Impact of Positive and Negative Messaging on Food Waste in Lower Dining Hall

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Abstract

This study intended to determine the impact of positive and negative messaging on food waste habits of students at Boston College in the Corcoran Commons (Lower) Dining Hall. The International Review Board approved the research proposal and waived the need for signatures to guarantee informed consent. Surveys were given to 150 students over the course of three rounds of research. The plates of each student that completed a survey were photographed and labeled in such a way to remain connected to the survey information and carry no personal data. The photographs were taken and surveys administered while students were in the process of putting their plates on the conveyor belt to the kitchen for waste. During the first round of 50 surveys, no messaging was used in the dining hall. During the second round of 50 surveys, positive messaging was used. During the third round of 50 surveys, negative messaging was used. The photographs were studied to determine the average percent of food wasted by students and to determine the type of food that was wasted. The surveys were used to analyze other qualitative factors that affect food waste habits, such as gender and the degree of concern about climate change. The results of this project do not suggest that messaging, neither positive nor negative, has an effect on food waste habits. Certain error sources, such as the messaging posters being taken down approximately every 24 hours, may have contributed to the lack of statistical significance. With the incorporation of certain improvements to the study and recommendations offered for the dining hall, food waste could be reduced at Boston College. The problem of food waste is of national and international concern. Boston College is advised to take many more preventative measures to reducing post-consumer food waste.

Introduction

Food waste is a global environmental issue that can be, largely, prevented through lifestyle changes of willing consumers. In the United States, 40% of food is wasted, and globally, about 1/3 of all of the food that is produced is wasted (Baldwin: 2015). The United States Department of Agriculture describes food waste as, "when an edible item goes unconsumed, such as food discarded by retailers due to undesirable color or blemishes and plate waste discarded by consumers" (USDA: 2015). According to the documentary *Just Eat It*, part of the problem seems to be that in wealthy societies people want a daily change on their taste buds. This way of life easily translates to college campuses, where students are presented with many different options at

each meal and are attracted to the different tastes. Another challenge to resolving the problem of food waste that would require a lifestyle change has to do with our cosmetic standards for the food we eat (Baldwin: 2015). Large amounts of food are being wasted because people do not like how it looks. In the US, about 90% of the food waste that is created goes straight to a landfill or incinerator rather than going to other more ecologically friendly place, like a composting area (Baldwin: 2015).

EPA Administrator Gina McCarthy and U.S. Department of Agriculture Secretary Tom Vilsack announced that the federal government would enter into partnerships with charitable organizations, faith-based organizations, the private sector and local, state and tribal governments to accomplish this goal. By reducing food loss and waste, the United States is also working to "improve overall food security and conserve our nation's natural resources." In this press release, the EPA stated that "reducing food losses by just 15 percent would provide enough food for more than 25 million Americans every year, helping to sharply reduce incidences of food insecurity for millions" (US EPA: 2015). It is estimated food loss and waste totals up to $161 billion dollars in the United States on retail and consumer levels. Food waste should be looked at an environmental issue, a consumer protection issue, and a matter of public health.

As part of the Menus of Change University Research Collaborative (MCURC), Boston College is looking to reduce food waste on its campus, and in specifically, in Corcoran Commons (Lower) Dining Hall. On BC's campus, each dining hall has a different way of dealing with food waste. In Lower, the dining staff composts all of the pre-consumer and post-consumer waste. However, dining has noticed an excessive amount of food left of the students' plates that reaches the point of needing to be composted. Lower is looking for methods to reduce the amount of food waste that reaches the conveyor belt to be composted. In order to come up with the most effective messaging campaign that will reach the students, this project will analyze the impact of positive and negative messaging campaigns on the habits of students who are eating in Lower. By exploring different messaging that BC Dining could use, the hope is that the findings will decrease the amount of food waste exhibited currently by consumers. The purpose of this research is to better understand the causes for excessive food waste on BC's campus and what messages can be implemented within the dining halls to reduce plate waste. This project will also determine the extent to which the messages impact the amount of food wasted by students. Finally, this study aims to recommend different actions that can be taken by BC Dining to continue this research in a

sustainable direction that would benefit both the dining hall, student consumers, and the environment.

Methods

Before beginning the research, a proposal to the Institutional Review Board was required by the Office of Research Protections at Boston College. The proposal was accepted for a complete waiver of informed consent from all students participating in the study. Students were told that no personal information would be recorded and there would be no way to connect the surveys and photographs taken of their plates back to them individually. Students who were agreeing to participate in the study were encouraged to ask questions about the project and the intentions of the research.

There were three separate rounds of data collection and analysis for this project. The first round of data collection took place prior to distributing any messaging in Lower Dining Hall. This first round of data was focused on surveying 50 students before they played their food on the conveyor belt after their meal. During this time, pictures were taken of the plates of each participant. The pictures were used to determine the percent of the food that was wasted. The percentage of food wasted on the plate was further broken down into specific category of food that was wasted (vegetables and fruit, grains, protein, and other). For example, Figure 1 shows 95% of food wasted, 80% of this waste is grain and 20% is vegetable and fruit waste. Figure 2 shows 50% of food wasted, 100% of waste is vegetable and fruit waste. Figure 3 shows 10% of food wasted, 50% of this waste is grain and 50% is vegetable and fruit waste. Figure 4 shows 0% of food wasted, where the student left no food left on their plate after their meal. (See appendix Figures 1, 2, 3, 4.)

In addition to the photographs, surveys were given to the same 50 students. The survey questions from this portion of the data collection process acted as the standard for the next two rounds of data collection (see appendix Figure 5.) Based on these standards, the change in behavior of students in Lower Dining Hall were measured after the positive messaging was displayed throughout Lower for a week, and then the negative messaging was displayed for another week.

The second part of the data collection took place after the implementation of the positive messaging in Lower (see appendix Figure 6 examples of positive messaging). The positive messaging was displayed on paper sheets, size 8 x 11, that were posted on the walls throughout Lower where students sit to eat. There were three different templates used for the positive messaging. Between the three different templates, there was a total of 15 positive messaging

posters displayed throughout Lower. As with the first round, another 50 students were surveyed with the same questions as stage one in the data collection process, with additional questions that were solely focused on the student's interpretation and attention to the positive messaging provided. The plates of the 50 students that were surveyed were photographed in order to quantify the plate waste from each student to measure the direct effect of the positive messaging on their food waste habits.

