

# SI618: Students' Opinion on MOOCs

## Motivation

I have been working with Christopher Brooks, a Research Fellow at the University of Michigan (UM), looking at University of Michigan students' relationship with Massive Open Online Courses (MOOCs) and their opinions about MOOCs as a whole and in relation to the university. We recently finished administering a survey to a random sampling of University of Michigan students. This is the dataset I used for this project.

I explored the following four research questions: What types of students take MOOCs? How do students think MOOCs should be funded? What are students' opinions of the impact of MOOCs on their own education? How do students think the UM should treat MOOCs?

## Data Source

The dataset contains 798 responses from University of Michigan students, exported from Qualtrics as a csv file at the end of our survey. The questions on the survey are almost all categorical variables, with some nominal (Yes/No), and others ordinal (likert scales, 1-5). Some of the main variables include whether students have enrolled in a MOOC before (Yes/No), reasons for enrolling in a MOOC (likert scale for every reason), whether UM should offer course credits for UM MOOCs (Yes/No), and how MOOCs might be funded (likert scale for every option). These results were combined with student demographics obtained from the University of Michigan Data Warehouse. The student demographics included sex, birthdate, academic load, academic level, current GPA, cumulative GPA, academic group, field of study, degree, and CIP code. These two datasets were anonymized using MD5 hash (code: anonymize.py). The datasets were then combined into one dataset based on a common hash value (code: combine.py), resulting in a final combined student dataset, available at <http://goo.gl/Prmq3i>.

## Methods

### Q1: What types of students take MOOCs?

To look at the types of students that take MOOCs, I looked at the Qhaveenrol variable, which asked if students have enrolled in a MOOC before. I recoded the academic level variable, creating a new variable (edulevel) that grouped students into freshmen, sophomores, juniors, seniors, masters, and doctoral students. I dropped all undeclared/unspecified students because there were only two in the dataset. Next, I created a factor for MOOC enrollment, separating the students into those who have taken a MOOC and those who have not.

To see who enrolled in a MOOC, I created a pie chart comparing those who have taken a MOOC to those who have not. I then created stacked bar charts based on different demographic variables including education level, sex, and academic load.

### Q2: How do students think MOOCs should be funded?

To see students' opinions of how MOOCs should be funded, I looked at the variables for the three funding questions, which asked students to state their level of agreement to a series of hypothetical funding options for UM MOOCs: donations (Qhypofund\_1), from university student tuition (Qhypofund\_2), and through MOOC enrolment fees (Qhypofund\_3). I created a data frame that displays a count of each level of agreement for each variable. I then removed all the NA responses from my analysis. I wanted to plot all three variables and the

level of agreement on the same graph so that I could easily compare the response and the level of support for each hypothetical funding situation. I discovered the reshape package in R and used this to help reshape the data before my analysis. I used the melt function to get a data frame so that every row is a unique id-variable combination and a count of the number of responses with that combination. Finally, I created a stacked bar chart that displayed each hypothetical funding option and the level of agreement within the stacked bar.

After seeing students' opinions of how MOOCs should be funded, I wanted to see if there was a difference in opinion depending on whether or not students had enrolled in a MOOC before and depending on the students' level of education. To determine this, I created a data frame with each of the funding variables, education level, and MOOC enrollment. I recoded NA responses (indicated as 6 in the dataset) to be NA, and then removed all the NA responses. For each funding question, I created a stacked bar graph factored by education level and another by MOOC enrollment.

### Q3: What are students' opinions of the impact of MOOCs on their own education?

To determine students' opinions of the impact of MOOCs on their own education, I looked at several questions: reasons they enrolled in MOOCs, how participation in MOOCs influenced their academic study, and their opinion on the benefits of volunteering to help with a MOOC. I wanted to see the difference in opinion depending on students' education level.

To determine how participation in MOOCs influenced students' academic study, I created a new influence variable based on the six options provided in the survey. Students were asked, "Has your participation in one or more MOOCs influenced your academic study?" and asked to select all that applied. There were 6 options available, outside of the "Other" option. These were used to create one influence variable with 6 levels of responses. After creating the influence variable, I created a data frame with the influence variable as well as education level. NA values were removed, then influence was plotted by education level.

