

Carnegie Mellon University

CMU Dining: You Are What You Eat!

By: Qiaona Yu, Tianjiao Qi, Jisu Jennifer Kim, Sally Cheung, and Heewon Chi

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Introduction

Dining has always been a topic that has received much attention at Carnegie Mellon University (CMU). Even though many changes have been made last year in efforts of improving the quality and the selection of foods, we would like to once again re-evaluate the satisfaction of students on the meal block system with the current dining options. CMU requires first year students to be on a meal plan, so any changes made would be highly relevant for incoming freshmen each year.

According to the National Association of College and University Food Services (NACUFS), 21% of prospective college students strongly consider the school's dining program and amenities when deciding where to enroll. NACUFS also provides past winners of campus dining awards ranging from Most Innovative Nutrition Program to Vegan Recipe Contest. Being able to constantly acquire feedback from students and implement innovative changes to CMU's dining options can motivate students to dine on campus more and appeal to incoming students.

Our survey sets out to assess the satisfaction of students on the CMU dining system. We want to obtain insight into the reasons for which people choose to dine at certain locations and what is important to student when it comes to food. Some of the variables our survey will measure include the correlation between major and dining location as departments are located in different campus buildings and this could be a factor as to where students choose to dine. Another variable is the correlation between ethnicity and dining location as CMU offers different types of food for students to choose from.

After fully assessing our responses and results, we hope to determine whether or not students are satisfied with the current dining options and vendors, what changes they want to see take place. We've already contacted Housing and Dining Services and they are highly enthusiastic in our results. We hope to present a detailed report for them and voice the opinions of our student body to bring about changes that can better satisfy the student community of CMU.

The results of our survey that freshmen are (we will include a brief summary of our results, including the most significant results and the results of the variables we propose to measure for our survey)

Methods

The target population is CMU undergraduate students who are on the Meal Plan. The sampled population will be a subset of the target population due to cases such as part-time students. There are not significant biases due to the difference.

The sampling frame is CMU freshmen who registered at HUB as a full-time student and bought the Meal Plan this semester. We used the list from the C-Book and designed to ask whether they are on the meal plan. If one says no to the question on the meal plan, no further question is asked. This sampling frame is a subset of the target population, because we are

sampling freshmen only as compared to all students at CMU. Since part of our target population is not in the sampled population, there might be some non-sampling errors. Also, if the response rate is low and the sample size is small, there might be some sampling errors.

In our survey, there are approximately 10,000 listings in C-Book, and the students' names are listed in alphabetical order as compared to being categorized by year. For these reasons, we chose to conduct a simple random sample (SRS). Since we are exploring the freshmen undergraduates' satisfaction with CMU dining, we can approach this survey more accurately by utilizing an SRS of the freshmen population. In our case, sampling without replacement is an appropriate and easy to conduct random sampling because as each person is sampled, he or she should be crossed off to avoid overlapping samples.

To generate our SRS, we first found out the starting and ending page numbers of the student listing in the C-Book. By indexing each page, we can randomly select a page per iteration. To do this, we used a random number generator. We also estimated the maximum number of names per page and indexed each other. By indexing each person per page, we can randomly select a person's index affect selecting a page. By repeating this process, we gathered the desired size of our random sample pairs – e.g. (page 1, index 1), (page 2, index 2),..., (page 400, index 400)

After generating the pairs of numbers needed, we flipped through the C-Book to locate the person. If the person selected was a freshmen, then that person would be counted in our sample, if not, they were excluded and we went onto the next pair. We went through this process until we reached our desired sample size.

From several calculations on the sample size (please refer to appendix 1 for sample size calculation), we decided that a sample size of 542.12 was the most reasonable one with a marginal error of 8% and an expected response rate of 25%.

For our mode of data collection, we choose to use Googledoc via email, and contacted 547 CMU freshmen. We collected a list of 547 email addresses for the undergraduate students who are on the Meal Plan from the C-Book and sent them the link to Googledoc form, which is an efficient mode of collecting data. Once the students received the emails, they would go to the link and respond.

To protect confidentiality and ensure students are of age, our survey was split into 2 forms. The first googledoc form consisted of the online consent form (please refer to appendix 2 for Online Consent Form) of which students had to agree to participate and was above 18. The last question on this form was if the student was on the meal plan. If yes, the students were prompted with a second line to the actual questionnaire and if no, the students were done with the survey.

144 students have responded to our survey starter so far, of which 121 were eligible and completed our survey. Hence, our current response rate is $121/547 = 22.1\%$. We've planned to send three follow up emails (please refer to appendix 4 for contact letters) to the students to remind them to complete the survey. The first follow up email was sent on March 28th, the second was sent on April 6th, and the last follow up email will be sent on April 14th.

