36-303
Oliver Lam
Mike Len
Go Okumura
Rita Wang
Wentian Zhu

A Study on Students' Change of Majors, What they Choose and Why

A. Why is this topic interesting?

As upperclassmen at CMU, we ourselves and other students alike have encountered decisions in switching majors, in which many claim to be a problem for various reasons. We also believe that some majors may be better at retaining students, and some majors have high turnover rates. We would hope to understand why some majors have better retention rates. We believe that everyone at some point has considered transferring to another major, and if they haven't, we would like to know what factors caused students stay in their major. This study would be most beneficial and significant for prospective students who are visiting. For example, if prospective students know reasons behind switching majors, they are able to choose their majors more carefully. This is also important for the university itself letting them make inference on how or why people change their majors. By conducting this survey, we would hope to be able to make inferences on specific majors on CMU campus, and obtain data regarding why people choose the majors they chose to pursue.

B. What questions do you propose to study?

Some of the questions we propose to study are:
a. What are students current majors
b. What percentage of the students like their current major
c. What percentage of the students have changed or are going to change their major
d. Why would students want to change from their current major
e. Which majors have the lowest and highest retention rate
f. What are the major factors affecting students changing their major

C. What is some existing research?

a. http://www.assessment.uci.edu/reports/documents/SurveyofMajorChangers.ppt
"Survey of Major Changers" presented by Dr. Judy Shoemaker of UC Irvine. Survey results were presented October 15, 2007, and the presentation can be found at the link above.
The survey was conducted to determine why students change majors, how the major-change

process is perceived and what can be done to improve the process at UC Irvine. While the information gathered is similar to our goals, we would gather information primarially to develop inferences regarding specific majors.
--Michael Len
b. http://www.youngmoney.com/careers/career-advice/037_217/
This website gives some major reasons college students change their majors. This help us develop our hypothesis and survey questions.
– Dunyang Wang
c. http://life.globaltimes.cn/life/2010-12/604400.html
“Freshmen Keen to Switch Majors” - Jia Jianyu (December 27, 2010). A recent online news article reporting on a survey taking in Chinese universities regarding the high volume (and high demand) of students wishing to change their majors and pertinent reasons The survey covered in the article has similar motivations to our proposed study, and can serve to aid us in crafting our questions by providing a number of possible responses. This will allow for easier coding of our collected responses into data and in turn, a more straightforward/less convoluted conclusion.

-

Oliver Lam
d. http://www.cs.washington.edu/homes/letchner/classwork/cs201/survey.html#switchingmajors
“Whether Students Have Considered Switching Majors, and Why”- Stanford Survey Results. Sample size were 162 Stanford students divided in to sub groups of Male-Female, and Non-Technical-Technical Majors, and within Technical majors if they are either CS or non-CS. This is survey is a great resource to out survey since our university is very technical and this survey answers questions like “Influences on students’ choice of a major” and “whether students have considered switching majors, and why”.
-Go Okumura
e. http://www.parent.umn.edu/previousarchive.html
Here it lists a simple survey conducted on parents of students, and what their prospectives. Not all survey result is significant to our survey, although few are right on the spot such as question like “Has the economic downturn of the past year affected your student’s choice of major or career?” Results on questions like these will help us make inference on why student’s change majors since we believe parents play a big role in student’s choice of majors.
-Jude Zhu

D. What is the sampling frame? What population or populations do you plan to sample from? (This is the question many tend to miss).

The sampling frame for this proposal is all undergraduate students in the Carnegie Mellon C-book or the campus directory. We plan to sample from the C-book email list.

this is fine

We may also use social networking sites such as Facebook to create an survey event because we predict that people will be more likely to participate in surveys on Facebook rather than receiving emails. Another benefit of using Facebook is that there is no risk of survey emails going into "junk mail" folder. We can ensure that our sample will get the survey on Facebook.

when you adv on facebook you no longer control who can respond. this is not a good idea because it introduces possible

E. What is the target population? To what population(s) do you wish to make inferences?

Our target population is the Carnegie Mellon undergraduate student population We wish to make inferences on this population regarding our proposal topic.

Using the Carnegie Mellon C-book should be a fairly good match on the target population, provided we can extract only undergraduate students for sampling.