Determining students' opinion on the benefits of volunteering to help with a MOOC required the use of the reshape library again to melt the data into the right structure before graphing the data. Each volunteer response (Qmooccreat\_1, Qmooccreat\_2, Qmooccreat\_3, Qmooccreat\_4) was added to a separate data frame and a count of the number of responses for each level of opinion was made. These were plotted on a stacked bar chart to show the four different responses side by side with a distribution of students' opinion. I also wanted to look at how these opinions differed depending on a students' education level. Stacked bar chart separated out by education level was created for each of these variables.

Finally, to analyze students' reasons for taking MOOCs, again I combined 5 different likert scale questions that represented possible reasons on the survey into one graph, with a stacked bar chart for each reason and the level of agreement represented as each level in the stack. I dropped the Other response and used only 5 items in the analysis. When creating the data frame with a count of each agreement level for each variable, I had trouble combining the different variables because they had different column lengths. For some of the reasons, there were levels of agreement that students never chose (ex. for Qreasons\_1, no student picked option 6). For these, I added a new column for the missing agreement level and set that value to 0. Once I combined all the reasons into one data frame and melted the variables together to create a data frame of every category and variable combination, I created the stacked bar chart. Finally, I created a stacked bar chart for every reason separating out the responses by education level.

#### Q4: How do students think the UM should treat MOOCs?

To answer the question of how students think UM should treat MOOCs, I looked at the variables Qcoursecre, Qadmitstu, and Qbenefiten, which students responded Yes, No or I Don't Know to. Qcoursecre asked students if the university should consider offering UM credits to students taking UM MOOCs, Qadmitstu asked students if MOOCs should be considered when admitting students, and Qbenefiten asked students if they thought UM MOOCs are a benefit to students enrolled in traditional programs at UM.

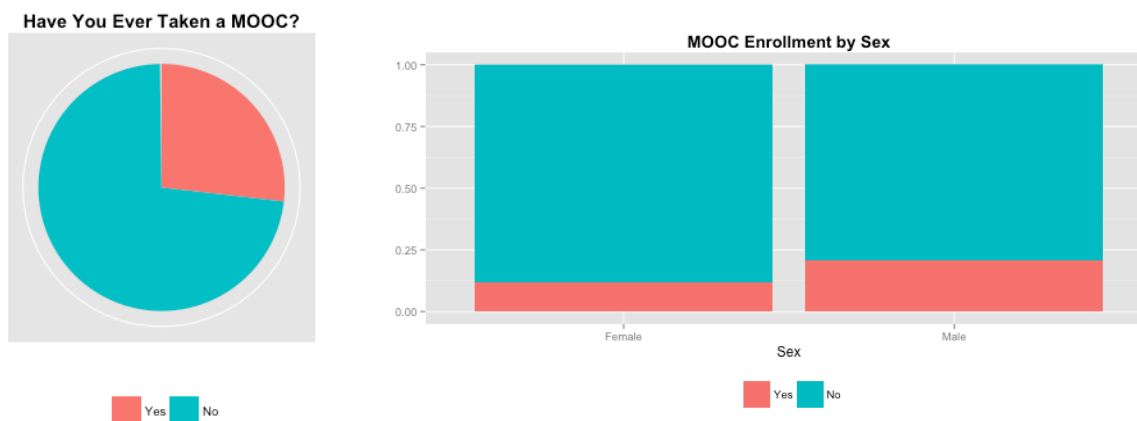
To prepare the data for analysis, I created a data frame with the three variables and melted them so that I had a count of each response for each question in one table. This was then used to create a stacked bar graph that showed each question side by side with the ratio of students' answers stacked on the graph. I also created tables for each variable factored by education level as well as by MOOC enrollment.

### Analysis and Results

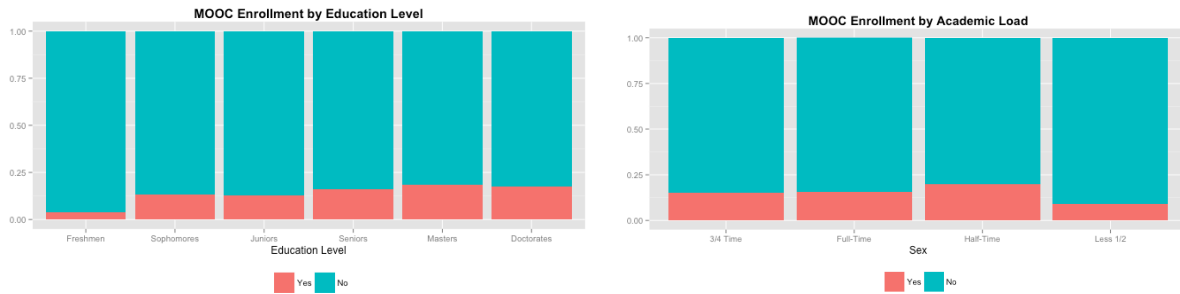
I only included the graphs that showed interesting relationships in this report, however, the code for all the graphs mentioned in the Methods section is available in the R file.