Our survey is split into two parts, 7 demographic based question section and 13 dining question section. Some sample questions from our survey include, but were not limited to (please refer to appendix 3 for the complete questionnaire):

5. Do you live in school housing?

- Yes
- No

6. If yes, where?

- Boss House
- Doherty Apartments
- Donner House
- Fairfax Apartment
- Hamerschlag House
- Henderson House
- London Terrace House
- Margret Morrison Apartments
- McGill House
- Morewood E-Tower
- Morewood Garden
- Mudge House
- Neville Apartments
- Stever House
- Resnik House
- Roselawn House
- Scobell House
- Shady Oaks Apartments
- Shirley Apartments
- Spirit House
- Tech House
- Veronica Apartments
- Webster Hall
- Welch House
- West Wing
- Woodlawn Apartments
- Other

9. How often do you dine at one of the on-campus food vendors? Choose one

- At least once every day of the week, including weekends
 - At least once every day, but just weekdays
 - Less than 5 times a week
 - Never.
- 11. How would you rate the CMU dining services when it comes to:

	Very Poor	Poor	Neutral	Good	Very Good
The food and drinks offered suit my taste/need					
The menu variety					
Prices in general					
The quality of the food					
Healthy choice options					
The waiting time					
Cleanliness					
Staff friendliness					
Availability/Hours of Operation					

During the sample selection, we generated a set of random numbers through R. We used the random numbers to create a set of sample pairs -- i.e. page number and row number. However because there were duplicate pairs, it was necessary to sort out the data through Microsoft Excel and eliminate the duplicates.

Another problem that we encountered was that there was drop-out rate during the respondent's transition from the starter part to the questionnaire part of the survey. Since it was necessary that we have two parts, in which first part filters out those who do not satisfy the pre-question categories (meal plan enrollment, age limit, consent form, agreement to participate), we considered the drop-out as a refusal to respond.

Post Survey Processing

Upon the completion of data collection, we will impose weights on gender and college based on the overall freshmen class distribution. We might consider imposing weights on resident hall size, as our initial data collection suggests that we might have a lot of respondents from one resident hall and none from others. Imputation will not be used as our survey was not designed to allow for partial responses.

Results (indicates what we plan to do**)**

**In order to determine whether or not students are satisfied with the current dining options and vendors, we asked students to rank their satisfaction on overall dining services, the tast of the food, the menu variety, the price, the quality of the food, the health choice options, the

waiting time, cleanliness, staff friendliness, and the availability/hours of operation. In our data analysis, we will recode the rankings with numbers (1=very poor; 2=poor; 3=neutral; 4=good; 5=very good). For each variable above, we plan on studying the distribution of it, including mean, median, variance, skewness, high frequency area, etc.. **

**We will create two contingency tables, one for students' favorite vendors and the reasons why they like them, the other for students' least favorite vendors and the reasons why they dislike them. Some area plots could be used to visualize the tables (Mosaic plot for example). Then we will explore certain locations' strengths and shortcomings, which might lead to valuable suggestions to specific vendors. **

**To test the hypothesis that there is a correlation between student's major and dining location, we will create a contingency table for colleges they are in and where they usually dine. By examining the most common college-vendor combinations, we might find the association between the two variables. **

**We might combine vendors by the type of food they serve, and study the relationship between ethnicity and the food types on campus. A contingency table might be made to show the common combinations. **

**We will also recode the last open-ended question, and summarize how many people want certain types of food on the menu. The most popular answers would be studied and reported. **

Discussion

**In this section, we will be summarizing specific findings of our survey in terms of the variables and relationships that we would like to measure. These include possible relationships between location of college and location of frequently visited vendors, location of resident hall and location of frequently visited vendors, ethnicity and frequently visited vendors, overall satisfaction with dining services, importance of healthy and organic options to students, particular likes and dislikes in terms of individual vendors and various rating criteria (i.e. taste, location, pricing, cleanliness, etc.), and whether students would like the implementation of cafeterias and independent vendors (i.e. McDonalds, Wendy's, Chipotle, etc.), and one particular item for the Dining Menu at CMU. We will also specify the difference between our survey and the other similar surveys that has been done on campus, specifically since we're only surveying freshmen. We would like to see freshmen's responses to the newly improved dining system, since they have never used the old one, and that they will be the future of CMU.

