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Haste To No Waste: A Multi-Component Food Waste Study in a University Dining Facility

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Abstract
In universities across the United States, about 3.6 million tons of food is wasted annually. Food waste accounts for the largest landfill deposit and an average annual loss of $100 billion. Some food waste research has been conducted in university settings, yet additional work is necessary to understand food waste perceptions and behaviors of young adults. Among this population, text messaging is the most common form of mobile communication and an emerging means of education. The primary aim of this pilot study was to determine university students’ knowledge, attitudes, and behaviors about food waste. The secondary aim was to evaluate the impact of a text message based educational intervention on individual food waste. The survey instrument was developed in Qualtrics using validated questions identified in the literature and additional study specific questions regarding participant food waste knowledge and behaviors. A convenience sample of female university students living on campus with meal plans (n=55) was recruited during fall 2014. At baseline (October 2014) and post intervention (December 2014) participants completed an online survey and individual plate waste was measured by research staff in an al-la-carte cafeteria setting. Educational text messages were disseminated to participants using cell phone technology over a 4-week period and focused on four food waste themes identified from the baseline survey results: environmental effects, use-by-dates on food, impact of one person, and make a change. Data will be analyzed to measure the effectiveness of the educational intervention by assessing the pre/post plate waste differences and changes in knowledge, attitudes and behaviors towards food waste. Participants (mean age= 19 years) were primarily white (63.4%), in their first year at the university (56%) and had either the largest or second largest meal plan offered (87.5%). Mean baseline food waste was 17.9 g (n=39). Baseline data suggest that participants often keep leftovers (80.5%) and follow use-by dates on food packages (70.7%). Environmental sustainability is very important to participants (70.7%) yet only 51.2% reported an excellent understanding of environmental sustainability. Post intervention data collection is in progress. To our knowledge, this novel nutrition education approach targeting food waste knowledge, attitudes, and behaviors of young adults has not been utilized previously. These data will guide development of future research with a larger, more diverse sample and aid in implementing effective waste-reduction strategies in university settings.

Keywords: Food Waste, Food Systems/Sustainability, Catholic Social Teaching
INTRODUCTION

food waste and sustainability

In the United States (U.S.), over 35 million tons of food is wasted each year, equating to a daily average of 0.16 to 0.67 pounds of food per person. Food waste accounts for the largest landfill deposit, followed by plastic, with about 21% of landfills being taken up by food waste. Food in the landfills rots and produces methane gas (CH4), which is the second most prevalent greenhouse gas in the United States. Methane has 20 times greater impact on climate change than carbon dioxide over a 100-year period. Hall et al. estimates that total food loss in the United States requires an expenditure of over 25 percent of U.S. freshwater consumption, used in farming, and four percent of total U.S. oil consumption, required for transporting foods.

In addition to environmental impacts, food waste has economical impacts as well. Food waste in the United States averages $100 billion per year in losses with about $35 billion occurring in the commercial and retail sector and $20 billion occurring in the farming and food processing industry. In 2010, the average cost of food loss in the United States per capita was between $400 and $522 per year, which equates to over $1 each day spent on food that goes uneaten.

Social concerns are also associated with the issue of food waste. Over 802 million Americans are food insecure which is defined as when the food intake of one or more household members is reduced and eating patterns are disrupted at times of the year because the household lacks money and other resources for food. The government has implemented programs and laws to reduce food waste in institutions such as the “Food Recovery Challenge” and the “Good Samaritan Act”. The “Food Recovery Challenge” is a program for businesses or organizations, which aims to reduce food waste by providing incentives such as national recognition and free resources to conduct waste assessments. The “Good Samaritan Act” was passed in 1996 with the goal of protecting organizations that donate foods, which would otherwise be wasted, to non-profit organizations. Yet both of these programs are highly underused, with only 889 organizations participating in the Food Recovery Challenge in 2014.

theological and philosophical perspectives

In a conversation with Sr. Amata Miller, IHM (October 2014), Catholic Social Teaching (CST) was discussed as a framework that is used by, not only the Catholic tradition, but also many people to assess social issues including the issues of hunger and food waste. The tenants can be categorized differently, resulting in varying total number of CST principles. The basic CST principles include: Human Dignity, Community/Common Good, Rights and Responsibilities, Priority for the Poor and Vulnerable, Participation, Dignity of Work/Worker’s Rights, Solidarity, Stewardship, Governance/Subsidiarity, and Promotion of Peace. There are several principles that can be applied to food matters.

The fundamental principle of CST is the dignity of the human person and all of the tenants stem from this principle. This principle states that each person has a dignity, a right to life, and a right to the things that are necessary to life. One of the most basic needs of life is food and water. With the problem of food insecurity and worldwide hunger, it is clear that this first principle of CST is not being met. Only when people recognize the dignity of each person, will they care to work for just institutions.

Another principle is that of “solidarity”, or brotherhood, which recognizes the interdependence of the human race. We are all related, from our local communities to those living across the world. The principle of the “common good”, which states that the members of a community have a responsibility to ensure that every person’s basic needs are met, is applicable to food distribution and waste. To achieve the common good, distributive justice should be used. Distributive justice states that a society should share all resources, including wealth, land, power, and food. The problem of world hunger is not one of production, but rather of distribution.

A fourth principle of CST that applies to hunger and food waste is that of the “universal purpose of material things” which states that everything is a gift and is meant to be shared for the good of all. This directly relates to
food and hunger because the wasted food is not being treated as a gift, but rather an indispensable object. If we took the principle of “universal purpose of material things” seriously, then food would be considered a gift and it would be shared so that no person would go hungry.

The principle of “subsidiarity”, which states that decisions should be made as much as possible by those most affected by the decision, is applicable to food and hunger. The local food movement is a prime example of this concept because it reduces the amount of people involved in the production and purchasing of foods. Closely related to this are the principles of “transformation of social institutions” and “responsibility” for society. Injustice, as in food waste and hunger, can only be changed by a transformation of the culture and society regarding food production, processing, and distribution. This transformation can only happen through the action of responsible peoples who will work to ensure just societies and systems.

CST is a framework that is helpful in understanding the issue of food waste and hunger through a moral framework. The underlying principle is that of the dignity of the human person, which we all have as children of God. Hunger and food waste are problems in the United States and throughout the world, but the daunting question remains of how to resolve them. Maintaining a spirit of hope is essential when it comes to reforming societies in order to become more just. CST encourages individuals to remain grounded in God’s dream of a kingdom of justice and to work for small changes that will bring more peace and dignity to all people.