#### Q1: What types of students take MOOCs?

To answer this question, I looked at the students who reported that they have taken MOOCs before. 27% of the students surveyed have enrolled in a MOOC before. Around 12.5% of female students and less than a quarter of male students have enrolled in a MOOC.



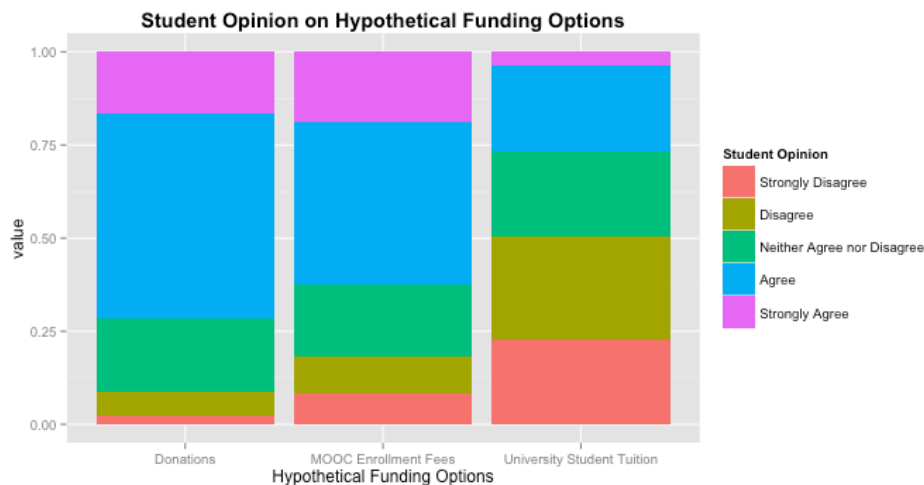
Looking at the academic makeup of students, there are a higher percentage of Masters students and doctoral students who have taken MOOCs before compared with the other education groups. There seems to be an increase in MOOC enrollment between freshmen and sophomore year. Only 7% of freshmen have enrolled in a MOOC before compared with 23% of sophomore students. This is not surprising as a lower percentage of those in lower education levels have heard of MOOCs compared to students in higher levels. Only 14% of freshmen indicated they have heard of a MOOC before compared with 16% of sophomores, 40% of juniors and 38% of seniors. Perhaps students were not exposed to this type of learning until they were further along in their education.



Looking at the academic load, it appears as though there is a higher percentage of MOOC enrollment by students with a half-time academic load. This visualization is misleading however because there were only 6 half-time students in the survey. The majority (94%) of those surveyed were full-time students.

## Q2: How do students think MOOCs should be funded?

Looking at student responses to hypothetical funding options, overall, students were more in favor of donations and MOOC enrollment fees as methods of funding MOOCs at the university compared to university student tuition. 50% disagreed with funding MOOCs through university student tuition. There was a high level of support for funding MOOCs at the university through donations—almost 75% agreed or strongly agreed with this option.



I was interested to see if students' education levels affected their opinions on how MOOCs should be funded. When looking at supporting MOOCs through donations, junior students showed the highest percentage of support for this option. Over a quarter of students in all education levels strongly disagreed with supporting MOOC development through university student tuition. Interestingly, over half of the seniors agreed or strongly agreed with supporting MOOC development through university student tuition. Perhaps this is due to the fact that these students are graduating soon (this survey was administered in March of this year) and won't be paying tuition anymore. Almost half of the sophomores disagreed with university student tuition as a method of funding MOOCs. Finally, when asked about funding MOOCs through MOOC enrollment fees, with the exception of senior and junior students, over

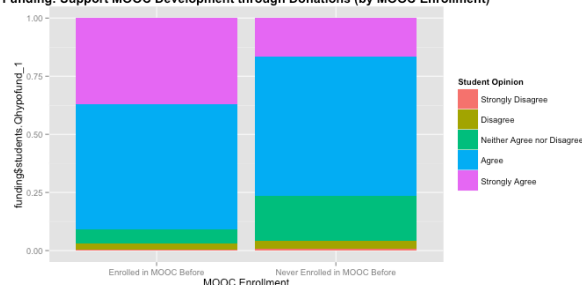
75% agreed or strongly agreed with this method. Senior students had the largest percentage of disagreement with this funding option.



