Some overall comments:

* there seems to be some confusion in your report abotu whether you are doing SRS or stratified sampling... please make clear

* what is the website that respondents go to, to answer your questionnaire?

* see note in your paper about formatting for referneces

* note that all 5 references did not get mentioned or listed in the paper!

Oliver Lam
Mike Len
Go Okumura
Rita Wang
Wentian Zhu

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

Abstract:

Selecting a major is an important decision for an undergraduate. What a student chooses to study often determines their future career by providing them with a knowledge base that will enable them to succeed in that field. At Carnegie Mellon University (CMU), students are allowed to change majors as they wish in accordance to certain influences in their life, including but not limited to perceived academic success, future job prospects, personal interests, and social pressures. This study aims to determine the retention rates of each major at CMU, which majors are most popular to switch to, and the prevailing factors that influence a students decision to change or not to change their major. Our results indicate(to be filled out later), which lend insight to what CMU departments can do to affect the popularity and retention rates of their majors by identifying what influences an undergraduate's decision on changing majors the most.

Section 1: Introduction

1.1 Research Question and Motivation

College major plays an important role in determining one's career and life after graduation. 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 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 would also like to know if classese has an effect on major changing and choosing. In situations that students don't switch majors even if they have originally thought so, we are interested in the reasons. This study would be most beneficial and significant for prospective students as they are able to make their decisions more carefully when they know reasons behind switching majors. This study 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.

Our survey sets out to asses the main motivations that drive students to change majors, what keeps students stay in their current majors, what are the factors that have possibly stopped students from changing majors even though they have thought about it, and the type of majors people are likely to ot have switched to. The results of this survey are based on students' responses about their opinions of their current majors, and their thoughts about what affected them the most when they changed or thought about changing major if they ever have done so. We sample students from each class level (sophomore and up) and compare the results. We expect to see different reasons from students in different departments for the field and characteristics of the majors within the department is similar.

1.2 Citations to Literature on This Topic

A survey called "Survey of Major Changers" presented by Dr. Judy Shoemaker of UC IrvineSurvey was conducted to determine why students change majors and how easy the process is. The results of the survey shows how the major-change process is perceived and what can be done to improve the process. Another survey "Freshmen Keen to Swtich Majors" conducted by Jia Jianyu in December 27, 2010 focused on the high volume Chinese University students wishing to change majors and the reasons behind it. The survey covered in the article has similar motivations to our proposed study, and can serve to compare our data with theirs.

1.3 Quick Summary of Results

After fully assessing our responses and results, we find that ...

Section 2: Methods

2.1 Target Population and Sampling Frame

The target population is the Carnegie Mellon undergraduate student population, specifically students in grade levels sophomore and up. We wish to make inferences on this population regarding our proposal topic.

For our sampling frame we will use the Carnegie Mellon C-book email list to avoid any unbiased collection of data. Since C-book lists email addresses of all currently enrolled Carnegie Mellon students, a random sample selected from the C-book email list excluding freshmen and graduate students gives us an appropriate sample frame.

2.2 Sample Size

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

$$n_0 = (z^2) \times \frac{SD^2}{ME^2} = (1.962^2) \times \frac{0.5^2}{0.05^2} = 384.16 \approx 384$$

$$n > \frac{(N \times n_0)}{N + n_0};$$

$$n > \frac{(4214 \times 384)}{4214 + 384} = 352.06 \approx 353$$

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 took a moderate amount of effort.

2.3 Sample Design and Methods

We have decided that sending out questionnaires from the C-book is the most unbiased and error-free procedure in conducting this survey. Since we feel that the questions asked in the survey are only adequate to persons in grades sophomore and up, we have excluded any responses from freshmen. 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. We will assume that simple random sample will distribute the population evenly in each grade automatically making this plan a stratified one.

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

as far as I can tell, you are not using stratified sampling.... at least, you did not describe it!

any double counting of responses, which could skew our results negatively.

please indicate what website you directed respondents to, to fill out the survey

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 gave 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.

2.4 Response/Non-response

The large sampling size of 1800 students resulted from a calculation assuming the maximum response rate of 20% which is fairly low. Our calculation was done assuming worst case scenario, therefore we expect to not encounter any problems regarding non-response rates. Although we have concerns regarding distribution of responses across different grade sub-groups, fearing one class may be over or under represented. To account for this issue, we will take some adjusting measures described in 2.6 Post-survey Processing section below.

2.5 A few Questions From the Questionnaire

What department is the major you are considering to declare?
(List of every CMU department)

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

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

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

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

Why didn't you change? (Check all that apply)
Not enough time to complete Financial Issues Parents don't agree Other

2.6 Post-Survey Processing

Coding procedure: we'll code our questions into numbers by replacing each possible answer with a simple number. For example,
Q: Have you changed major:
A: Yes = 1; No = 0.
Q: What factors influenced your choice to change majors? (Check all that apply)
A: Future Job conditions = 1, Sounded interesting = 2, provide a well rounded education = 3, Recommendations from others = 4, Ease of coursework = 5, Prepare for graduate school = 6, Other = 7

We'll have excel spread sheet for data entry. We'll do edit check after that.

