reduce the amounts of waste entering the landfill while promoting a more sustainable campus. UBC's Compost Project also provided them with the opportunity to work with students, staff, and faculty to provide hands on training and educational support and awareness. To achieve their goal, in 2004 they purchased an in – vessel composter that is capable of processing five tonnes per day. Each year, UBC composts roughly 500 tonnes. They experience lower values during their summer sessions as students move home or are away on a work term. The composting facility is managed by a small handful of operators who work Monday to Friday. Their in – vessel composter is capable of producing compost within two weeks along with a maturation period and is deemed environmentally, socially, and economically sustainable. Environmentally the composting program at UBC has found a reduced need for top soils and fertilizers for their grounds – also provides a financial saving by not purchasing these materials. It also decreases the amount of greenhouse gas emissions created from both the landfill materials and number of trips made to the city's landfills. Due to the large volume of materials they receive, their composting programs number one challenge is the people who place non – compostable materials into their bins (Emme Lee, personal communications, February 2014). This affects their operating budget and when maintenance is required it stops the composting project completely until the problem can be resolved. This can sometimes take up to a week. To participate in the program, those interested download an Organic Collection Program Form and submit it to UBC Waste Management. It outlines the program and upon acceptance they are given a kitchen composter and a large green bin is placed nearby so they can empty the contents of the smaller bin. This program has been very popular according to Bud Fraser and more information can be found at: <http://sustain.ubc.ca/get-involved/staff/sustainability-coordinators/toolkit/composting>.

University of British Columbia, Okanogan Campus

Nestled in the Okanogan of British Columbia is a UBC satellite campus, UBC Okanogan. Their composting program began six years ago and only involved kitchens across campus and slowly expanded year by year as it gained more popularity. Campus wide composting only began two years ago and according to Allen King, Facilities UBC – O, the program is going great! Yellow bins are located right beside their waste centers, near various exits on the first floor of each building. Their reasoning for this is that students who use the upper floors will have to come down eventually and appear to have no problems carrying their compost down stairs and it makes pick up easier for their facilities staff (Allen King, personal communications, February 2014). For their kitchens those interested directly email or call Allen King and he will personally deliver it. A part of their program is that if participants are neglecting their compost bins he will remove it and they no longer participate in the program.

To compost they use a giant Earth Tub which is a smaller scale in – vessel composter. It is capable of handling 4, 000 pounds of material at it's peak and reduces the organic waste by 70 percent. It

takes 28 days for the Earth Tub to cycle and a one – month resting period before it can be used. Recently they purchased a second Earth Tub to meet their growing demand. Fascinatingly, they have made a ‘menu of dirt’ and depending on what they will use their compost for will ultimately determine the ratios of nitrogen and carbon. For example, if they are interested in producing mulch they will use more carbon (mainly dead Pine Beetle wood) than nitrogen sources.

Composting is built into their facilities budget. Due to the savings associated with composting like reduced garbage pick – ups, not purchasing fertilizers or topsoil’s the cost of running the program does not affect their budget. They have designated a few of their facilities staff to spearhead the program and are excited to see where composting takes them in the future. For more information, please visit: <http://facilities.ok.ubc.ca/services/maintenance-grounds/composting.html>.

University of Victoria

The University of Victoria (UVic) has established a vigorous composting program that aims to ban all food waste and organic materials from the Hartland Landfill by January 1, 2015. Since 2003, when their composting program began, it has continued to grow and credits their Food Services group. According to Rita Fromholt, Sustainability Coordinator, the Foods Services group composts all food waste in the kitchen and dining areas; this includes scraping off the leftover food off of plates left on the trays (Rita Fromholt, personal communications, February 2014).

UVic has been tracking their progress since 2010 and has seen an overall increase in materials being composted while materials that have been diverted from the landfill has increased. This is from collecting more paper towels and coffee cups in the compost waste stream. A more popular opportunity for staff, students, and faculty is a voluntary composting program. Those interested can apply to join the program and will be set up with a 10 Liter green bin and biosolid bags. Participants, also coined compost champions, are responsible for emptying their composting bins. Their voluntary composting program has gained momentum over the past few years and continues to grow.