The survey was very straight-forward in terms of questioning students. Students were given the many options to choose, pick and rank, and students answered honestly and gave many suggestions. **

Surprising, expected results

******We are expecting to see a strong correlation between college location and location of frequently visited vendors. We also expect to see students who frequently dine on campus (at least once a day, including weekends) to rank variety and availability lower than students who dine less frequent (3 times a week).

We are surprised by how passionate some students were about our open ended questions - there were long paragraphs regarding what they think CMU Dining Services should improve on, that wasn't covered elsewhere in our survey. Aside from suggestions to menu variety and quality of food, many people suggested to have somewhere that they can voice their opinions about how to improve. ******

Strengths and weaknesses and recommendations

******We believe that our survey covered very many topics in a short survey. We also believe that we will be giving Dining Services very helpful suggestions since very many students pointed out interesting and different suggestions that Dining Services could consider. We will also see if the survey proposes other interesting questions that we have not covered in our survey for further studies/surveys.******

Take home messages

******This section will be final suggestions for Dining services to improve student satisfaction in the future. Since we are surveying the future of CMU, we hope that Dining Services will take these suggestions into serious consideration, and we hope to see improvements in the near future.******

References

- College Decisions and Food Services*. National Association of College and University Food Services, 10 Feb. 2009. Web. 25 Feb. 2010.
<http://www.nacufs.org/files/public/pdf/technomic_surveys/nacufs_feb10.pdf>.
- Davis, Dominique. "New Dining Options Bring New Vendor, Changes to Meal Plans." *The Tartan*. Carnegie Mellon University, 24 Aug. 2009. Web. 4 Apr. 2010.
<<http://www.thetartan.org/2009/8/24/news/food>>.
- "Past Winners - The National Association of College & University Food Services." *Home - The National Association of College & University Food Services*. National Association of College and University Food Services. Web. 07 Apr. 2010.
<<http://www.nacufs.org/i4a/pages/Index.cfm?pageid=3368>>.
- Student Government Task Force: Analysis of Carnegie Mellon Dining Program*. Rep. Carnegie Mellon University, 2 Feb. 2009. Web. 25 Feb. 2010.
<<http://stugov.andrew.cmu.edu/executive/projects/2008-2009/student-government-task-force-dining-proposalvfinal.pdf>>.

Appendix

Appendix 1: Sample Size Calculation

Calculate SRS with replacement and apply correction for SRS without replacement.

$$n_0 \geq \frac{(Z)^2(SD)^2}{(ME)^2} = \frac{(1.96)^2(0.5)^2}{(0.08)^2} = 150.06$$

$$n \geq \frac{Nn_0}{N + n_0} = \frac{(1400)(150.06)}{1400 + 150.06} = 135.53$$

Expected response rate of 25%:

$$\frac{n}{0.25} = \frac{135.53}{0.25} = 542.12$$

Appendix 2: Starter Part & Consent Statement

Dining Survey Starter

Please fill out this survey to see if you are eligible for our survey. Once you've submitted your answers below, you will be given more instructions. Thank you!

Note: All information given in these surveys will be kept confidential. Your Andrew ID will be used to make sure we know we've contacted you and you have filled out our survey. Please fill out your Andrew ID so that we don't spam you with more emails!

Online Consent

This survey is part of a research study conducted by Joyner Yu at Carnegie Mellon University.

The purpose of the research is to assess CMU's current dining system. Even though many changes have already taken place in the past year improving the quality and the selection of foods, we would like to conduct a survey to investigate how satisfied students who are on the meal block system now are with the current dining options. What changes do students still want to see in the current dining system and what do students like about the current dining system. Being able to constantly improve dining services on campus can motivate students to eat at certain places more often.

Procedures

Participants will be contacted through Andrew Mail and an external survey link will be provided. Participants should click on the link and will be redirected to googledocs. This survey consists of 28 questions and should take no more than 10 minutes in total.

Participant Requirements

Participation in this study is limited to individuals age 18 and older.

Risks

The risks and discomfort associated with participation in this study are no greater than those ordinarily encountered in daily life or during other online activities.

Benefits

There may be no personal benefit from your participation in the study but the knowledge received may be of value to humanity. Suggestions are highly recommended as our assessments will be handed out to the Dining Services of CMU and improvements could be made accordingly to improve the overall Dining Services of Carnegie Mellon University.

Compensation & Costs

There is no compensation for participation in this study. There will be no cost to you if you participate in this study.