While Catholic Social Teaching can provide one framework for looking at the problem of hunger and food waste, another perspective is that of consumerism. Miller describes a consumer culture as “a situation in which elements of culture are readily commodified.” Food is one such commodity, where “elaborate rituals of planting, harvesting, preparation, and sharing are stripped to their elemental form, reduced to the crude consumption of purchased foodstuffs.” Miller explains how supermarkets enforce a mentality of commodification by having shelves of products, which “compete with each other for our attention.” The commodification of foods is not limited to supermarkets, but nearly every foodservice facility contributes to this culture as well. Miller explains that commodities hide the conditions of production, in which the purchaser has no idea where the products came from nor has any connection to the farmer. The result is that the food has no meaning to the person. Treating food as a commodity can easily lead someone to dispose of it without any thought about the “calloused hands and stooped backs of the workers,” which produced the items.

Commodification can take two forms: completely and incompletely commodified, as Margaret Jane Radin describes in Contested Commodities. Completely commodified objects are limited to market exchange and the worth of the item is reduced to merely a price tag. Incompletely commodified objects include those that simultaneously have both a market and non-market value. For example, home ownership, could be labeled as incompletely commodified. While the “home” holds value: memories and comfort, the insurance and mortgage payments result in the object viewed as merely a “house”. Consider grocery stores, where food must be somewhat commodified for the business to be sustained. Yet, the value of food, as related to labor, processing, family, traditions, and health, must be retained for food to have any meaning. In a consumerist culture, more aspects of life (work, health care, education, etc.) are becoming completely commodified and their worth is reduced to a market price. Food is quickly becoming more commodified, for a consumer culture that does not view food waste as a problem, identifies food as merely something with a price.

food waste in university settings and targeting the population

In university settings across the U.S., about 3.6 million tons of food is wasted annually. A food waste study completed at Kansas State University sought to understand the effectiveness of two different kinds of educational messages. Baseline food waste was collected for six weeks before the messages were implemented. First, a prompt-style message was posted in the facility for two weeks followed by a feedback-based message that was posted for two weeks. The simple prompt-style messages resulted in a food waste reduction of 15 percent. The following feedback-based messages did not stimulate further waste reduction. Whitehair et al. found that an average of 32
pounds of food was wasted per person per semester\textsuperscript{11}. In the conclusions of their study, Whitehair et al. suggested the use of technology as a means of disseminating educational messages to young adults.

Technology has rapidly been developing across the globe and smartphones have become a primary means of communication. In the United States, 95\% of Americans have a mobile phone subscription. After the second quarter of 2013, over 432 million smartphones were shipped worldwide\textsuperscript{12}. Specifically, the young adult population has increased their use of smartphones, as evidenced by an increase from 41\% of young adults owning a smartphone in 2010 to 62\% in 2011\textsuperscript{13}. Smartphone applications, or “apps” are popular among young adults and allow users to easily and quickly access various kinds of programs, including games, books, finance, religious, and music.

Educational information can be developed using different theories or models to guide message construction. Theories, such as Reasoned Action and Theory of Planned Behavior, describe whether a person implements a recommended behavior or if they abstain from a non-recommended health behavior. Factors such as knowledge, beliefs, locus of control, and self-efficacy have been shown to impact behavior adaptation\textsuperscript{14}. The Social Ecological Model and Social Cognitive Theory are two models that describe the various factors that influence a person’s decisions. Specifically, these factors include individual, relational, communal, and societal\textsuperscript{15}. These models have provided the theoretical framework for understanding behaviors of individuals, such as eating and physical activity, when utilized in intervention research.

A growing body of research focused on food waste has been conducted in university settings, yet additional work is needed to understand food waste perceptions and behaviors of young adults. This study aimed to determine university student knowledge, attitudes, and behaviors about food waste and to evaluate the impact of a text message based educational intervention on individual food waste. Secondary aims of the project included to gain an understanding of the relationship between at-home food experiences and food waste behaviors and attitudes and to understand the relationship between spirituality and food waste behaviors and attitudes.

**METHODOLOGY**

study design and protocol

This study was approved by the Saint Catherine University Institutional Review Board and participants provided informed consent before beginning the study. The study included the following steps: development of the survey instrument, recruitment of participants, baseline data collection (survey and food waste), development and implementation of a text message intervention, post-intervention data collection (survey and food waste), and post-intervention individual interviews. Data collection took place from September-December 2014.

development of the survey instrument

The Social Ecological Model and Social Cognitive Theory provided the theoretical framework for construction of the survey instrument used in this study. The survey was developed in Qualtrics\textsuperscript{16} and contained validated survey questions identified from the literature including those used by Whitehair et al.\textsuperscript{11} and Quested et al.\textsuperscript{17}, as well as newly created study specific questions. The baseline survey contained a total of 25 questions and participants completed the survey in about 10 minutes. Questions targeted the following categories: environmental sustainability, dining habits, at home food experiences, cell phone usage, and the relationship between food and spirituality. Demographic questions were also included at the end of the survey.

study sample

A convenience sample of undergraduate university students at a mid-west college for women (n=55) were recruited during fall 2014. Inclusion criteria for participation in the study required that students lived on campus and had a
meal plan. Recruitment methods included posting flyers around campus buildings and in the dining facility, tabling outside of the dining facility, and sending email messages to eligible participants, through contacts with Residence Life staff on campus. Informed consent was obtained from participants during the tabling event in the cafeteria in September 2014. No incentives were provided to participants for their involvement in the study.

baseline data collection

A baseline survey was disseminated using Qualtrics in October 2014. Participants were allotted one week to complete the online survey. Email reminders were sent to participants who had not completed the survey within the first five days of survey dissemination. The survey was closed after two weeks of distribution. Baseline food waste was collected on two consecutive days over the lunch and dinner service hours in October 2014. Arrangements were made with the campus foodservice director prior to data collection. Participants were notified of the specified waste collection days through an email message and anonymous text message. Trained research assistants were located at the point of sale and participants were directed to meet the assistant to receive instructions on the food waste protocol. The research assistant provided the participant with a study ID card, which the participant was to leave on their tray. The research assistant also noted the foods and liquids that were on the tray of each participant. When the participant was finished eating, they were asked to bring their tray with the ID card to the tray drop-off carrousel where the food waste would be weighed. After the participant was finished eating, they brought their tray to the weight station where a calibrated scale was used to measure the amount of edible food waste. All edible food waste and beverages other than water were weighed and recorded. Items not weighed include peels, cores, and bones. If there was negligible waste (such as remaining sauces and condiments) or if there was no waste, the participant received a waste amount of zero. The waste was removed and the scale was tared after each measurement was obtained.