Table 1: This is a comparison of UVic’s waste stream between 2010 and 2013. Materials between the baseline years and performance years show they have committed to reducing the amount of waste entering the landfill. This is from an increase in compostable organic materials.

	Performance Year Sept. 2012 - Aug. 2013	Baseline Years Sept. 2010 - Sept. 2011
Materials recycled	496.5	563.7
Materials composted	791.8	604.4
Materials disposed in a solid waste landfill or incinerator	679	748

Source: Rita Fromholt, Sustainability Coordinator, University of Victoria.

Compostable materials are collected by an outside company, reFUSE Resource Recovery, and are then transported to the Cobble Hill facilities in – vessel composer. Unfortunately none of the compost is re – used on campus which are factored into the facilities budget. For more information please visit: <http://www.uvic.ca/sustainability/operations/waste/composting/index.php>.

British Columbia Institution of Technology



Figure 3: Red wiggler worms used in BCIT's composting program.

British Columbia Institution of Technology (BCIT) has one of Canada's oldest and largest commercial composting programs. Beginning in 1997, BCIT inquired 170,000 red wiggler worms for vermicomposting. Each day these worms receive around 60 kilograms of organic waste produced from kitchens and cafeterias located on campus. This apparently has cut campus waste by 16 tonnes per fiscal year while providing the campus' green spaces with rich topsoil. Each year they estimate that 2,180 liters of compost are produced.

Composting of leaves and yard scraps composted separately from the organic food waste. BCIT has two people who are completely responsible for composting on campus. Both are members of their janitorial staff and are contracted Monday to Friday. Composting does not occur during the weekends. The production of compost on campus means they save on costs for fertilizer and topsoil's. It also has been beneficial in providing learning opportunities for students and the general community who are interested in composting and sustainability. For more information regarding BCIT's composting and zero waste initiatives please visit: <http://www.bcit.ca/sustainability/operations/waste/burnabycomposting.shtml>.

Simon Fraser University

Metro Vancouver is banning all food waste from garbage early 2015 to reduce their environmental impact and Simon Fraser University (SFU) is getting a head start in order to adhere to the new policy. SFU recently launched a new Zero Waste campaign including composting across all three of their campuses in January 2014. Early in the fall semester they launched a small pilot program but did not collect any data regarding how much organic materials were present or whether or not contamination rates dropped. Data is only now starting to be collected. However, SFU noted improvements in contamination based on visual checks due to better, efficient signage. Similar to UVic, compost is collected by a third party company and is transported to Richmond where they use aerated static – pile composting combined with anaerobic digestion and takes slightly longer to produce usable compost. Their main goal is to eventually use the 'black gold' on their campuses in the future.

Due to their program being new, they were not able to comment on any cost savings at this point in time. More information can be found at: www.sfu.ca/zerowaste.

Appendix B: Composting poster that was designed and placed above all composters on campus.

We're Composting

Composting 101: *How To Make Brown Gold*



We're excited to announce that TRU is now composting! Please help us do it right by using this bin and following this simple list of 'Dos & Don'ts'. Together we can make TRU more sustainable!

Do Compost:

- Fruits & Veggies (cooked, raw, or processed)
- Bread (including baked or cooked products, ex: cakes, cookies, pasta)
- Grains (any kind cooked or raw)
- Meat & Fish (cooked or raw; no big bones please)
- Chicken & Fish Bones
- Eggs & Egg Shells (cooked or raw)
- Coffee Grinds/Filters & Tea/Tea Bags
- Napkins (clean or soiled by food/drink)

Don't Compost:

- Oils & Fats (salad dressings, olive oil, butter, etc.)
- Large Quantities of Liquids (glasses of water, pop, milk, juice, etc.)
- Big or Thick Bones (beef, pork, or lamb)
- Compostable Paper Cups, Plates, Bags, Cutlery, etc.
- Chewing Gum
- Plastic or Metal