For the third and final round of data collection, negative messaging was implemented throughout the seating area in Lower Dining Hall (see appendix Figure 7 examples of negative messaging.) This sequence of data collection and analysis mimicked the process of the second round of data collection. The negative messaging was displayed on paper sheets, size 8 x 11, that were posted on the walls throughout Lower. During the round of negative messaging, posters were also displayed in the dining hall where studnets are standing in line to eat food and waiting in line to purchase their food. Posters were also placed in frames on the tables between students where they sit to eat. There were three different templates that were used for the negative messaging. Between the three different templates, there was a total of 15 negative messaging posters displayed. 50 students were again surveyed with the same questions as round two data collection. The 50 student's plates were photographed in order to quantify the plate waste from each student to measure the direct effect of the negative messaging on their food waste habits.

Once all of the data was collected from a total of 150 students, the data was analyzed in multiple different ways. The data was used to compare and contrast the impact of the positive versus negative messaging, as well as to determine what the overall change was from the primary test group without any messaging at all. In addition to this, the survey questions were analyzed in relation to the amount of food wasted by individuals. Lastly, the photos of plate waste from the 150 students were independently analyzed. The surveys were not used to quantify the amount of food wasted in order to prevent reporting bias from impacting the results. The total average food waste broken down by into categories by different types of food was determined by the researchers photographs. Three separate researchers independently analyzing the photographs. From these independent values, the data was averaged together to find the mean percentages of food waste over each round of messaging. In addition, the three researchers determined the percent of food that was wasted from each different category of food (vegetable & fruit, grain, protein, and other).

Results

The results of this study do not suggest a strong significance between the positive and negative messaging campaigns and the amount of food wasted in Lower Dining Hall. The results of this study cannot say, with a 90% confidence interval, that messaging had an impact on food waste. However, with an 87% confidence interval, we can say that the messaging had an impact on food waste ($p = .134$). Based on the average total food waste determined by looking at the photographs, there was less food wasted during the negative messaging campaign. However, this could be due to many other factors and cannot be directly connected to the messaging campaign.

The study shows that there is no statistically significant result between the amount of food wasted and the type of meal plan that the students have, full meal plan, flex plan, DiningBucks, or using cash or a credit card. We cannot say with 90% confidence that the type of meal plan you have impacts your food waste ($p = .532$).

The study shows that there is no statistically significant result between the amount of food wasted and the degree to which you care about food waste. Although we cannot say with 90% confidence that the degree to which you care has an impact on food waste, we can say with 86% confidence that caring about food waste had an impact on amount of food wasted ($p = .140$).

This study does not show that students who care more about climate change are less likely to waste food. We cannot say with 90% confidence that caring about climate change has an impact on food waste ($p= .740$).

The survey results of this study can be used to clarify qualitative aspects of food waste trends among BC students. The statistically significant results of this study suggest that the gender with which you identify has an impact on the amount of food you waste. The findings suggest that women are more likely to waste food than men ($p=.004$). Another significant aspect of this study is that there is a correlation between the amount of food students waste and the amount of times that students saw the messaging posters. The findings suggest a weak positive correlation between the number of times you see the posters and the amount of food you waste (correlation = .124).

Figure 1. Average total food waste (measured in % of meal on plate wasted) and gender

Gender	Mean total food waste	St. Deviation	St. Error Mean
Female	26.27	22.08	2.53

Male	23.68	17.53	2.04

Figure 2. Average total food waste (in % of plate) in comparison with the messaging campaigns

Messaging Round	Average Total % Waste	Average % Vegetable-Fruit Waste	Average % Grain Waste	Average % Protein Waste	Average % Other Waste
1- No Messaging	28.75	20.33	38.24	14.08	10.42
2- Positive Messaging	22.27	29.03	35.34	8.55	10.14
3- Negative Messaging	20.75	18.89	39.16	12.57	8.72
Total Average (as seen in Figure 2)	23.92	22.75	37.58	11.73	9.76

Figure 3. Percentage of types of food wasted

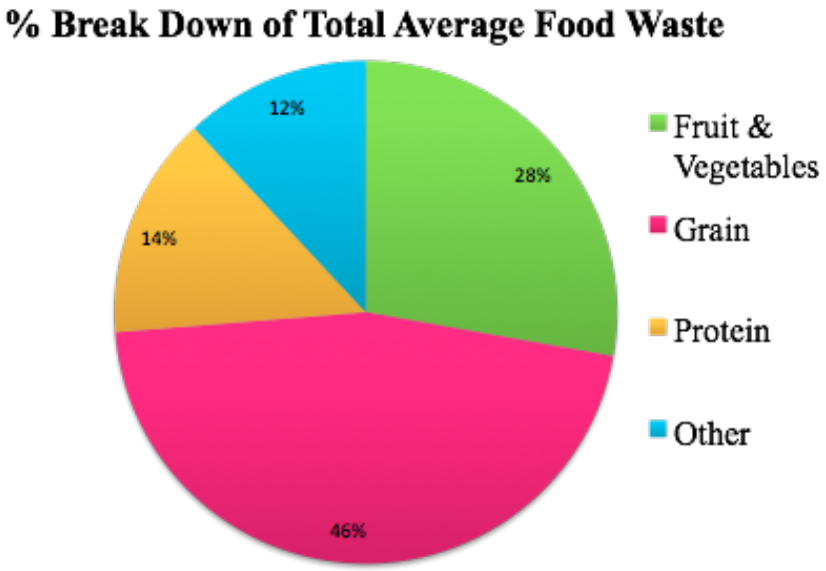
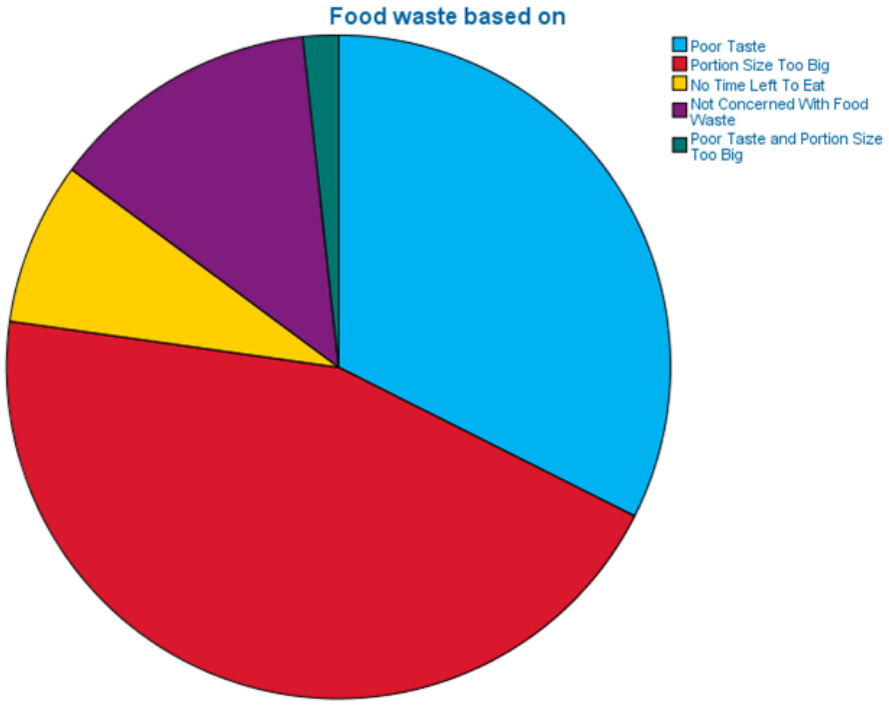