intervention development and implementation

Four educational text messages were disseminated to participants using cell phone technology over a 4-week period. The messages focused on four food waste themes identified from the baseline survey results: “environmental effects”, “use-by-dates on food”¹⁸, “impact of one person”, and “make a change”. The content of the messages were as follows: (1) “US food waste occupies the most landfill space (21%). Consider that 3.6 million tons of food are wasted each year in university settings.” (2) “Use-by” dates refer to best quality and aren’t required by law. If you store food properly, it will likely be safe after the “use-by” date.” (3) “802 million Americans are food insecure with reduced food quality and variety. Make small changes: compost food scraps, eat leftover food.” and (4) “Campus dining facilities are a large source of food waste. Advocate for sustainable practices on campus: go trayless, donate leftover food.” The four text messages were disseminated using “Remind”¹⁹, an online program that anonymously sends text messages to registered participants. The educational messages were disseminated each Monday throughout the month of November 2014; one message distributed per week.

post-intervention data collection

The post-intervention survey included the same questions from the baseline survey with the addition of eleven questions that addressed spirituality in relation to food waste, behaviors while dining with others, and effectiveness of the text message intervention. The survey was disseminated in December 2014 to participants using Qualtrics and participants had one week to complete the survey. Email reminders were sent to participants who had not completed the survey within the first five days of survey dissemination. The survey was closed after two weeks of distribution.
Post-intervention food waste collection followed the same procedure as at baseline. All edible food waste and liquids other than water were weighed using a calibrated scale and recorded. If no waste was observed, the participant’s waste was recorded as zero.

individual interviews

Individual interviews (n=7) with a subset of interested participants were conducted after the post-intervention waste collection and survey administration was completed. A private time and meeting space was arranged for the interviews, which lasted between 20-45 minutes. Interview questions addressed sustainability knowledge and attitudes, home influence on food waste behaviors, effectiveness of the intervention text messages, and modification of eating behaviors that may have occurred during data collection. Each interview was recorded and transcribed verbatim and analyzed to generate themes.

analytical procedures

Data were analyzed using SPSS (version 22.0, SPSS Inc, Chicago, IL, 2013). Statistical significance was set at p<0.05. Individual interviews were analyzed using qualitative analytical procedures to determine themes.

RESULTS

demographic characteristics of the sample

A convenience sample of female students (n=55) enrolled at a private college for women in the Midwest participated in the study. The majority of the participants were White (63%) with a mean age of 19 years. Slightly more than half (56%) reported being a first-year student living on campus and had the largest or second largest meal plan offered (87.5%). Participants reported eating in the campus dining facility three or more times per day on Tuesdays, Wednesdays, and Thursdays during fall semester 2014. All students reported owning a cell phone of which 88% were smartphones. Cell phone services most often used by participants (over 10 times per day) included sending text messages, checking social media sites, and checking email versus making phone calls and taking pictures (1-4 times per day).

knowledge, attitudes and behaviors regarding food waste

A majority of the surveyed students (70.7%) reported that environmental sustainability is important to them, but only 51.2% rated their knowledge of environmental sustainability as excellent. Table 1. shows responses from selected survey questions at baseline and post-intervention. The only significant survey change from baseline-post intervention was the use of a grocery list, with fewer participants reporting the use of a grocery list at post-intervention. Additionally, there were more participants at post-intervention who agreed that a person’s efforts to decrease food waste can improve world hunger, though the difference was not significant. In general, participant knowledge and sustainability attitudes improved from baseline to post-intervention.

table 1. changes in university students’ knowledge, attitudes and behaviors pertaining to food waste and environmental sustainability issues

<table>
<thead>
<tr>
<th>Survey question</th>
<th>Range</th>
<th>n</th>
<th>Mean Baseline</th>
<th>SD</th>
<th>Mean Post-Intervention</th>
<th>SD</th>
<th>Change from baseline</th>
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<th>P value for differences</th>
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<tr>
<td>My understanding of environmental</td>
<td>0-5&lt;sup&gt;†&lt;/sup&gt;</td>
<td>27</td>
<td>3.52</td>
<td>.75</td>
<td>3.66</td>
<td>.88</td>
<td>.15</td>
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<td>0.21</td>
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<td>sustainability is excellent.</td>
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<td>Environmental sustainability is very</td>
<td>0-5&lt;sup&gt;†&lt;/sup&gt;</td>
<td>27</td>
<td>4.22</td>
<td>.75</td>
<td>4.33</td>
<td>.68</td>
<td>.11</td>
<td>.51</td>
<td>0.26</td>
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<td>important to me.</td>
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<tr>
<td>Leaving uneaten food on my dining tray</td>
<td>0-5&lt;sup&gt;†&lt;/sup&gt;</td>
<td>27</td>
<td>4.0</td>
<td>.56</td>
<td>4.11</td>
<td>.64</td>
<td>.64</td>
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<td>has a negative effect on the environment.</td>
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<td>I feel the dining facility has a large</td>
<td>0-5&lt;sup&gt;†&lt;/sup&gt;</td>
<td>27</td>
<td>4.48</td>
<td>.64</td>
<td>4.40</td>
<td>.636</td>
<td>-.07</td>
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<td>amount of food thrown out on student</td>
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<td>I believe it is wrong to waste food when</td>
<td>0-5&lt;sup&gt;†&lt;/sup&gt;</td>
<td>27</td>
<td>4.59</td>
<td>.50</td>
<td>4.51</td>
<td>.64</td>
<td>-.07</td>
<td>.55</td>
<td>0.49</td>
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<td>there are so many hungry people in the</td>
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<td>world.</td>
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<td>I feel one person’s food waste can have a</td>
<td>0-5&lt;sup&gt;†&lt;/sup&gt;</td>
<td>27</td>
<td>3.85</td>
<td>.66</td>
<td>3.96</td>
<td>.71</td>
<td>.11</td>
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<td>I feel one person’s efforts to decrease</td>
<td>0-5&lt;sup&gt;†&lt;/sup&gt;</td>
<td>27</td>
<td>3.77</td>
<td>1.01</td>
<td>4.14</td>
<td>.86</td>
<td>.37</td>
<td>1.11</td>
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<td>food waste can assist in improving world</td>
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<td>hunger.</td>
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<td>I believe the dining facility should</td>
<td>0-5&lt;sup&gt;†&lt;/sup&gt;</td>
<td>27</td>
<td>4.37</td>
<td>.69</td>
<td>4.40</td>
<td>.69</td>
<td>.04</td>
<td>.71</td>
<td>0.78</td>
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<td>implement more programs on environmental</td>
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<td>sustainability.</td>
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<tr>
<td>I use a grocery list when shopping.</td>
<td>0-5&lt;sup&gt;†&lt;/sup&gt;</td>
<td>26</td>
<td>3.57</td>
<td>1.06</td>
<td>3.30</td>
<td>1.40</td>
<td>-.27</td>
<td>.67</td>
<td>0.05*</td>
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</tbody>
</table>
I plan most of my meals before going grocery shopping.  

<table>
<thead>
<tr>
<th></th>
<th>0-5</th>
<th>26</th>
<th>.98</th>
<th>2.57</th>
<th>1.06</th>
<th>-.04</th>
<th>.87</th>
<th>0.82</th>
</tr>
</thead>
</table>

I check the levels of food in the cupboards and fridge before going grocery shopping.  