Variance Estimation?

Our post-survey processing includes data collection, data entry, edit-checks and build weights. 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.

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

Section 3: Results

3.1 General Results
Sophomore

Male	**SCS**	**switched**	**reason to switch**	
		not switched	**why not if thought**	**reason to stay**

	CIT	**switched**	**reason to swithch**	
		not switched	**why not**	**reason to stay**
	MCS	**switched**	**reason to switch**	
		not switched	**why not**	**reason to stay**
	H&SS	**switched**	**reason to switch**	
		not switched	**why not**	**reason to stay**
	Tepper	**switched**	**reason to switch**	
		not switched	**why not**	**reason to stay**
	CFA	**switched**	**reason to switch**	
		not switched	**why not**	**reason to stay**

we will make similar tables for female, junior and seniors

We are currently under process of gathering data. We will expect to have enough responses to make conclusions by next week.

3.2 Statistical Analysis of Our Results

The first analysis step is coding--translating non-quantitative/non-categorical data into quantities and categories. In our survey, most of the data are in categorical form. Even though there are some originally open-ended questions, we have converted them into multiple choice questions in order to make the coding process simpler. We make sure that the multiple choices we provide cover a wide range of possible answers if the question is open-ended, and if a students' answer doesn't fall into any of the multiple choices, he/she can always answer "other" and specify. However, we predict such cases are rare, and we will make a footnote for these outliers if there appears to be some.

Our stratification is based on gender, major and grade level. Upon obtaining the data, we will determine the percentage in which students have responded according to various categories such as gender, major, grade-level, etc.

In the end, we will compare the numerical results such as percentage of students having thought about changing majors in different colleges, and what are the most driving reasons behind major switching. We hope to see a pattern of distribution after the analysis is completed.

3.3 Conclusion of our Results

We expect to see some kind of distribution for each question asked. Anything significant

results will be noted, studied, and analyzed thoroughly.

Section 4: Discussion

4.1 Research Questions

We hope to explore the factors that affect a student's decision to change or retain their majors and how prevalent these factors are in the decision making process.

1. What percentage of the students like their current major
2. What percentage of the students thought about switching majors?
3. What percentage of the students have changed or are going to change their major
4. What are the reasons behind students who decided to change their majors?
5. Which factors play a role in decision making process of switching majors?
6. What kind of issues arise when considering to switch majors?

4.2 Surprising or Unexpected Results ... or even "expected" results...

Anything significant results will be noted, studied, and analyzed thoroughly.

4.3 Answer to the Research Questions

Our expectations for the research questions presented above is as follows.

1. We expect to see about >50% of students to like their current majors.
2. We expect this percentage to be very high (>75%).
3. Although we expect percentage of 2 to be very high, we expect the actual percentage of students switching majors to be lower than 50%. This is because there are various factors and issues regarding switching majors, and it is our primary goal in making conclusions on why this is the case.
4. We predict that majors that are less difficult, renowned, academically higher ranked, and yield high pay after graduation will have higher retention rates. The opposite will be true for lower retention rates.
5. Hopefully the reasons behind changing majors is one of the choice listed in the multiple choice. If there is a significant amount of students filled out “other” we will ensure to include that in our discussions.
6. Same as 5
7. Same as 5

4.4 Strengths and Weaknesses

We hope to find some significant distribution or percentage through our responses. This would add meaning to our study, and allow us to make strong conclusions on questions listed above.

However if the distributions of responses are spread evenly with no significant results, it is hard to make inferences.

4.5 Take-home Messages

If the result shows a significant portion of students who are held back because of university major switching policies, then we could advice the university to impose less constraints on major switching and design more flexible curriculum.

Also, our result will tell what influences students to change major/retain the most. This will help perspective students to think carefully before declaring majors. For example, if heavy workload is a common reason why people decides to quit their current major, incoming students or freshmen should take a second thought on whether or not they could manage to complete the coursework if they declare their desired major. Our result will also indicate the majors students are most likely to switch to, and this will give perspective students some ideas about the most popular majors at CMU.

List of References

Please make your references look like the examples in the second half of http://www.library.cornell.edu/resrch/citmanage/apa

Dr. Judy Shoemaker. "Survey of Major Changers". Oct. 15, 2007. <http://www.assessment.uci.edu/reports/documents/SurveyofMajorChangers.ppt>

Jia Jianyu. "Freshmen Keen to Switch Majors". Dec. 27, 2010. <http://life.globaltimes.cn/life/2010-12/604400.html>

Women in Computer Science, *Stanford Survey Results*. "Whether Students Have Considered Switching Majors, and Why" <http://www.cs.washington.edu/homes/letchner/classwork/cs201/survey.html#switchingmajors>

CMU website, retention rates

Apendix 1: Survey

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 department(s) are the major(s) you are considering to declare (check all that apply)?

(Checklist of every CMU department)

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 department does your current primary major belong to?

(List of every CMU department)

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 previous major?

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

Which department was your previou major within?

(List of every CMU department)

Why did you choose your previous 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 previous 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 department is the major you were thinking about switching to (check all that apply)?

(Checklist of all CMU departments)

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.