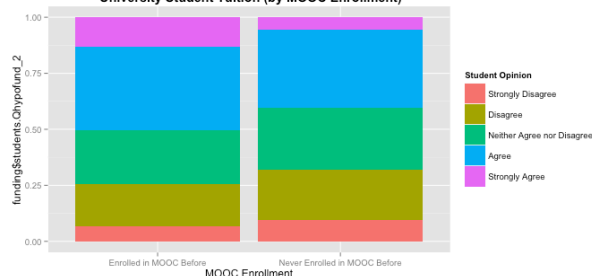
I also looked at the effect of previous MOOC enrollment on opinions of how MOOCs should be supported. An overwhelming majority of students who have enrolled in MOOCs before agreed with funding MOOCs through donations. A higher percentage (50%) also supported funding MOOCs through university student tuition, with over 12% of strongly agreeing with this method of funding. Finally, almost 75% of students who have enrolled in a MOOC before agreed or strongly agreed that MOOCs should be supported through MOOC enrollment fees. This is interesting because it hints at the fact that students see value in the

MOOCs they have enrolled in before and are willing to pay a fee for that education over and above the tuition they currently pay for school.

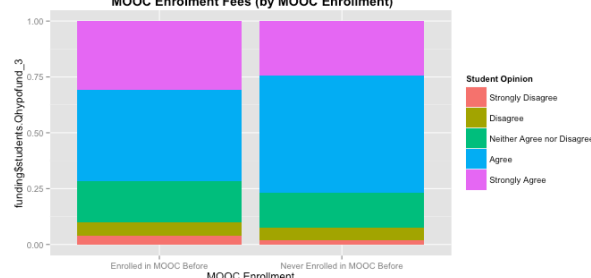
Funding: Support MOOC Development through Donations (by MOOC Enrollment)



Funding: Support MOOC Development through University Student Tuition (by MOOC Enrollment)

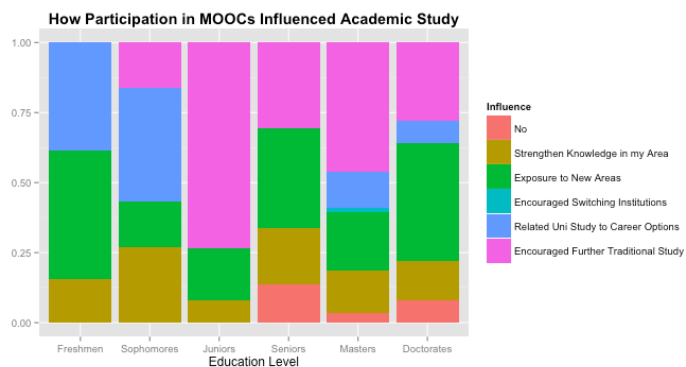


Funding: Support MOOC Development through MOOC Enrollment Fees (by MOOC Enrollment)