Confidentiality

By participating in this research, you understand and agree that Carnegie Mellon may be required to disclose your consent form, data and other personally identifiable information as required by law, regulation, subpoena or court order. Otherwise, your confidentiality will be maintained in the following manner:

Your data and consent form will be kept separate. Your consent form will be stored in a locked location on Carnegie Mellon property and will not be disclosed to third parties. By participating, you understand and agree that the data and information gathered during this study may be used by Carnegie Mellon and published and/or disclosed by Carnegie Mellon to others outside of Carnegie Mellon. However, your name, address, contact information and other direct personal identifiers in your consent form will not be mentioned in any such publication or dissemination of the research data and/or results by Carnegie Mellon.

Right to Ask Questions & Contact Information

If you have any questions about this study, you should feel free to ask them by contacting the Principal Investigator now at 917-459-6816, and address: SMC 5246, 5032 Forbes Ave, Pittsburgh, PA 15213. If you have questions later, desire additional information, or wish to withdraw your participation please contact the Principle Investigator by mail, phone or e-mail in accordance with the contact information listed above.

If you have questions pertaining to your rights as a research participant; or to report objections to this study, you should contact Brian Junker at Carnegie Mellon University. Email: brain@stat.cmu.edu . Phone: 412-268-2718.

This research project is exempt from Carnegie Mellon University Institutional Review Board (IRB) review, since it is being undertaken as a course requirement.

Voluntary Participation

Your participation in this research is voluntary. You may discontinue participation at any time during the research activity.

* Required

I am 18 or older. *

- Yes
- No

I have read and understand the information given in the consent form above. *

- Yes
- No

I want to participate in this research and continue with the survey. *

- Yes
- No

Are you on a CMU meal plan (including meal blocks, DineX, Plaid Cash for food)? *

- Yes
- No

What is your andrew ID? * This is to track response rates, please fill this in so that we don't ask you over and over again to fill out our survey!

Appendix 3: Full Questionnaire

Dining Services Survey

Please answer these questions as carefully and accurately as possible.

If you are NOT on any form of the CMU dining plan (meal blocks, DineX, plaidcash for food), you are not eligible for this survey.

Thank you for your contribution!

* Required

2. Gender *

- Male
- Female
- I prefer not to answer

3. What Carnegie Mellon meal plan are you on currently? Check all that apply * If none, you are not eligible for this survey, thank you for your participation!

- Meal blocks
- DineX.
- Plaid Cash (primarily for food)

4. What college are you in? * Check all that apply

- Tepper School of Business
- Mellon College of Science
- School of Computer Science
- Humanities & Social Studies
- College of Fine Art
- Carnegie Institute Technology

5. Do you live in school housing? *

- Yes
- No

6. If yes, where? *

- Boss House
- Doherty Apartments
- Donner House
- Fairfax Apartment
- Hamerschlag House
- Henderson House
- London Terrace House
- Margret Morrison Apartments
- McGill House
- Morewood E-Tower
- Morewood Garden
- Mudge House
- Neville Apartments
- Stever House
- Resnik House
- Roselawn House
- Scobell House
- Shady Oaks Apartments
- Shirley Apartments
- Spirit House
- Tech House
- Veronica Apartments
- Webster Hall
- Welch House

- West Wing
- Woodlawn Apartments
- Other

7. What is your nationality/Ethnicity? * Check all that apply

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic or Latino
- Native Hawaiian or Other Pacific Islander
- White
- I prefer not to answer
- Other:

8. I regularly have...on campus. * check all that apply

- Breakfast
- Lunch
- Brunch
- Mid-morning/mid-afternoon snacks
- Dinner
- Late-night

9. How often do you dine at one of the on-campus food vendors? * choose one

- At least once every day of the week, including weekends
- At least once every day, but just weekdays
- Less than 5 times a week
- Never.

10. How satisfied, in general, were you with your meals/snacks? *

	1	2	3	4	5	
Very Unsatisfied						Very Satisfied

11. How would you rate the CMU dining services when it comes to: *

	Very Poor	Poor	Neutral	Good	Very Good
The food and drinks offered suit my taste/need					
The menu variety					
Prices in general					

The quality of the food							
Healthy choice options							
The waiting time							
Cleanliness							
Staff friendliness							
Availability/Hours of Operation							