Figure 3. Reasons for wasting food

Food Waste Based On:	Frequency	Percent (as seen in Figure 4)
Poor taste	37	24.7%
Portion size too big	51	34%
No time left to eat	9	6%
Not concerned with food waste	15	10%
Poor taste & Portion size too big	2	1.3%
Missing Data	36	24%
Total	150	100%

Figure 4. Graphic image of reasons why students wasted food



Discussion

These results suggest that neither positive, nor negative, messaging impacts food waste habits of students. However, with an 87% confidence interval, the results suggest that the messaging had an impact on food waste ($p = .134$). There was less food wasted during the negative messaging campaign according to the average total food waste that was determined by looking at photographs. There were many error sources during this project that could have made the negative messaging campaign more successful than the positive messaging campaign. The posters were taken down from the walls on two consecutive days during the positive messaging campaign. There was no way for students to see the messaging unless they were in Lower at very specific times. During the negative messaging campaign, the posters stayed on the walls and the tables throughout the dining hall for almost a week and the messaging remained visible. Another positive aspect of this study is the correlation that exists between the number of times students see the messaging posters and the amount of food that is wasted. There is a weak positive correlation between the amount of food waste and the amount of times that students saw the messaging posters. This suggests that food waste may be reduced by posting the messaging at different places throughout the dining hall to gain more visibility. Many of the recommendations for BC Dining that come from this project have to do with the placement and visibility of messaging, which will be discussed later in the Recommendations section.

The results of the survey suggest that 34% of all food waste is due to the fact that portion sizes were too big, 24.7% of food waste is due to poor taste, 10% of students do not care about food waste, 6% of students ran out of time to eat, and 1.3% of the food waste is because of both poor taste and the portion size was too big. 24% of the students surveyed did not respond to this question because they did not waste any food. Of the food that is wasted, 46% is grain, 28% is vegetables and fruit, 14% is protein, and 12% is other. The findings also suggest that women are more likely to waste food than men. This is reflected in the average percentage of food wasted.

In a study concerning portion sizes titled "Reducing Portion Size Reduces Food Intake and Plate Waste," Marjorie Friendman and Carolina Brochado's work can be used to elaborate on certain results of the food waste study done at Boston College. As was previously mentioned, 34% of total food waste for students at Boston College was due to the fact that the portion sizes were too big, according to Figure 3. Freedman and Brochado conducted similar research to the food

waste project done at Boston College. The researchers conducted a 5-week study in order to determine whether or not decreasing portion sizes would ultimately reduce the amount of food waste at a given university. Freedman and Brochado elaborate on certain results of the food waste study done at Boston College. The research suggests that when the portion size of food at an all-you-can eat dining hall on a college campus is reduced, students do not eat as much food. Therefore, when students eat less food this led to less plate waste and less food production at the university (Freedman: 2012).

In relation to BC's food waste project, the portion size being too large was the most significant cause of "Food Waste Based On" according to Figure 3. Therefore, this suggests that if BC was to make their portion sizes smaller there is the potential to reduce plate waste. However, there are some limitations to Freedman and Brochado's research in relation to Boston College's food waste project. The two researchers stated that they primarily interviewed freshmen because they were the only demographic of student that consistently ate in the dining halls where they were conducting their research. The Boston College food waste project focused on a variety of different grades in comparison. In addition to this, it is unsure whether there is a difference between an all-you-can-eat dining hall compared to the dining hall at Boston College where students pay for individual food items.

In addition to Freedman and Broachdo's research, Steffen Kallbekken and Hakon Saelen (2013) conducted their own food waste research but in a different context. These two researchers specifically focused on hotel restaurants and how to reduce food waste in them. What they found was similar to Freedman and Broachado's research, as well as the food waste study conducted at Boston College. The researchers in this study found that they could reduce 20% of food waste in hotel restaurants by two simple "nudges"- reducing plate size and social cues to the customers (Kallbekken: 2013).

This study elaborates on the research done on food waste at Boston College in two separate aspects. First, the hotel restaurant research found that social cues reduce food waste, as does the research at Boston College. While there may not have been a strong significance between the positive and negative messaging campaigns, there was an 87% confidence interval that messaging had an impact on food waste on Boston College's campus. Kallbekken and Saelen saw similar results in their study. What they found was that by simply giving social cues

to consumers this reduced plate waste (Kallbekken: 2013). In addition to this, their research spoke directly to the Boston College's food waste project in terms of portion size. As was mentioned earlier, 34% of food waste at Boston College was due to large portion sizes. Kallbekken and Saelen's research agreed with these findings, stating that by reducing portion sizes will reduce plate waste. An important aspect about their research is that while it was conducted in solely hotel restaurants, "the findings, at least for the effect of reduced plate size, are likely to be transferable to other contexts" such as schools (Kallbekken: 2013). The researchers statement speaks directly to Boston College's food waste campaign and the findings of the research.