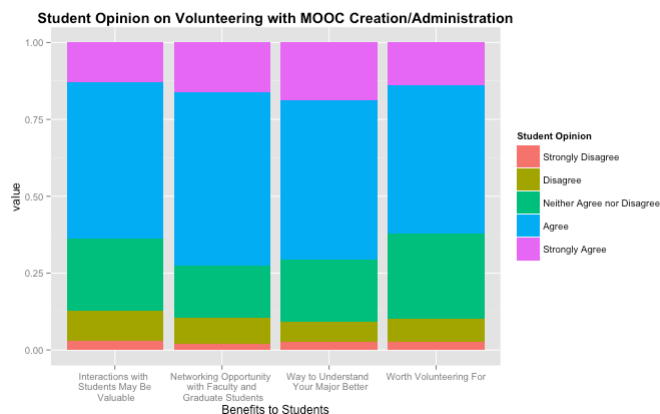


### Q3: What are students' opinions of the impact of MOOCs on their own education?

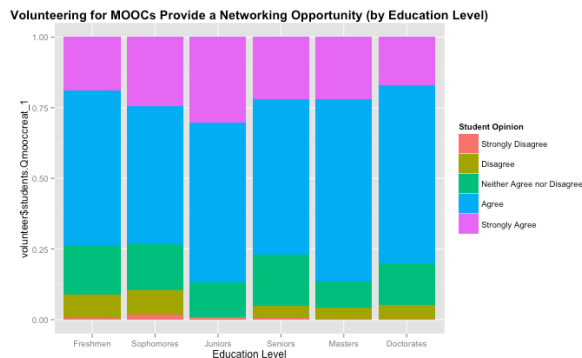
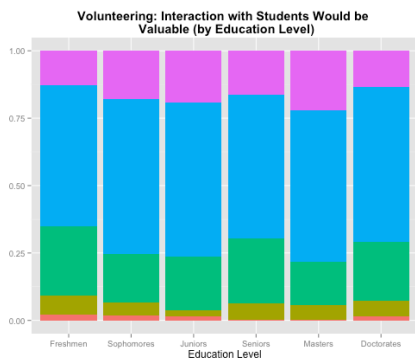
Looking at students' opinions on how participation in MOOCs influenced their academic study (this question was only given to students who indicated they have enrolled in a MOOC before), over 12% of senior students said that participating in MOOCs did not influence their academic study. None of the freshmen, sophomores or juniors indicated that MOOCs did not influence their academic study. That MOOCs encouraged students to consider further study accounted for 75% of junior students' responses. Perhaps junior year is a time when these students are considering whether or not to pursue further education after they graduate and they are using MOOCs to evaluate potential education options. This option also accounted for almost half the responses from Masters students. Only Masters and doctoral students indicated that participation in MOOCs encouraged them to switch institutions—perhaps the institution that offers the education is not as important to undergraduates compared to Masters and doctoral students. Surprisingly, none of the juniors and seniors indicated that MOOCs helped them relate university study to their career options. This option accounted for a large percentage of responses from freshmen and sophomores. Perhaps by the time students reach their junior and senior year, they have a good sense of what their career outcome might be based on the current degree they are pursuing.

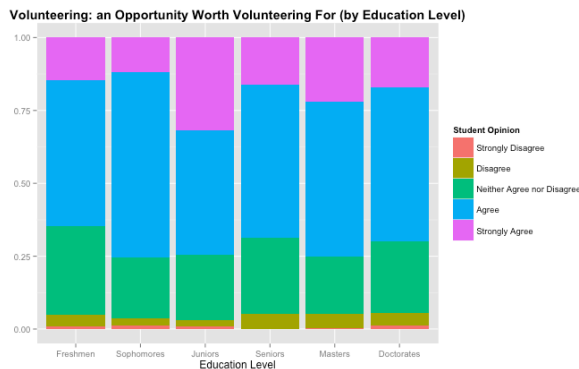
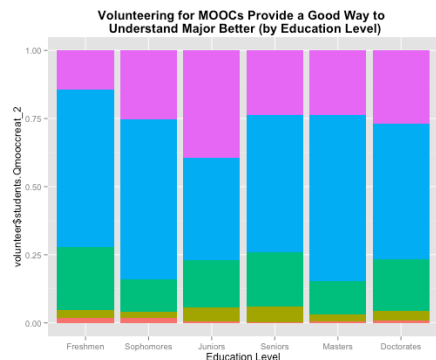


Looking at student opinion on volunteering with MOOC creation and/or administration, in general, students responded favorably to the various ways in which volunteering could be beneficial to them. The highest percentage of favorable responses were for networking opportunities—almost 75% of students agreed that volunteering with MOOCs would provide a networking opportunity with faculty and graduate students.