Our primary sampling frame is the Carnegie Mellon C-book. We understand there are risks with doing an email survey, in particular that there may be a high non-response rate. It is difficult for people to fill out surveys when they do not have an incentive to do so. Although we initially thought of Facebook as another means of distributing the survey, we decided that the chance of coverage error is too great give the demographics of our group (all ofAsian ethnicity, all upperclassmen, etc.). Instead, we decided to send follow-up reminder emails to increase the response rate of our survey.

great

F. What is the mode of data collection? How do you plan to carry out the survey (e.g., by telephone, e-mail) and why?

We think that it would be too challenging conduct surveys through phones because it would be hard to find a sampling frame of phone numbers, and we have the lack of resources to reach each individuals through calls. As such we decided it would be easier to provide invitees a link to an online survey of our design. To distribute the invitations we decided to use email to invite students so we have a strong sampling frame, allowing for fast distribution of the survey and effective use of the resources we have available for the study.

G. What variables do you propose to measure?

One variable we propose to measure is a student's opinion about their current major(good stay with it/ thinking about switching)

Student Major Switch: We plan to ask questions added above and other questions we come up with in the future. Ultimately we would like to subgroup departments, or even majors, and major which department/major students are most likely to switch or not switch, and why this is the case.

K. Decide on a sampling scheme (e.g., SRS, Stratified random sample, etc.) and explain why you chose it.

We have decided that sending out questionnaires from the C-book is the most unbiased and error-free procedure in conducting this survey. Right now our concern is if we are able to collect data from each individual class level. Because we feel that the questions asked in the survey are only adequate to persons in grades sophomore and up, it is important to exclude freshmen samples. If the C-book does list the students' email addresses along with their class level, we will use stratified random sample without replacement as our sampling scheme. We will assume that simple random sample will distribute the population evenly in each grade automatically making this plan a stratified one.

If there is a possibility in which C-book does not indicate the grade level of the students, we will overcome this issue by asking participants to indicate their grade levels and excluding responses from freshmen respondents. This does decrease our effective sample size, but we were not conservative in increasing sample size to account for non-response and believe this should cover the potential unused observations of freshmen. With use of google-documents this is easily done.

By using stratified random sampling without replacement we are able to separate our sample population by grade level to isolate effects that may be present due to school or major experience. It also allows us to later fix our sample's representativeness if our initial sample does not represent our target population well. That is to say, if our initial sample turns out to have a non-representative percentage of sophomores, we can sample more sophomores. By using sampling without replacement (as opposed to sampling with replacement) we prevent any double counting of responses, which could skew our results negatively.

Although we would like to rely on a respondent naturally not taking the survey twice to ensure sampling without replacement, if we go down this route we cannot say for sure if each respondent only took the survey once. Alternatively, we can give the respondent the

chance to provide us with their Andrew ID so that we do not contact them when we send out follow-up emails, which will ensure to a greater degree that our final sample was taken using sampling without replacement.

If any issues come up after the survey regarding response rate such as higher response rate in one of the grade level than the others, we will adjust the result by weighing accordingly.

L. *Write a questionnaire with 20–30 questions. Up to approximately 1/3 of these can be background or demographic questions and the rest should be directly related to the research questions you will try to answer with your survey. NOTE: If your survey involves observations instead of asking people questions, then instead you should carefully describe your observation protocol. That is, list 20–30 things you will always look for when observing each unit in your survey.*

We have already pretested and edited our questionnaire after completing Part N. We have provided the updated questionnaire below. A link to our online questionnaire is as follows:

https://spreadsheets0.google.com/viewform?formkey=dGJlSHR5TlBKNzdHOEZKVmh5a1JLV2c6MQ#gid=0

the google docs thing looks great

Major Changer Questionnaire

What is your gender?
Male Female
What year are you?
Freshman Sophomore Junior Senior 5th year Undergraduate Other
What school are you in?
CIT CFA H&SS TSB Heinz MCS SCS
Interdisciplinary(BHA, BHS, etc.)
What is your current cumulative GPA?

What is your current primary major?

Have you declared your major yet? Yes No

If Undeclared:

What area is the major you considering to declare?
Engineering Sciences Business/Economics Art/Music/Drama Computer Science
Humanities/Social Studies Math/Statistics
Other(Please specify)

Is the major you're thinking about in your current college?