<table>
<thead>
<tr>
<th></th>
<th>0-5</th>
<th>25</th>
<th>1.05</th>
<th>3.92</th>
<th>1.07</th>
<th>.16</th>
<th>.80</th>
<th>0.32</th>
</tr>
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</table>

I freeze foods to extend their shelf life.  

<table>
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<tr>
<th></th>
<th>0-5</th>
<th>25</th>
<th>.898</th>
<th>3.68</th>
<th>1.06</th>
<th>-.160</th>
<th>.986</th>
<th>0.42</th>
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I follow the use-by-dates on purchased food products.  

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<th></th>
<th>0-5</th>
<th>26</th>
<th>.744</th>
<th>3.92</th>
<th>.890</th>
<th>.00</th>
<th>.632</th>
<th>1.0</th>
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I keep leftover foods.  

<table>
<thead>
<tr>
<th></th>
<th>0-5</th>
<th>26</th>
<th>.870</th>
<th>4.00</th>
<th>1.01</th>
<th>-.038</th>
<th>1.07</th>
<th>0.85</th>
</tr>
</thead>
</table>

SD, standard deviation  

*Significant baseline/post intervention difference: p < 0.05  
1 Response options: Strongly disagree, disagree, neutral, agree, strongly agree  
2 Response options: Never, rarely, sometimes, often, all of the time  
3 Difference=Post intervention - Baseline

Of the participants who completed the post-intervention survey, 92% (n=24) responded that they received the text messages from the study, and 63% (n=15) stated that they read all four messages. Yet, only 8% (n=2) said that they shared the information from the messages with another person.

Baseline to post-intervention food waste difference was 8.34 grams (n=32, p=0.42). The majority of participants at baseline and post-intervention had less than 50 grams of waste. Table 2. shows the percentage of participants with the designated amount of plate waste at baseline and post-intervention.

Table 2. grams plate waste at baseline and post-intervention

<table>
<thead>
<tr>
<th>Grams plate waste</th>
<th>Baseline (n=39)</th>
<th>Post-intervention (n=32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0g</td>
<td>49%</td>
<td>50%</td>
</tr>
<tr>
<td>1-50g</td>
<td>33%</td>
<td>22%</td>
</tr>
<tr>
<td>&gt; 51g</td>
<td>18%</td>
<td>28%</td>
</tr>
</tbody>
</table>

post-intervention individual interviews

Five themes emerged from the post-intervention individual interviews: (1) “we only have one earth”, (2) “family influences food habits”, (3) “eating with other people takes time, but builds community”, (4) “mindful of food selection on weigh days”, and (5) “mixed reviews of text messages”. Selected quotes from participants representative of each theme are depicted in Table 3.

Table 3. themes identified and corresponding quotations from individual interviews (n=7)
<table>
<thead>
<tr>
<th>Theme</th>
<th>Participant Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>We only have one earth</td>
<td>“We should take care of the environment cause it’s the only one we have.”</td>
</tr>
<tr>
<td></td>
<td>“We need to protect our earth because we only have one earth.”</td>
</tr>
<tr>
<td>Family influences food habits</td>
<td>“I think family has an influence because if you’re living at home you eat what your family eats...and if your family doesn’t save leftovers, well then you don’t save leftovers, and you like learn from your family.”</td>
</tr>
<tr>
<td></td>
<td>“Me and my family, we really, really try to not waste food and I do the same here. Like, I’ll usually eat all my plate...even if I don’t like it from the cafeteria, because that was like what I’ve always done.”</td>
</tr>
<tr>
<td>Eating with others takes more time, sense of community</td>
<td>“I like eating with other people, it’s a lot more pleasant experience. It’s like a sense of community.”</td>
</tr>
<tr>
<td></td>
<td>“[Eating together with people] gives me a sense of belonging.”</td>
</tr>
<tr>
<td></td>
<td>“I love the social aspect of food...it take a long time...cause you’re sitting with somebody and then after you’re done eating, you want to talk for longer.”</td>
</tr>
<tr>
<td>Mindful of food selection on weigh days</td>
<td>“[I was] aware of what I choose too, cause… I don’t want to choose something that I don’t like to eat cause if I eat that, I know for sure that I’m not going to finish it.”</td>
</tr>
<tr>
<td></td>
<td>“I was kind of more mindful of what I picked to make sure that I would like it, just in case.”</td>
</tr>
<tr>
<td>Mixed reviews of the text messages</td>
<td>“I was already in the habit of like not wasting food and not throwing stuff away, so it was ineffective to me.”</td>
</tr>
<tr>
<td></td>
<td>“I liked the information presented...it was really quick, you had it as like a reference if you wanted to go back and read it.”</td>
</tr>
<tr>
<td></td>
<td>“I don’t really know if they were effective...I feel like [the texting] kinda just makes it like background.”</td>
</tr>
</tbody>
</table>

**DISCUSSION**

This study examined the knowledge, attitudes, and behaviors about food waste of female college students and the impact of a text message educational intervention on individual food waste. Results from this study showed that no significant changes were observed in food waste knowledge, attitudes, and behaviors of participants. Responses from individual interviews showed that participants are concerned about the environment, their family and home-
environment affects their food waste habits, and there were mixed reviews regarding the effectiveness of the text message intervention. Because the baseline responses regarding concern for environmental and sustainability issues were high, there was little room for attitudes to increase further. Survey results showed that the majority of participants frequently use text messaging, making the use of text messaging a viable means of communication and message dissemination. Yet, the messages from this study were not engaging enough for participants to share the information with others. The use of text messaging as a way to convey educational information to young adults is very appropriate, but the messages must be relevant and memorable to resonate with this target population.

This study had several limitations. One such limitation is that menu items differed at baseline and post-intervention, despite efforts to maintain the same menus on each data collection day. The nature of the meal plans is such that students’ meal points cannot roll-over to the next semester, thus food purchases may have been higher at post-intervention than at baseline. The first-year participants are required to have the largest meal plan and therefore may have had many points remaining at post-intervention, which was conducted two weeks before the end of the fall semester. Having meal points to use up may have resulted in more waste since the participants bought more food items but did not want to consume all the purchased foods. Another limitation is that the dining facility is an a-la-carte style, where each item must be paid for. If a student doesn’t like the item that they have purchased, they must pay for another item if they want to replace the unfavorable food. If a participant did not like the menu item of the day, they may have: purchased a new item and discarded the old, tossed the item, or eaten the item regardless of their preference. Furthermore, individual interviews concluded that participants were more selective of food choices on data collection days, which may have decreased the total plate waste collected than would normally be seen in the dining facility on a regular basis. These variables would affect the food waste collected.