The scholarly article, "Reducing Food Loss and Waste", presents numerous reasons and recommendations for food waste in society today. What the researchers of this article stress is that food waste has both an economic and environmental impact that not many research has begun to address (Lipinski: 2013). One of their recommendations, that the researchers from Boston College food waste project address as well, is to keep a consistent waste measurement tool at all time. In order to understand the problems at hand, it is essential to fully comprehend the situation one is dealing with.

In addition to this recommendation, this research elaborates on the research, results, and recommendations of the Boston College food waste project. As is presented in the results of the Boston College food waste project, there is an 87% confidence interval that messaging has an impact on food waste on Boston College's campus. Lipinski's research acknowledges that it is difficult to change the mentalities of individuals, but a recommendation the researchers suggest is creating consumer awareness campaigns and how they can be effective in reducing food waste (Lipinski: 2013). The researchers found that, "communication campaigns can help influence consumer behavior at the household level" (Lipinski: 2013.) The Boston College food waste project similarly found this in their research, that the negative and positive signs used did have an effect on its viewers, therefore it is essential to continue to use these types of campaigns to reach consumers.

As demonstrated in the results of this Boston College food waste study, female students are projected to waste more of their chosen food from the Lower dining hall than male students. These findings suggest that the portion sizes served at in the dining halls were simply too large for the female students to consume all one hundred percent of. The academic institution fails to

provide students with several portion sizes and, instead, recommends one standard size for all. This method provides the university with an easy "one size fits all" menu for its students but after determining the results of this study this method does not prove to most efficient for the university or for the students. A 2011 academic article similarly found that women consume a fewer daily calories than men as females are more likely to accumulate the energy from calories without expending them. "One possible explanation is that women are more efficient at conserving energy and storing it as fat. Supporting this notion is the recognition that women must reduce their dietary intake by a greater proportion to achieve the same degree of weight loss as men." (Wu, O'Sullivan: 2011)

The food waste and portion size recommendations that arise from this study are in no way focused on female weight loss but rather, the quote above suggests that women simply do not need as many daily calories in order to carry out their metabolic functions. This suggests that women do not need as large of a portion size in order to reach their satiated amount of energy for the day. This demonstrates a problem in the portion size availability within the Boston College dining halls. If there is no option for a reduced portion size then female students will inevitably be forced to select the standard portion size which may be too large for their metabolisms. This fact alone means that there will inevitably be some form of increased food waste from women over men. Once women have reached a point in which they have finished the meal, they have no choice but to dispose of the remaining food if none of their peers is willing to consume it. Based on this fact, Boston College's approach to portion size proves to be an equally unsound economical decision for the university as it is having to spend a waste amount of money on food that will ultimately be wasted. This is also economically unsound for the BC students as they are paying more for food that they are not consuming rather than having a choice in the process and making the decision to opt in to a reduced portion size that may cost slightly less than the regular size.

In 2016, Jordon Lazell from Coventry University in the United Kingdom studied food waste in a university setting in order to determine what solutions might be useful in remedying this growing world concern. Lazell aimed to implement a food sharing system based on the uneaten foods from students around campus. His idea for this system was to use a social media based application to reach university students at times when there was a portion of a food product that had been un-eaten by another student. This sequence of events would progress as

such: “1. User sends message noting what food is available and where it is located including hashtag,” “2. The tool re-tweets the message via hashtag,” “3. Message displayed to all user’s news feeds,” “4. User responds to either reserve the item or indicate that they have picked them up,” “5. The social media tool shows all users that the item is no longer available in the conversation.” (Lazell: 2016) This food distribution platform reflects similar properties to other widely used social media applications such as Facebook, Instagram, or Twitter. Ideally, this would indicate a rapid adoption rate for the application with reduced laggards which can often be an issue when presenting a new format for technology.

Although practical in theory, Lazell’s food waste tool suggestion is one that is extremely complicated and is not truly fixing the food waste issue that society is facing today. This tool is only diverting food waste rather than reducing food waste overall by altering the consumer behavior. The root of Boston College messaging study was to determine which form of messaging would be most effective in altering a student’s food consumption behavior without facing large societal barriers. The Lazell study encountered many difficulties with implementing this tool as it defies many of society’s standards and expectations towards food. “A further vehicle was the visceral way in which consumers interact with food and food waste as well as negotiating trust and the accepted norms of interrupting the linear journey of food into waste such as recirculating and recovering food.” (Lazell: 2016) It is much easier to implement a system that centers around students finishing their individual meals or one that is aimed at altering their initial food selection to a reduced portion size.

Recommendations

Prior to starting data collection, it may be required that the project be approved by the Office of Research Protections (ORP) by completing a proposal to the Institutional Review Board (IRB). This is crucial to consider as certain information collected from subjects may be sensitive to release to the public. This particular food waste study did not collect any personal information about participants and therefore requested a full waiver of consent from the IRB. Although this was necessary for the protection of the participants, this process can severely slow down the timeline of the study due to alterations that are requested from the IRB. These study recommendations ideally should not take very long to alter but do sometimes prove challenging if researchers have a specific idea about how they would like to carry out the study. Seeking IRB approval may also be necessary if the researchers are hoping to publish their findings.

For similar future projects on food waste, it is recommended to retain the three rounds of data collection discussed in the methods section in order to compile a baseline of the food waste without any messaging impact as well as two separate rounds for each type of messaging used. One additional round of data collection should be added for each additional variable that is tested. Ideally, the surveyed population would be more than 50 random candidates in order to have the results be more accurate and telling of the actual food that is being wasted and how the messages are impacting this. Even by sampling 100 candidates per round would help achieve this goal. Although the initial data was collected on paper surveys, it is easier to use iPads or some other form of digital technology that has the capability of timestamping the surveys as well as attaching to the food plate picture to the individual survey. Because the surveys were done on paper, the pictures had to be matched to the correct surveys at a later time leaving more room for error as it can be difficult to match the pictures with the food described by participants.

During the two rounds of messaging surveys, positive and negative, the message displays were placed solely in the eating portion of the dining hall rather than additionally utilizing the section of Lower that actually distributes food to the students. For future studies, it would be beneficial to increase the amount of signage throughout the entire dining hall in order to obtain the most precise data possible. By doing this, the likely that students might actually be exposed to the signage increases significantly and therefore causes less error when collecting the data. The additional locations for the signage might include: on the television screen all throughout lower, above each table rather than select ones, beside each cash register, and on the wall above the cutlery station. These locations are central to getting the attention of students as they are in locations where students will have an increased chance at seeing the messaging due to their prolonged time in these specific locations throughout Lower.