Yes No

What major(s) are you considering to declare? (List all that apply)

What attracts you to these majors? (check all that apply)

Future Job conditions Interested in the Subject provide a well rounded education
Recommendations from others (i.e parents) Ease of coursework
Did well in subject in high school CMU program is well-known Other

If Declared:

Which category does your current primary major belong to?

Engineering Sciences Business/Economics Art/Music/Drama Computer Science
Humanities/Social Studies Math/Statistics
Other(Please specify)

Do you like your primary major?

Yes No

What led you to choose your current major? (Check all that apply)

Future Job conditions Interested in the Subject provide a well rounded education
Recommendations from others Ease of coursework
Did well in subject in high school CMU program is well-known Other

Would you pursue the field of your major in future professional career?

Yes No

Have you changed majors?

If Changed Majors:

From which school was your original major?

CIT CFA H&SS TSB Heinz MCS SCS Interdisciplinary(BHA, BHS, etc.)

Which area is your original major within?

Engineering Sciences Business/Economics Art/Music/Drama Computer Science
Humanities/Social Studies Math/Statistics
Other(Please specify)

Why did you choose your original major? (Check all that apply)

Future Job conditions Sounded interesting provide a well rounded education
Recommendations from others Ease of coursework
Did well in subject in high school CMU program is well-known Other

Why did you leave your first major? (Check all that apply)

Didn't like the courses had academic difficulties didn't match career interests
Materials different from what expected Didn't match personal interests Other

What factors influenced your choice to change majors? (Check all that apply)

Future Job conditions Sounded interesting provide a well rounded education Recommendations from others Ease of coursework Prepare for graduate school

Other

How soon did you start thinking about another major?

Before College Freshman Sophomore Junior Senior

What year did you change your major?

Freshman Sophomore Junior Senior 5th year Other

If Have Not Changed Majors:

Have you considered changing majors? Yes No

Please indicate your level of satisfaction with your current major from 1-5 (1-strongly dislike, 5-strongly like).

1 2 3 4 5

If Considered changing majors:

Why did you consider changing majors? (Check all that apply)

Future Job conditions Interested in the Subject

provide a well rounded education Recommendations from others

Ease of coursework Did well in subject in high school

Current major is harder than expected CMU program is well-known Other

What area is the major you were thinking about switching to?

Engineering Sciences Business/Economics Art/Music/Drama Computer Science

Humanitities/Social Studies Math/Statistics

Other(Please specify)

Why didn't you change? (Check all that apply)

Not enough time to complete Financial Issues Parents don't agree Other

If Not Considered changing majors:

What possible changes in your current major will lead you to reconsider? (Check all that apply)

More difficult curriculum Poor Professor/Instructor/Faculty Bad future job prospects

Less school support for program/related research

Would you consider changing majors if there are no restrictions.

Yes No

Do you think the University should put more emphasis on major selection counseling?

Yes No

If you have any other comments regarding what the school can do to help you in exploring your interests please list them here:

If you do not wish to be contacted with further emails reminding non-respondents to take our survey, please provide us with your Andrew ID so we can place you on our do-not-contact list.

M. Give some idea of the sample size you will require and how you arrived at this number (talk about the margin of error for inferences you want to make)

Considering that the total undergraduate population of CMU is 5619, assuming that students are evenly distributed across the four grade levels, the sample target will be 75% of this population (sophomores, juniors, seniors) which is 4214 students.

Simple random survey without replacement
$n_0 = (z^2)(SD^2)/(ME^2) = (1.96^2)(.5^2)/(.05^2) = 384.16$
$n > (N*n_0)/(N + n_0)$; $n > (4214 * 384)/(4214 + 384) = 352.06$

According to our calculations, assuming a standard deviation of ½ with 95% confidence interval and 5% margin or error, we would need to sample at least 353 students. We decided on restricting the margin to 5% because this is recommended in the context of the book, and here our inference about the target population with 5% margin will be convincing enough.

Assuming we use as our medium of distribution, which has a maximum 20% response rate, we would need our sample size to be 353*5=1765 students in order to account for this low percentage. Just to simplify we choose our sample size to be 1800. This sample size seems large, but with our source of C-book and computer sending out email to 1800 students would just take a moderate amount of effort.

There is always the risk that our sample is not demographically representative of the target population. To account for this we plan to perform additionally sampling to adjust our sample positively. For instance, if we do not have enough juniors in our sample, we will sample more juniors until our whole sample is representative of our population.