This study utilized a small sample of college-aged women and had low participant follow-through during the entirety of the project. This could be due to the commitment required of participants, in that they were asked to come to the dining facility on specified days and times. Scheduling, dining preferences, and available meal points may have contributed to the low participation and participant follow-through.

CONCLUSIONS AND IMPLICATIONS

Results from this study provide evidence that additional research is needed to determine the overall effectiveness of a text-message based educational intervention targeting young adults. There is some evidence indicating that families and at-home food experiences influence food waste behaviors of university students in the campus dining facility. The relationship between spirituality and food waste behaviors is likely complex and requires further investigation. Future research should include a larger more diverse sample and contain additional waste collection days to provide a more comprehensive view of student food waste behaviors. Also, of interest would be to measure the food waste at a dining facility where the meal plan consists of meal points that can be used to purchase a-la-carte items versus a facility with a meal plan that limits the student to a specific number of meals purchased in an all-you-can-eat facility. Future studies could also include the use of newer technology, such as the use of social media sites.

ACKNOWLEDGEMENTS

The author wishes to express her appreciation to the St. Catherine University Antonian Scholars Honors Program for supporting this project. In addition thanks to the faculty advisors Dr. Teri Burgess-Champoux, Professor Deb Sheats, Dr. Michael Naughton, and Elizabeth Ellwanger-Kollasch; research assistants Kayla Guerrero, Lauren Lund, Anna Marsh, and Lindsey Smith; and student participants. All interpretations of the present study are those of the author.
REFERENCES

Acknowledgements

This project could not have been possible without the support of numerous people who have guided me and supported me over the past twelve months. I first must thank my mentor Dr. Teri Burgess-Champoux, who has taught me about the research process and has supported me through every step of the process. Her insight and encouragement has helped me to continue throughout the project. In addition, a huge thanks to my other supportive committee members: Professor Deb Sheats, Dr. Michael Naughton, Elizabeth Ellwanger-Kollasch, and Ryan Sinn. They have helped me to maintain a focused and cohesive project. Sr. Amata Miller, IHM has also provided me with information regarding Catholic Social Teaching to enhance my project.

Furthermore, I thank the many others who have been a part of this project. Brian Dusbiber who provided Qualtrics training during the summer and was a contact person for questions regarding the program use. Thanks to my student research assistants, St. Catherine University Residence Life, the dining facility’s Sodexo staff, St. Catherine IRB, and the Nutrition and Exercise Sciences Department. In addition, thanks to my student participants. Thanks to Gayle Gaskill, the honors program director of St. Catherine University, who kept me on schedule and encouraged me to continue working towards the completion of the project. Finally, thanks to my family who supported me throughout the semester, encouraging me in my pursuits and supporting me in all my endeavors.
Project Experience

Research Process

Throughout the research process, I learned many things about executing a well-designed research project. Primarily, I learned about the importance of attention to details. Prior to beginning the project, I did not realize the depth of research and the required management of the many moving parts of a fluid project. Organization was essential to the execution of this project and regular meetings with my advisor were critical to the gradual progression of the project. Keeping in constant communication with my committee members and informing them of my progress was something that I learned was also important to the completion of a well thought out project.

I learned a lot about myself during this process. There were moments where I felt lost and there were moments where I felt totally confident in my abilities and progress. I was pushed to limits that I never knew I could go to, with the support of my family and the encouragement and guidance of my committee members. There were long days collecting and analyzing data and preparing and practicing for the final presentation. Amidst all of my other activities, I had moments where I doubted if I would ever finish. I learned that I am more of a qualitative person, rather than quantitative, for I really enjoyed conducting the interviews, but struggled to find motivation to analyze the survey results. I also learned that I like to do things thoroughly and well, not wanting to produce anything that is sub-par.

Challenges

From the beginning of the project back in the summer of 2014, I experienced various road bumps along the way. Challenges aren’t the most welcomed in the heat of the moment, but looking back, the road bumps were opportunities to problem-solve and learn how to overcome the situations. Some specific problems I experienced include the use of Qualtrics, participant recruitment and follow-through, and experiencing feelings of an unsuccessful project.

Using Qualtrics for the first time, I was not completely familiar with the process of distributing online surveys. Because of this unfamiliarity, I sent out a test survey to a group of about 20 participants without having a way to identify each participant. In turn, this left me unable to send the survey a second time to the same persons so that I could test the survey for internal reliability. Performing this test would have allowed me to establish some credibility to the survey that I used because most of my questions had not previously been tested and were study specific. Therefore, the use of Qualtrics proved to be a challenge for me at the beginning of the project.

Also, I had difficulty recruiting and retaining participants. I knew that this study was going to have a long duration, but I made an effort to create a design that would require little time commitment from my participants. Despite my efforts, I think that many people were deterred by the fact that they had to be a part of the study throughout the entire fall semester and that they had to come to the cafeteria on specified days and times. It would have been nice to have a larger sample because then the results would have been more representative of the St. Kates student population. Another challenge was maintaining the participant sample throughout the entirety of the project. Because I collected data in October and again in December, few participants remained engaged and active in the study during this time span. Again, a smaller sample size prevents the findings from being generalizable beyond this study.

Another challenge that arose during the study was the feeling of having an unsuccessful project because of the low participation and the increased food waste from baseline to post-intervention, which was not what I expected. There weren’t significant responses from participants to be engaged in the study and the survey responses didn’t change much from baseline to post-intervention. At times, I would experience feelings of exhaustion and I would want to give up working so hard on something that didn’t seem to be having any effect on the participants. Yet, perseverance propelled me to continue and resulted in a successful project.

Successes and Joys
Despite the challenges, I had many successes during this project including having generally positive feedback from the individual interviews and other participants, learning about the interconnections of my passions for both Catholic Studies and food, and recognizing my hard work and reflecting on the comprehensiveness of my project.

The last stage of data collection included conducting individual interviews with seven participants and these were a great success. I had considered not doing the interviews because of time limitations and because I didn’t know if they would be beneficial to the study. Thankfully I did conduct the interviews and gained a lot of information from my participants regarding their food waste behaviors at school and at home, as well as their experience of being in the study. There were moments during the interviews when I would hear participants say something and I would think, “That’s going to be the perfect quote for the project.” I also heard responses that helped me to realize that even if just a few people were affected, some participants were impacted positively by this study. Even at my senior presentation, people would make comments about facts or messages that they took away from my story that showed they learned something valuable. These are little successes from the project.

In addition, I found the integration of food and Catholic Studies to be very interesting and rewarding. The project did not originate from a desire to combine food and Catholic Social Teaching, but the discovery was exciting. Meeting with Sr. Amata Miller and Dr. Naughton provided me with the groundwork that I needed to establish the connection between food and Catholic Social Teaching and Catholic Social Thought. I was grateful for the opportunity to share these ideas with my audience, to be able to educate them on the principles of Catholic Social Teaching and the value of food beyond a market price.