The location of the signage is not the only key component of this study. The length for which the messaging signs were posted is equally as important because this determines a set standard of length for which the posters must be up in order to be seen. It might take an eye a repeated amount of times before it is able to determine and truly grasp what is being said. This is why it is extremely important to carefully determine the amount of time for which the posters are up. During this study, it was very difficult to calculate the length that the flyers would be kept up because of the lack of communication between the Lower dining hall managers and the grounds staff. Without clear communication, this portion of the study will not be carried out properly. While

carrying out a project that requires so many different variables and involves the participation and approval of many different staff members, it is imperative to have explicitly clear communication in order to avoid unforeseen roadblocks. Keeping everyone informed on the specifics of the project is a wonderful way to minimize risks as well as gain feedback on certain aspects that may not be completely feasible.

In addition to posting signage in the Lower dining hall, it would be helpful to run future studies throughout all of the dining facilities on campus. This scope would allow Boston College to determine which dining hall is wasting the most food as well as which dining hall is most receptive to the messaging. This would help determine which location is most beneficial to target with high volumes of messaging after the study is over in order to effectively reduce food waste overall. Based on the 2013 Lipinski study "Reducing Food Loss and Waste," it is also suggested that the dining hall staff members keep a continuous food waste log even after the study has ended in order to track the progress from the messaging. This will make future studies easier to carry out as it allows for a better understanding of the current food waste occurring in these dining halls. If this food waste log is possible, it eliminates the initial data collection round to determine the baseline food waste without any of the messaging in place.

Finally, once the study has been carried out and the results have been delivered, there hopefully is some sort of change that is enacted. This portion of the project relies more heavily on direct action within the dining halls in instilling new food waste management, such as smaller portion sizes, but also requires an increased communications skillset in order to disseminate the findings. If students have the ability to see the direct impacts of their own food waste, they may be more likely to recognize their direct actions and change them. The entire purpose of the study would not be properly executed if change did not somehow result from it but this may be outside of the hands of the researchers and instead, must be taken up by the managerial staff for Boston College dining.

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Appendix

Figure 1. 95% food waste, 90% (of the 95%) grain waste, 10% (of the 95%) Vegetable-Fruit waste

Figure 2. 50% of food waste, 100% (of the 50%) Vegetable-Fruit waste

Figure 3. 10% of waste, 10% Vegetable-Fruit waste, 80% grain waste, 10% Protein waste

Figure 4. 0% of food waste

Figure 5. Student survey

Survey Questions about Food Waste at Boston College

1. Picture taken of plate:

   (time)_____

2. Gender:

   _____

3. Grade:

   ☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior

4. Meal Plan:

   ☐ Full ☐ Flex ☐ DiningBucks ☐ Cash/Credit

5. Meal:

   _____

6. Aware of composting initiative at Lower:

   ☐ Yes ☐ No

7. Do you care about wasting food?

   ☐ Yes, extremely ☐ Moderately ☐ Not very much ☐ Not at all

8. Food wasted on my plate:

   ☐ Vegetables ☐ Meat ☐ Sides ☐ Other:_____

9. Food waste based on:

   ☐ Poor taste ☐ Portion too big ☐ No time left to eat ☐ Don't care about waste

10. Are you more likely to waste food when you have the full meal plan?

    ☐ Yes ☐ No

11. If so, are you likely to use up your full meal plan each semester?

    ☐ Yes ☐ No

12. To what degree are you concerned about climate change?

    ☐ Alarmed about climate change ☐ Concerned about climate change

    ☐ Cautious about the problem ☐ Disengaged with the problem

    ☐ Doubtful that climate change exists ☐ Dismiss idea that climate change could exist

Additional questions for Round 2 & 3 of Data Collection based on the positive and negative messaging:

13. Did you see the posters in the dining hall about food waste?

    ☐ Yes, 3 or more times

    ☐ Yes, 2 times

    ☐ Yes, 1 time

    ☐ Not at all

14. Did the posters impact your decision about wasting food?

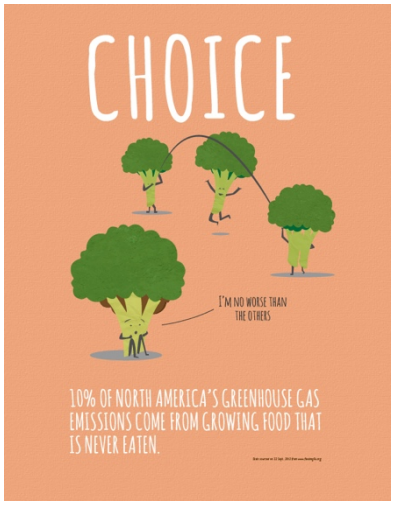
    ☐ Yes, extremely impacted my decision