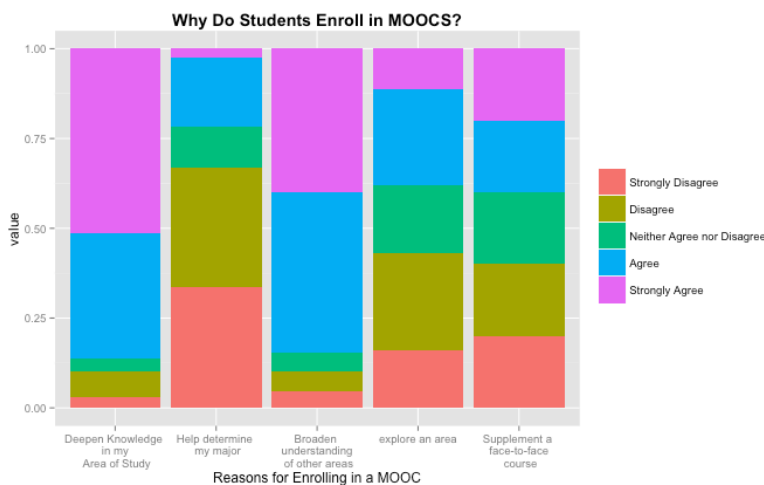


I also looked at the response for each potential benefit to students across all the education levels, but there wasn't anything particularly surprising. Most students across all education levels thought that it would be worth volunteering for. A large portion of junior students—around 88%—felt that volunteering for MOOCs would provide a networking opportunity with faculty and graduate students. This, along with the previous result that showed a large number of junior students indicating that MOOCs help them consider further study, perhaps shows that students at this point in their education are starting to consider further education and are using MOOCs as a way to evaluate their interest and future pursuits.



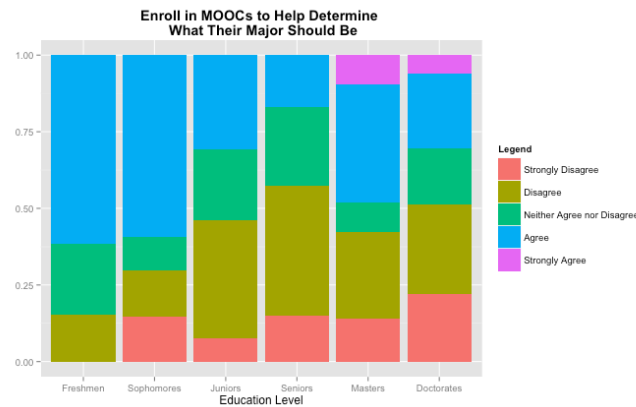


Finally, I looked at why students enrolled in MOOCs to evaluate students' opinions of the impact of MOOCs on their own education. An overwhelming majority enrolled in MOOCs to deepen their knowledge in their area of study. Almost 88% of students agreed with this statement and over 50% of students indicated strong agreement. Most students also use MOOCs to help broaden understanding in other areas as well. Most students do not use MOOCs to help determine their major but almost 40% indicated that they use MOOCs to explore an area to see if they should take a course in that area for university credit. Surprisingly, almost 40% of students enroll in MOOCs to supplement a face-to-face course, indicating that students are perhaps taking MOOCs alongside traditional university courses to help supplement their graded learning.

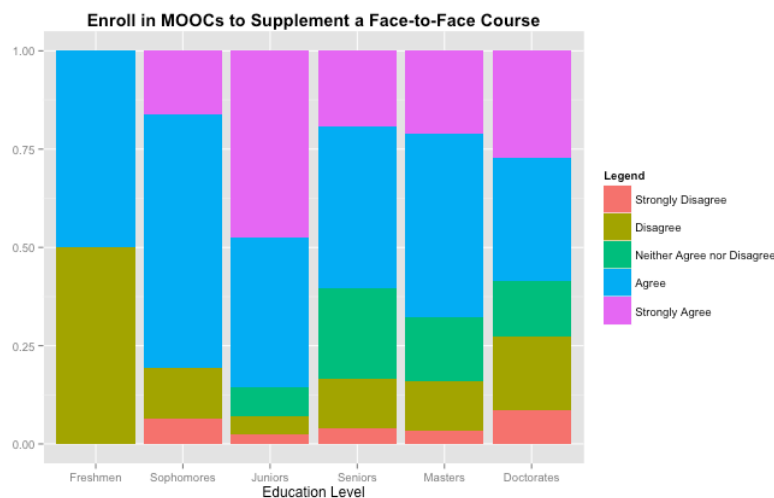


I also looked at the reasons for enrolling in a MOOC across the different education levels and found a few interesting insights. When asked whether or not students enrolled in MOOCs to help determine what their major should be, the largest percentage of students that agreed with this statement were freshmen. The level of agreement with this statement decreases as student education level increases, with over 50% of senior students disagreeing with this statement. This makes sense as students declare their majors throughout the course of their education. However, a large percentage of Masters students (almost 50%) also indicated that they use MOOCs to help determine their major. This then decreases again with the doctoral students.