Finally, it was a great joy to be able to present my work, and in doing so, realizing the amount of discovery I had accomplished throughout this project. In the midst of the project, it’s very easy to forget about all of the time and work that is being spent preparing a well-developed and organized project. But looking back, I realized the amount of work I had accomplished throughout the duration of the project. In addition, I enjoyed sharing all that I had done and learned with my peers and professors at the final presentation. It was truly a joy putting this together and realizing the great depth of knowledge that I have gained from this experience.

Future studies

When I was just beginning the project in April 2014 and was brainstorming about what my project would encompass, I thought that it would be very interesting to compare the food waste of an a-la-carte university cafeteria versus an all-you-can-eat style. To my knowledge, this type of comparison has not yet been done, but I predict that significant differences would be discovered. There have been many studies comparing tray versus tray-less dining facilities and the great impact that going tray less has on reducing food waste. I would be interested to see what the effects are of transitioning from an all-you-can-eat to an a-la-carte style dining facility.

Additional studies should include looking at a larger more diverse sample and testing of the survey instrument. Due to problems with Qualtrics and time limitations, I was unable to test the instrument to see if the study specific questions worded in a way such that the participant understood what was being asked and could respond accordingly. In future studies, it would be beneficial to test the survey to establish validity and reliability. Furthermore, having a more diverse and larger sample would allow for greater generalizability of the findings.

Another area of study could include looking at other sources of food waste and means of reducing food waste in the back and front of the house. While plate waste is a source of food waste, there are many others, with overproduction being one of the most significant, sources of waste. Implementing an intervention to reduce food waste throughout a food service facility could be tested.

In regards to spirituality, dining, and food waste, future studies could further examine the relationship between a person’s religious beliefs and practices and their sustainability attitudes and food waste habits. Additionally, exploring the impact of morals-based versus facts-based messaging interventions could be analyzed. Finally, conducting focus groups with a diverse population addressing food waste and spirituality could provide a better understanding of this relationship.
Conclusion

In conclusion, this project has been a long journey and I have learned a lot about myself throughout the experience. I recognize that with the assistance of many people, I have been able to complete a unique project that looks at a relevant issue through different lenses. I have enjoyed working with my committee members and learning from them. I have been pushed more than I knew that I could and, as the end of this project is in sight, I recognize all that I have put into it and all that I have gained through the experience. As a result of this project, my goal is that readers will remember that: (1) food is something to be shared and valued, not wasted thoughtlessly, (2) it is the responsibility of all people to decrease the amount of food waste, and (3) food is a gift from God and everyone has a right to food. I hope that I have begun the conversation regarding food waste on campus and in the community, and that this conversation would continue so that people would begin to make small changes, eventually resulting in significant reductions of food waste.
Appendix A: Abstracts

National Conference of Undergraduate Research:

In universities across the United States, about 3.6 million tons of food is wasted annually. Food waste accounts for the largest landfill deposit and an average annual loss of $100 billion. Some food waste research has been conducted in university settings, yet additional work is necessary to understand food waste perceptions and behaviors of young adults. Among this population, text messaging is the most common form of mobile communication and an emerging means of education. The primary aim of this pilot study was to determine university student knowledge, attitudes, and behaviors about food waste. The secondary aim was to evaluate the impact of a text message based educational intervention on individual food waste. The survey instrument was developed in Qualtrics using validated questions identified in the literature and additional study specific questions regarding participant food waste knowledge and behaviors. A convenience sample of female university students living on campus with meal plans (n=55) was recruited during fall 2014. At baseline (October 2014) and post intervention (December 2014) participants completed an online survey and individual plate waste was measured by research staff in an al-la-carte cafeteria setting. Educational text messages were disseminated to participants using cell phone technology over a 4-week period and focused on four food waste themes identified from the baseline survey results: environmental effects, use-by-dates on food, impact of one person, and make a change. Data will be analyzed to measure the effectiveness of the educational intervention by assessing the pre/post plate waste differences and changes in knowledge, attitudes and behaviors towards food waste. Participants (mean age= 19 years) were primarily white (63.4%), in their first year at the university (56%) and had either the largest or second largest meal plan offered (87.5%). Mean baseline food waste was 17.9 g (n=39). Baseline data suggest that participants often keep leftovers (80.5%) and follow use-by dates on food packages (70.7%). Environmental sustainability is very important to participants (70.7%) yet only 51.2% reported an excellent understanding of environmental sustainability. Post intervention data collection is in progress. To our knowledge, this novel nutrition education approach targeting food waste knowledge, attitudes, and behaviors of young adults has not been utilized previously. These data will guide development of future research with a larger, more diverse sample and aid in implementing effective waste-reduction strategies in university settings.

Abstract was accepted for oral presentation in April 2015.
Society for Nutrition Education and Behavior:

Title: Assessment of Food Waste Knowledge, Attitudes, and Behaviors of University Students

Objective: To determine university students’ knowledge, attitudes, and behaviors about food waste and evaluate the impact of a text message educational intervention on individual food waste.

Study Design, Setting and Participants, and Intervention: In university settings across the United States, about 3.6 million tons of food is wasted annually. A growing body of research has been conducted in university settings, yet additional work is necessary to understand food waste perceptions and behaviors of young adults. A convenience sample of undergraduate students with meal plans living on campus at a private university for women in Minnesota were recruited during fall 2014 (n=55). Food waste knowledge, behaviors and individual plate waste was measured at baseline and post-intervention. Social Cognitive Theory provided the framework for survey questions. Educational text messages delivered over 4 weeks focused on four food waste themes identified from the baseline survey results.

Outcome Measures and Analysis: Intervention impact was measured using pre-post knowledge, attitudes and behaviors pertaining to food waste and individual food waste measurements.

Results: Baseline survey responses suggest that participants often keep leftovers (80.5%) and follow use-by dates on packages (70.7%). Environmental sustainability is very important to participants (70.7%) yet only 51.2% reported an excellent understanding of environmental sustainability. Student perceptions of the educational text messages were mixed. Pre/post food waste differences were not significantly different (n=32; p=0.42). Data analysis is ongoing.

Conclusions and Implications: Food waste and sustainability are important issues to university students. Food is to be shared and valued, not wasted thoughtlessly. Future research should include a larger, more diverse sample in a variety of university foodservice settings.

Abstract was accepted for poster presentation in July 2015.
PRINCIPLES OF CATHOLIC SOCIAL TEACHING – Ethical Guideposts

Dignity of Every Person – human dignity is the essential foundation of a moral society

Solidarity in Community – to be human is to be a member of societies; we are all one human family in interdependent communities; everyone has a right to participate.

Commitment to the Common Good - co-responsibility for the quality of our society is necessary for us to achieve individual and social goals.

Rights and Responsibilities – my rights carry responsibilities to help guarantee those rights for others.