    ☐ Yes, moderately impacted my decision

    ☐ Did not impact my decision very much

    ☐ No, did not impact my decision at all

Figure 6. Positive Messaging



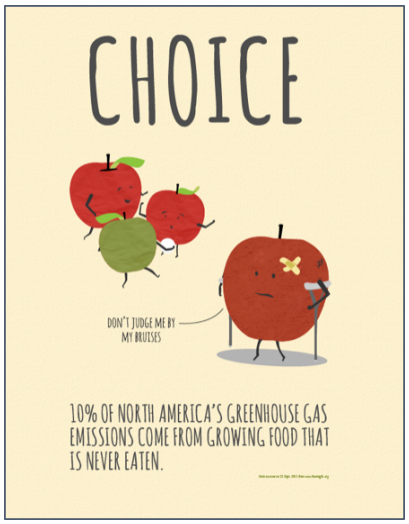


Figure 7. Negative Messaging

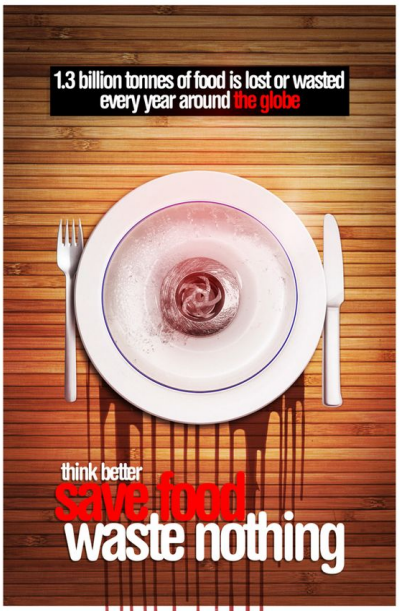
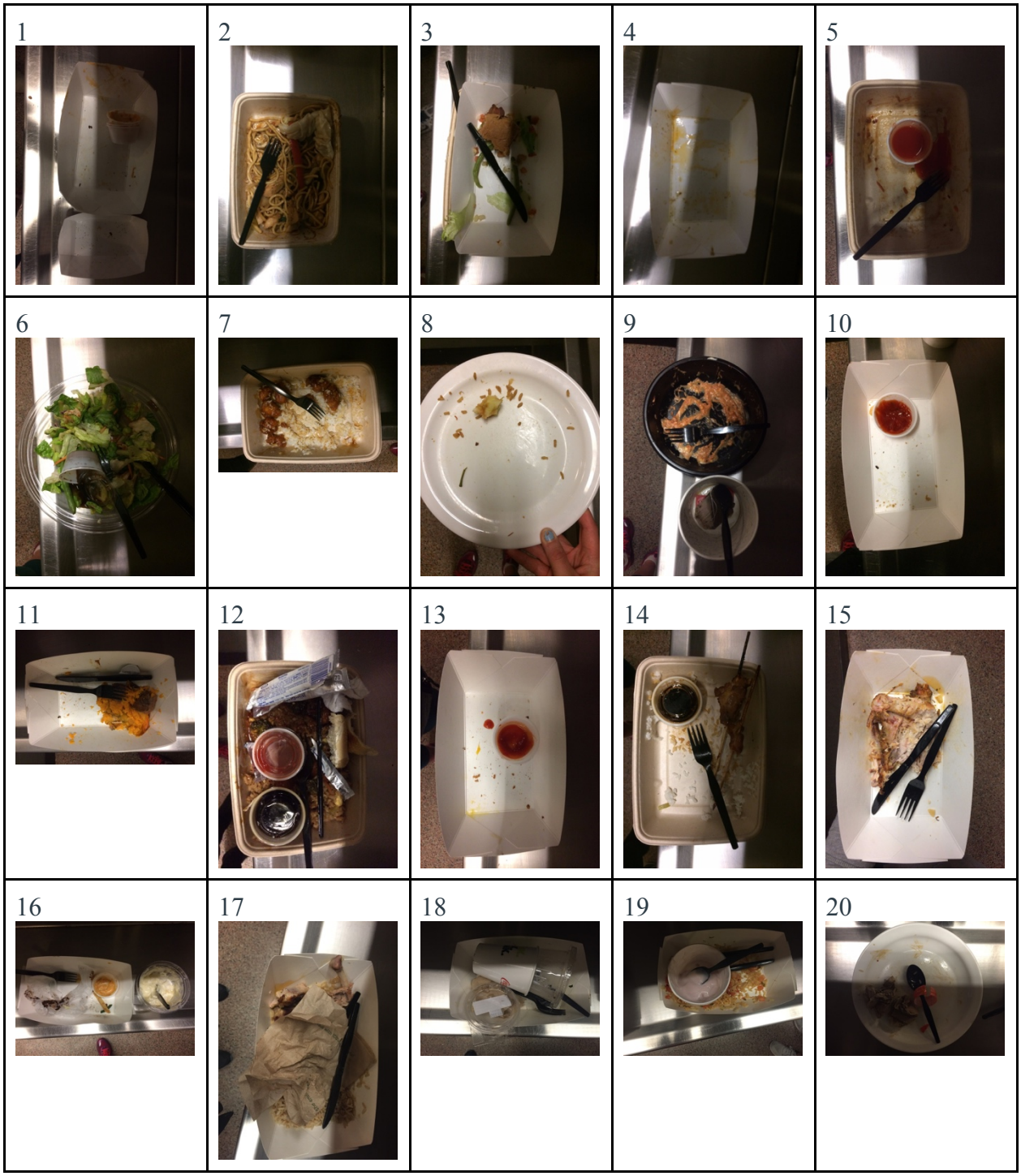