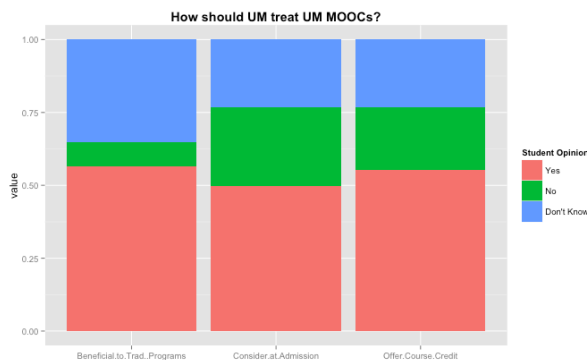


A higher percentage of juniors and sophomores indicated enrolling in MOOCs to supplement a face-to-face course compared with all other education levels. Almost 50% of juniors strongly agreed with this statement; over 75% showed agreement to this statement. There is a significant increase in students enrolling in MOOCs to supplement a face-to-face course from freshmen to sophomores. 50% of freshmen indicated enrolling in MOOCs to supplement a face-to-face course while the other half disagreed with this statement. Perhaps students at sophomore and junior levels of their education feel that the traditional programs at UM are not providing the level of support they feel they need to succeed in class.

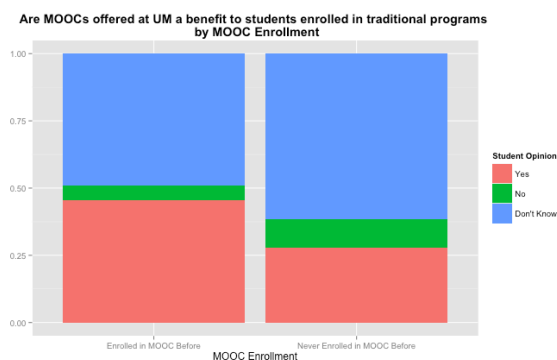
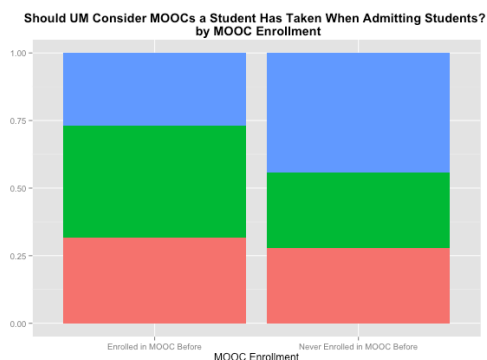


#### Q4: How do students think UM should treat MOOCs?

When looking at student opinions on how UM should treat MOOCs, over half of students said that UM should offer course credit for MOOCs, that MOOCs should be considered when admitting students, and that MOOCs are beneficial to traditional education programs. Only a small percentage (8%) of students indicated that MOOCs are not beneficial to traditional programs at UM but 35% of students indicated that they did not know if MOOCs are beneficial to traditional programs. Over a quarter of students feel that MOOCs shouldn't be considered at admission and almost 22% indicated that UM should not offer course credit for MOOCs. From this, student opinion appears to be divided as to how MOOCs should be treated at UM.



I looked at these same three variables between students who have taken a MOOC before and students who have not. Surprisingly, when asked whether MOOCs should be considered when admitting students, a higher percentage of students enrolled in MOOCs before indicated that the university should *not* consider MOOCs compared with those who have never enrolled before.



When looking at whether MOOCs offered at UM are a benefit to students enrolled in traditional programs, even students who have enrolled in a MOOC before are unsure as to whether or not these courses would benefit traditional programs. Almost 50% indicated they don't know. Over 60% of students who have never enrolled in a MOOC before indicated that they didn't know.

Finally, I looked at how students feel UM should treat MOOCs across the different education levels. Interestingly, the level of support for all three statements decreases steadily as students' education levels increase. Only 25% of doctoral students agree with those statements.