Universal Purpose of Material Things - all is gift and meant for the good of all; private property is a conditional right carrying moral responsibilities for self and others

Care for Earth/Sustainability - earth is a sacred trust for future generations

Priority for the Poor and Vulnerable – meeting the basic human needs of all has a moral urgency which must have a priority among our values

Transformation of Sinful Social Structures - social justice includes the obligation to work to change structural causes of injustice

Subsidiarity in Governance – no unnecessary hierarchies; decisions should be made as much as is possible by those who are affected by the decisions.

Cooperation rather than Conflict - violence has become too costly; we must learn non-violence and peaceful methods of change

Dignity of Work/Workplace Justice - to work is a basic human right; the dignity of work comes from the dignity of the worker

Active Citizenship - action for justice is a constituent element of love of neighbor; it is critical for a just society;

Spirit of Hope - work for social justice has to be rooted in “God’s dream” of the kingdom of justice and peace for all people.

All of these in combination are essential for a just and humane world for all people.

Amata Miller, IHM - 2/16/11
You are invited to sign up to participate in an on-campus food waste study.

In effort to better understand student’s perceptions, knowledge, and behaviors around food waste, I invite you to participate in a food waste study at St. Catherine University during the Fall semester. The study will include two 15-minute surveys and two food waste analyses. Participants will receive sustainability educational information via text messages throughout the study.

Recruitment for Study Participants will take place on September 30th from 11:00-2:00pm
St. Catherine main dining hall

Questions or concerns may be addressed to the Primary Investigator, Antonian Honors Student, Lynn Luecke
stkatefoodwaste@gmail.com
(319) 290-8971
Appendix D: Survey

Default Question Block

Welcome! You have been invited to participate in a research study entitled “Haste to No Waste: A Multi-Component Food Waste Study in a University Dining Hall”. You were asked to be a participant of this study because you are a student of St. Catherine University and have an on-campus meal plan. Please read the following information. If you have any questions, please ask before consenting to be a participant. This study is being conducted by: Lynn Luecke a senior Antonian Honors student, along with Teri Burgess-Champoux, PhD, RD, LD, in the Department of Nutrition and Exercise Sciences.

Purpose of the study
The purpose of this study is to gather information about your knowledge of, attitudes towards, and behaviors regarding food waste. This information will help in understanding students’ relationships with food waste in an effort to reduce the overall food waste at the St. Catherine University dining facility. A second component of the study is to disseminate sustainability educational information using text messages. In conjunction with the surveys, this will help to measure the impact of smartphone technology on young adult behaviors and knowledge.

Procedure
You will be asked to complete two online surveys that contain questions pertaining to your knowledge of food waste and sustainability, and your behaviors regarding food waste at school and at home. The surveys will each take 10-15 minutes to complete and you will have one week to complete them. You will also be asked to allow the researchers to code and weigh the remaining food on your meal tray on specified days in the St. Catherine University cafeteria. The food weighing will take place on October 13th and 14th at 11:30am-1:15pm and 5:00-7:30pm. You only need to come to one of the weighing times. You will be given a study ID number to identify your tray on data collection days. You will also be asked for your cell phone number so that text messages can be sent to your phone throughout the study. The text messages will only include information pertaining to the study such as sustainability information and the numbers will be securely stored so that only the primary investigator has access to them. The identification numbers, names, and cell phone numbers will be discarded after the data collection is complete.

Benefits or risks involved
This study has minimal risk. Participation in this study will not produce any harm or discomfort greater than that ordinarily encountered in daily life. Possible risks involved include a loss of time and an invasion of privacy. Participants may choose to refrain from answering any survey questions and may refrain from having their food waste collected. There are no direct benefits for participation. Participants might find that their knowledge of food waste and sustainability are increased and their actions might be altered after completing the project.

Confidentiality
The records of this study will be kept private and accessed only by the researchers in a password protected encrypted file. In any publication, personal identification will not be included. All personal information will be stored in a secured office and will be destroyed after the completion of the project.

Participation is voluntary
Participation in this study is completely voluntary. If you decide to not participate in any part of the project, your relations with St. Catherine University or the research team will not be altered. If you choose to participate, you may withdraw from the study at any time. You may choose to leave any question of the survey unanswered. Doing so will not harm the relations previously mentioned.

Contacts and Questions:
The researchers of this study are Lynn Luecke and Teri Burgess-Champoux, PhD, RD, LD. Please ask any questions that you have now. If you have questions later, you are encouraged to contact Lynn at stkatefoodwaste@gmail.com or (319) 290-8971 or Dr. Teri Burgess-Champoux at tburgesschmapoux@stkate.edu or 651-690-8750. If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact Dr. John Schmitt, Chair of the St. Catherine University Institutional Review Board at (651) 690-7739.
You may request a copy of this information to keep for your records.

Statement of Consent:
I have read the above information. I have asked questions and have received answers. At this time, I give consent to participate in the study and complete the survey.

☐ Yes
☐ No

Please use these ideas of environmental sustainability when answering the survey questions:

"Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. Sustainability is important to making sure that we have and will continue to have, the water, materials, and resources to protect human health and our environment." (Source: epa.gov)

"Dining facility" refers to the St. Catherine University main cafeteria.

The following survey questions will address your knowledge and attitudes about environmental sustainability.

Please rate your level of agreement with the following statements about environmental sustainability.

<table>
<thead>
<tr>
<th>My understanding of environmental sustainability is excellent.</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental sustainability is very important to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please rate your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>Leaving uneaten food on my dining tray has a negative effect on the environment.</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel the dining facility has a large amount of food thrown out on student trays.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I believe it is wrong to waste food when there are so many hungry people in the world.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel one person's food waste can have a negative effect on the environment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I feel one person’s efforts to decrease food waste can assist in improving world hunger.
I believe the dining facility should implement more programs on environmental sustainability.

The following questions will address your food preferences at the dining facility.

Please rate your overall level of satisfaction with the food available at the dining facility.

- Very Dissatisfied
- Dissatisfied
- Neutral
- Satisfied
- Very Satisfied

How important is the menu of the day in making your decision to eat at the dining facility?

- Not at all Important
- Very Unimportant
- Neither Important nor Unimportant
- Very Important
- Extremely Important

Please rate the frequency that you choose the following dining options: On a given day, if there is little to no foods that I like in the dining facility, I will...

<table>
<thead>
<tr>
<th>Dining Options</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>All of the Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat in the dining facility regardless.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat in the Pulse.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Get something from the Market Place.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat food from my room.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat at a friend’s room/house.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order food from an off-campus restaurant.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go out to eat at a restaurant off-campus.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Think of your eating habits in the dining facility. Please respond to the following statements with the frequency that you perform the following:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>All of the Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Even if those I am eating with have finished all of their food, I leave uneaten food on my plate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I eat alone, I leave uneaten food on my plate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I choose foods that will be just enough to fill me up.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I choose the same foods as the people I am eating with choose.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following questions will address your behaviors with the "to-go" option from the dining facility.