Win an iPad mini!

by taking our on-line Composting Survey.
Winner announced at the end of April.
Click on QR code or visit www.tru.ca/sustain



Questions/Comments:

We'd love to hear from you!
(250) 852-7153 www.tru.ca/sustain
facebook.com/TRUsustainability
twitter.com/TRUsustain

THOMPSON RIVERS UNIVERSITY
Office of Environment & Sustainability

Appendix C: Items used throughout the composting pilot project with the breakdown of their cost, how many were purchased, and the final cost. Many of these items were a one-time purchase and will be used continuously throughout the composting program while others will need to be continuously purchased. Taxes not included.

Item	Cost (\$)	Quantity	Final Cost *(\$)
Large Scale	49.99	1	49.99
Small Scale	39.99	1	39.99
Wood Pellets	5.99	5	29.95
Tongs	15.99	1	15.99
30x38 Regular Clear Bags - 250 per pack	27.09	1	27.09
#20 Hardware Bag - 500 per pack	100.80	1	100.80
Grocery Bag (8x5x16) - 500 per pack	104.40	1	104.40
Rubber Maid totes	8.99	5	44.95
10 Gallon Organic Waste Bin, with Wheels	29.99	33	989.67
7.5 L Organic Waste Bin	7.49	25	187.25
Stainless Steel Composter	29.99	1	29.99
Total Cost			1620.07

Appendix D: TRU Composting Survey 2014.

1. Are you a TRU student, staff member or faculty member?

- Student
- Staff member
- Faculty member

2. I consider sustainability a priority in my daily life.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

3. I feel that I understand how to compost properly

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

4. How frequently do you compost at home?

- Never
- Rarely
- Sometimes
- Very often
- Always

5. From the list below, please indicate why you don't compost at home most of the time (choose all that apply)

- Attracts rodents
- Attracts insects
- Causes unpleasant odours
- No accessibility to a composter
- Too much of a hassle
- Lack of knowledge on how to compost
- Not interested
- Other

6. How frequently do you compost at TRU

- Never
- Rarely
- Sometimes
- Very often

Always

7. From the list below, please indicate why you don't compost at TRU most of the time (choose all that apply).

- Attracts rodents
- Attracts insects
- Causes unpleasant odours
- No accessibility to a composter
- Too much of a hassle
- Lack of knowledge on how to compost
- Not interested
- Other

8. If there is no composting in the TRU facility you work in or have classes in, how frequently do you collect your compostable materials and them home to compost?

- Never
- Rarely
- Sometimes
- Very often
- Always

9. I think it's important that TRU has a campus – wide full – service composting program.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

10. I feel that a campus wide full – service composting program would build upon and promote a more sustainable university environment.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

11. From the list below, please indicate what issues you believe will prevent TRU from maintaining a good composting system (choose all that apply).

- It will attract rodents
- It will attract insects
- It will cause unpleasant odours
- Convenient accessibility to composters

People putting non – compostable materials in them
Too much of a hassle for people to compost
People’s lack of knowledge on how to compost
People won’t be interested in it
Other

12. Would you pay into a fund to specifically support a campus wide full – service composting program at TRU (for students this would be a tuition increase, and for staff and faculty this would be a pay deduction)?

Yes
No

13. I would be willing to pay the following annual amount to specifically support a campus wide full – service composting program.

1 -2
3 - 4
5 - 6
7 - 8
9 - 10

14. Please indicate why you would not pay into a fund to specifically support a campus wide full – service composting program at TRU:

Personal financial constraints
Student fees are already too high
I would prefer to see the money spent elsewhere
The money should be found through other means
I don’t really care about composting
Other

15. Would you be willing to volunteer to help with various aspects of the TRU composting project?

Yes
No

16. How many hours would you be willing to volunteer on a weekly basis?

0.5 hour
1 hour
2 hour
3 hour
4 hour
5 hour
Other