12. Which vendors do you like the most, for meals? * Choose up to 3

- Asiana (Newell-Simon Hall)
- Carnegie Mellon Cafe (Resnik House)
- City Grill (University Center)
- Downtown Deli (University Center)
- Entropy (University Center)
- Evgestos! (University Center)
- The Exchange/Ginger's (Tepper)
- Ginger's Express (Baker)
- Kosher Korner (University Center)
- La Prima (Wean)
- The Maggie Murph Cafe (Hunt Library)
- Mitchell's Mainstreet Market (Newell-Simon Hall)
- Quik Picks (University Center)
- Schatz (University Center)
- Si Senor (University Center)
- Skibo Coffeehouse (University Center)
- Souper Soups (University Center)
- Spice it up Grill (Resnik House)
- Spinning Salads (University Center)
- Stephanie's (Mellon Institute)
- Stir Crazy (University Center)
- Sushi Too (Resnik House)
- Take Comfort (Resnik House)
- Tartan's Pavilion (Resnik House)
- Taste of India (Resnik House)
- Tazza D'oro (Gates Hillman Center)
- Totally Juiced (University Center)
- The Underground (Morewood)
- The Zebra Lounge (CFA)
- AVI Vending (Wean/multiple locations)

13. Why do you like these vendors? * Choose up to 2

- The food tastes good.
- It's fast
- It's convenient location wise
- It has a lot of options.
- It's healthy
- The staff are friendly.
- The dining environment is good.
- They are always open
- They are cheap/reasonably priced.

14. Which vendors do you like the least, for meals? * Choose up to 3

- Asiana (Newell-Simon Hall)
- Carnegie Mellon Cafe (Resnik House)
- City Grill (University Center)
- Downtown Deli (University Center)
- Entropy (University Center)
- Evgestos! (University Center)
- The Exchange/Ginger's (Tepper)
- Ginger's Express (Baker)
- Kosher Korner (University Center)
- La Prima (Wean)
- The Maggie Murph Cafe (Hunt Library)
- Mitchell's Mainstreet Market (Newell-Simon Hall)
- Quik Picks (University Center)
- Schatz (University Center)
- Si Senor (University Center)
- Skibo Coffeehouse (University Center)
- Souper Soups (University Center)
- Spice it up Grill (Resnik House)
- Spinning Salads (University Center)
- Stephanie's (Mellon Institute)
- Stir Crazy (University Center)
- Sushi Too (Resnik House)
- Take Comfort (Resnik House)
- Tartan's Pavilion (Resnik House)
- Taste of India (Resnik House)
- Tazza D'oro (Gates Hillman Center)
- Totally Juiced (University Center)
- The Underground (Morewood)
- The Zebra Lounge (CFA)
- AVI Vending (Wean/multiple locations)

15. Why do you dislike these vendors? * Choose up to 2

- The food tastes bad.
- It takes me a long time to get my food.
- It's in a bad location; I never go to some of those locations.
- Not enough options.
- It's not healthy
- The staff are unfriendly.
- The dining environment is not good.
- It's expensive
- They are not open when I want food.

16. Which of these dining services would you like to see at CMU? *

- Independent vendors, i.e. McDonald's, KFC, Chipotle, Wendy's, etc
- A cafeteria, buffet style, in most resident halls.
- It's good the way it is.
- Other:

17. How important is it to you that school vendors provide healthy options? *

	1	2	3	4	5	
Not important at all.						Very important

18. How important is it to you that school vendors offer organic options? *

	1	2	3	4	5	
Not important at all.						Very important.

19. Would you like to see nutritional info and calorie counts on the menu boards? *

- Yes
- No

20. If you can add one type of food to the CMU dining service's menu, what would it be? It can be as specific as you like, or just a general genre of food.

Appendix 4: Contact Letters

FIRST EMAIL SUBJECT LINE: You are what you eat!

Dear PARTICIPANT,

If you care about what you eat on campus every day, then you should take this short survey for a student project! We are evaluating student satisfaction with the current dining services at CMU, and your results will be very valuable to us for suggesting improvements to Housing and Dining Services that will benefit YOU!

Here is the link to our survey:

<https://spreadsheets.google.com/viewform?formkey=dHFfTURMcOpsaFg5a08teIFcnFLa2c6MA>

Please take a few minutes to fill out this survey!! The more responses we get, the more opinions we'll be able to voice! Thank you very much for your participation!

Sincerely,

Tianjiao Qi
Sally Cheung
Jisu Kim
Jenny Chi
Joyner Qiaona Yu

FOLLOWUP EMAIL:

Dear PARTICIPANT,

We've noticed that you have not filled out our dining service survey! It would be greatly appreciated if you could take our survey before DATE, so that we can let the Dining Services know what YOU think!

It will only take a few minutes to fill out this survey, so please please take a moment to do this!

Here's the link:

<https://spreadsheets.google.com/viewform?formkey=dHFfTURMcOpsaFg5a08teIFcnFLa2c6MA>

Thank you for your participation!

Sincerely,

Tianjiao Qi
Sally Cheung
Jisu Kim
Jenny Chi
Joyner Qiaona Yu