On an average week, please indicate the frequency that you get food in "to-go" containers in the dining facility.

- Never
- 1-4 times/week
- 5-8 times/week
- Over 15 times/week

When I get food in a "to-go" container, I...

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>All of the Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take it somewhere other than the dining facility to eat.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat it in the dining facility.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use an eco-clam shell (re-usable green container).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use a styrofoam container.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use a paper plate with plastic wrap.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please mark all of the reasons that you get items to-go in the dining facility.
I plan to eat in my room.  
I plan to eat in class.  
I plan to have leftovers and save them for later.  
Other

I do not get food "to-go" because...

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>All of the Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are no to-go containers.</td>
<td></td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>I won't have time to eat the rest of the food.</td>
<td></td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>I have too many meal points and don't need any more food than I already have.</td>
<td></td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

Think of your eating habits at off-campus restaurants. Please respond to the following statements with the frequency that you perform the following:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>All of the Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>I ask for a to-go container even if no one else I am eating with asks for a to-go container.</td>
<td></td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>I ask for a to-go container only if another person I am eating with asks for a to-go container.</td>
<td></td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>I order foods that will be just enough to fill me up.</td>
<td></td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>I order foods because I know that I want to take leftovers home.</td>
<td></td>
<td>✗</td>
<td></td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

Please rate your level of confidence in performing the following:

<table>
<thead>
<tr>
<th></th>
<th>Extremely unconfident</th>
<th>A little unconfident</th>
<th>Neither confident or unconfident</th>
<th>A little confident</th>
<th>Extremely confident</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asking for a to-go container at a restaurant.</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Selecting a meal that will be just the right amount of food to satisfy my hunger.</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

The following questions will address your behaviors and attitudes around food at your home environment.
Please answer the following statements with the frequency that you do the following:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>All of the Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use a grocery list when shopping.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I plan most of my meals before going grocery shopping.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I check the levels of food in the cupboards and fridge before going grocery shopping.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I freeze foods to extend their shelf-life.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I follow the use-by dates on purchased food products.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I keep leftover foods.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Which of the following reasons best explains why throwing away food at home bothers you? (select only one response)

☐ It's a waste of my money.
☐ It's a waste of good food.
☐ It makes me feel guilty.
☐ I can't afford to throw away food.
☐ It's bad for the environment.

The following questions will address spiritual and relational aspects of eating.

Do you pray before meals?

☐ Always
☐ Most of the time
☐ Sometimes
☐ Rarely
☐ Never

How often do you attend a worship service?

☐ Daily
☐ 6-3 days/week
In a typical week, how many meals do you eat...

<table>
<thead>
<tr>
<th></th>
<th>Over 14 meals/week</th>
<th>13-9 meals/week</th>
<th>8-4 meals/week</th>
<th>3 or less meals/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>By yourself</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>With at least one other person</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

When you eat with other people, approximately how much time do you usually spend at the table together eating and talking?

- □ Over 45 minutes
- □ 44-35 minutes
- □ 43-25 minutes
- □ 15-24 minutes
- □ Less than 15 minutes

The following questions ask about your cell phone plan and usage.

Do you have a cell phone?

- □ Yes
- □ No

Is your cellphone a smartphone?

- □ Yes
- □ No
Do you have text messaging services?

☐ Yes
☐ No

How many text messages do you send or receive in an average day?

☐ over 100
☐ 50-99
☐ 25-49
☐ 10-24
☐ 0-9

How often do you use your cellphone for the following services?

<table>
<thead>
<tr>
<th>Service</th>
<th>over 10 times a day</th>
<th>5-9 times a day</th>
<th>1-4 times a day</th>
<th>Never</th>
<th>I don't have this feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making phone calls</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Sending text messages</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Checking social media sites</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Checking e-mail</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Checking/updating your calendar</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Playing games</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Taking pictures</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

The following questions will address the text messaging component of this study.

Did you receive the text messages from this study?

☐ Yes
☐ No
☐ Unsure
How many text messages did you read?
- 0
- 1
- 2
- 3
- 4

Did you share the information from the text message with anyone?
- Yes
- No
- Unsure

Who did you share the information with? (Select all that apply)
- Peer
- Family Member
- Professor
- Mentor
- Co-worker
- Other

How much did the educational messages change your beliefs about food waste?
- A lot
- A little
- No change

How much did the educational messages change your food waste habits?
- A lot
- A little
- No change
What year are you in school?

- First-year
- Second-year
- Third year
- Fourth year
- Graduate student

What meal plan do you currently hold?

- Platinum
- Gold
- Silver
- Bronze

On average, how many times do you eat in the dining facility each day during the fall semester?

<table>
<thead>
<tr>
<th>Day</th>
<th>Three or more</th>
<th>Two</th>
<th>One</th>
<th>Zero</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Which best describes your race? (check all that apply)

- Black or African American
- White
- Alaska Native or American Indian
- Asian
- Native Hawaiian or Pacific Islander
- Other
What is your age? 

What clubs or organizations (on or off campus) are you actively involved in?

Thank you for completing this survey. Your responses are valuable to this study. If you are interested in the results from this study, they will be shared at a presentation during spring semester 2015.
Appendix E: Individual Interview Questions

“Haste to No Waste” Individual Interview Questions: Participant Re-Cap

**Opening questions:** Tell us your name and year in school.

What is your favorite food to get from the dining facility? Why do you like it?

(Behaviors) How often do you eat in the dining facility? What factors determine if you will eat in the dining facility?

(Knowledge, attitudes) What are your feelings about environmental sustainability? Why is environmental sustainability important?

(Behaviors, attitudes) Do you use the reusable eco-clamshells that are provided in the dining facility? Why/why not? (probe for availability, sanitation, cost, increased planning, lack of knowledge) What steps can be taken to increase sustainability in the dining facility?

(Attitudes, behaviors) How much influence did your family have on your food habits? (probe for any spiritual traditions) Can spiritual/moral codes be applied to food waste? (probe for ideas of prayer, dietary restrictions, fellowship, Catholic Social Teaching)

(Behaviors) What kinds of changes do you make to dining behaviors when you eat with other people and alone? (probe for duration of dining, food choices, feelings of satisfaction, pleasure, etc).

(Behaviors) Did having your food waste weighed on data collection days during the “Haste to No Waste” study impact your eating habits? (probe for change in food selection, food consumption, etc.) How did the method affect the traffic in the dining facility?

(Behaviors, knowledge) How effective was the texting system for the sustainability education? What did you learn from the messages that you received? (probe for technical function and educational benefits.)

**Ending question:** The goal of the study was to measure the effectiveness of a cell phone-based education system on reducing food waste in our dining facility. Is there anything else that you would like to add about your experience participating in this study?