Figure 8. Round 1



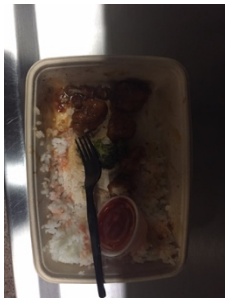
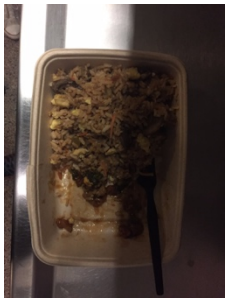
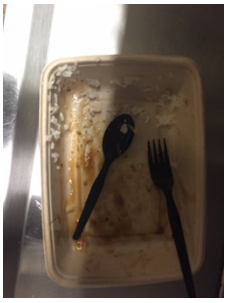
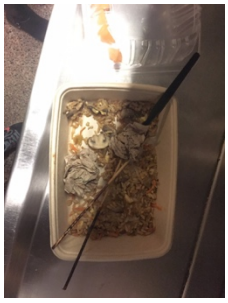
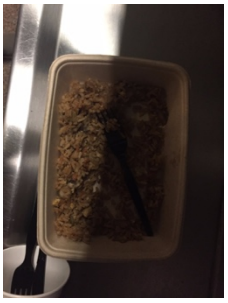
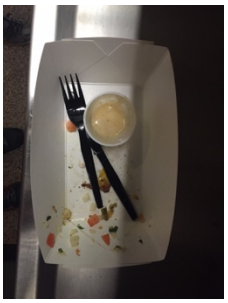
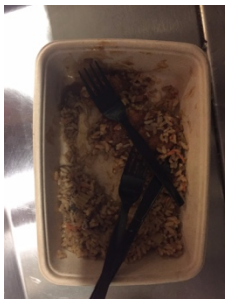
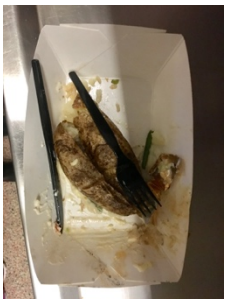
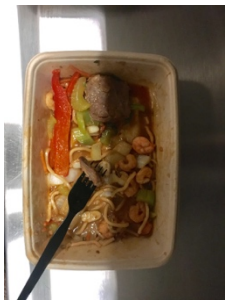
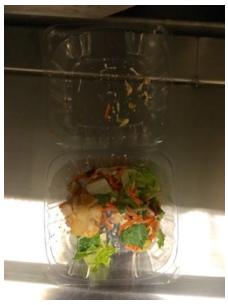
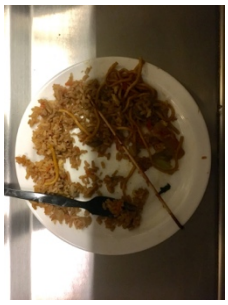
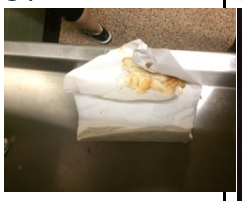
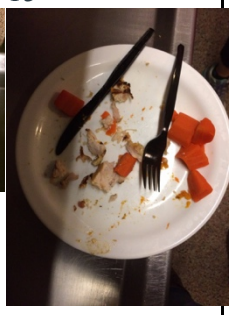
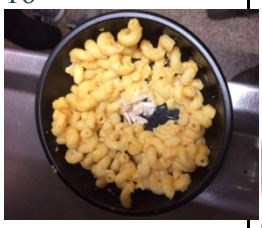
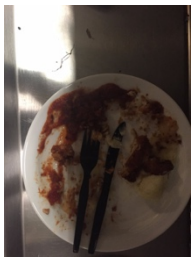
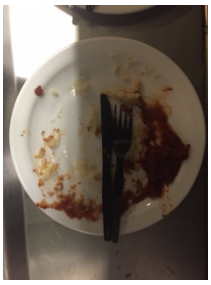
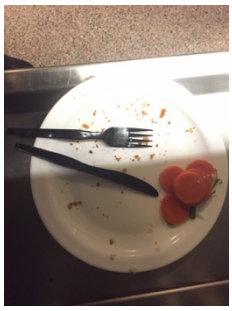
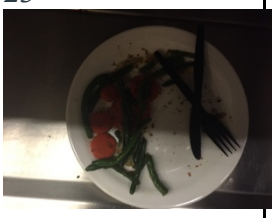
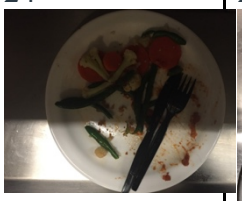
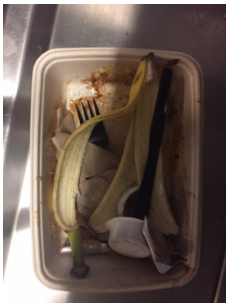
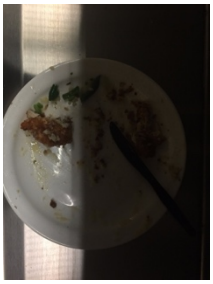
21 	22 	23 	24 	25 
26 	27 	28 	29 	30 
31 	32 	33 	34 	35 
36 	37 	38 	39 	40 

Figure 9. Round 2

11 	12 	13 	14 	15 
16 	17 	18 	19 	20 
21 	22 	23 	24 	25 
26 	27 	28 	29 	30 

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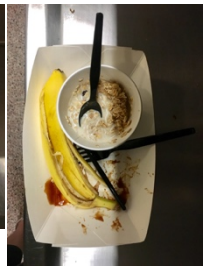

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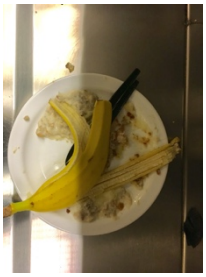

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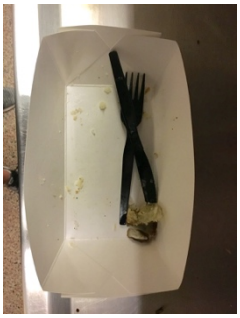

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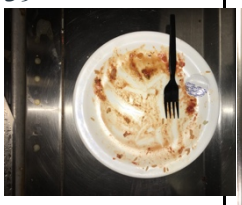

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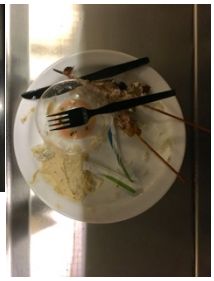

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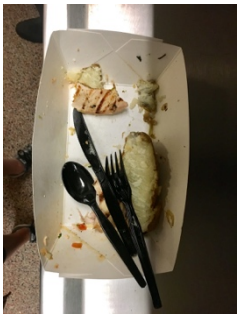

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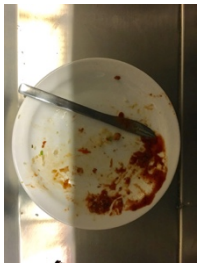

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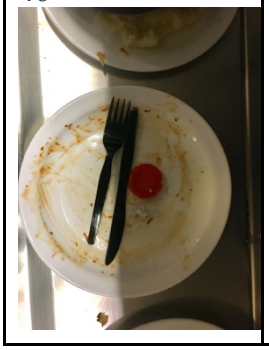

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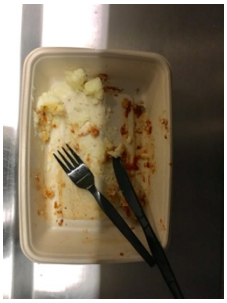

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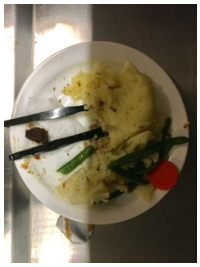

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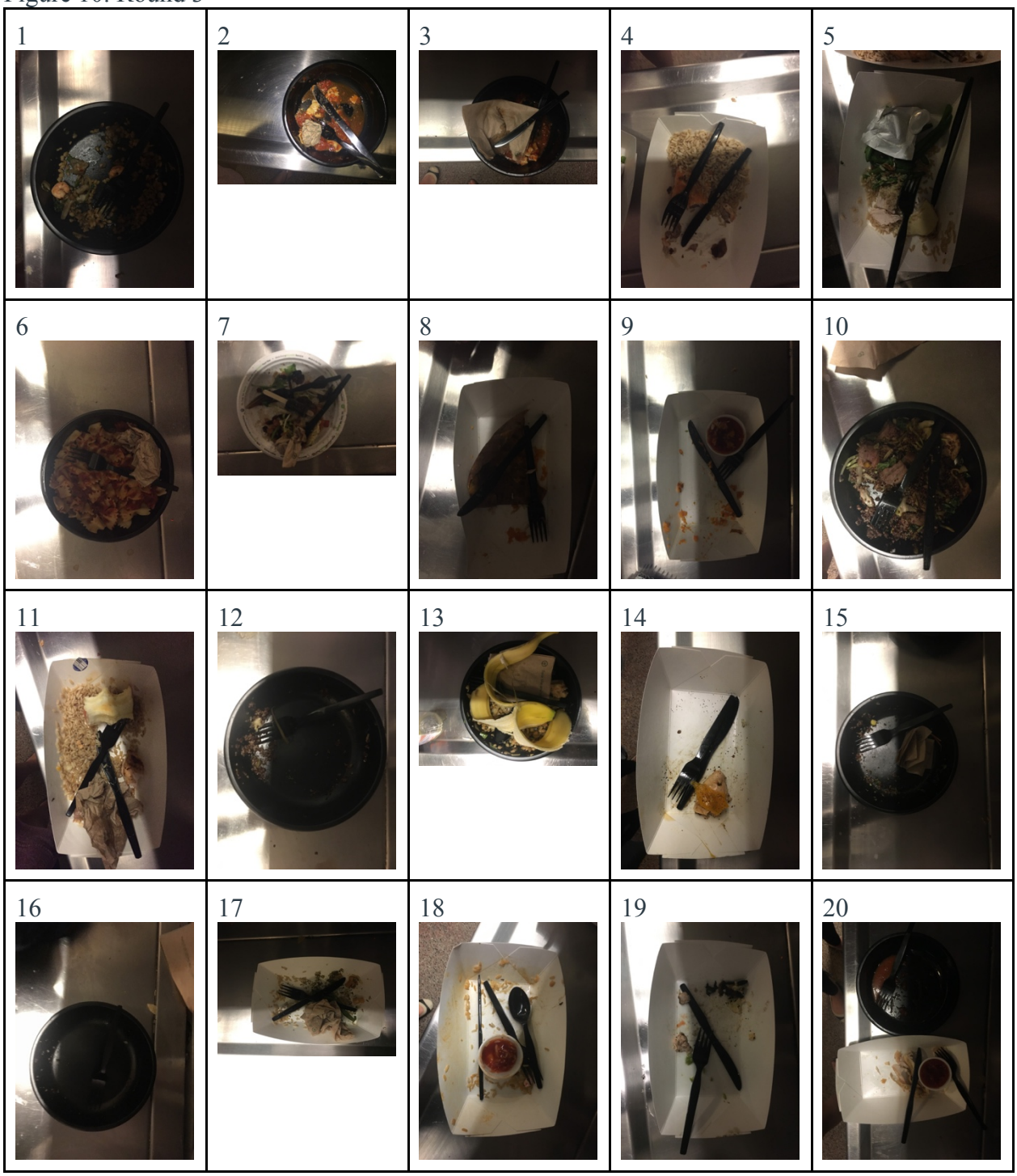
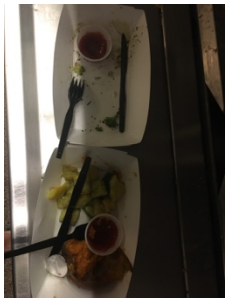
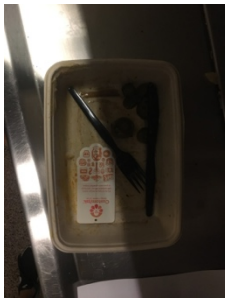
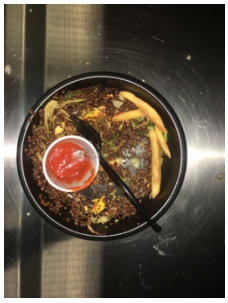
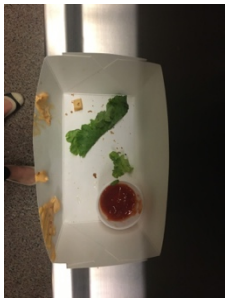
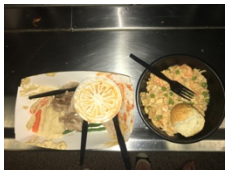
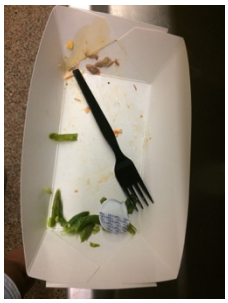
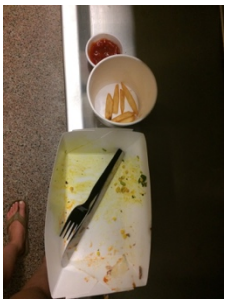
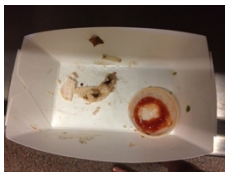
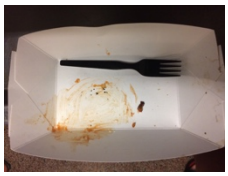
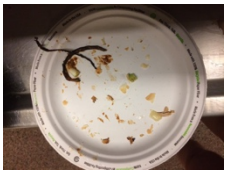
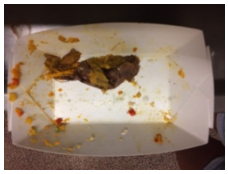
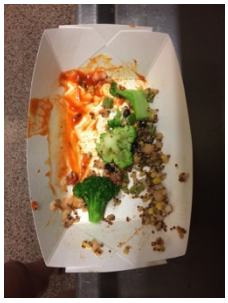
Figure 10. Round 3



21 	22 	23 	24 	25 
26 	27 	28 	29 	30 
31 	32 	33 	34 	35 
36 	37 	38 	39 	40 

41 	42 	43 	44 	45 
46 	47 	48 	49 	50