How Teaching with Cases Affects Student Attitudes in Math for the Liberal Arts Courses
Rachel Bayless
Agnes Scott College

PROJECT OVERVIEW

Math for the Liberal Arts is a course for non-science majors. Most students in the course are math-phobic and are only taking the class to meet their graduation requirement. Thus, it may be the last math course they ever take. The goal of the course is to change students’ outlooks on mathematics. They should gain an appreciation for the subject and see how mathematics permeates other fields including the social sciences and the humanities. This SoTL project studies whether or not teaching with cases changes students’ perceptions of mathematics. This semester I taught the first few sections via fairly traditional methods. I did, however, motivate each section with real-world examples, and every homework assignment had fabricated real-world-type problems. Then, I switched to teaching entire chapters of material with case studies. I am evaluating student attitudes via a survey after each section. A very rudimentary analysis of the initial data indicates that the students are responding positively to the case studies. I am seeing very different answers to questions about applicability of math and whether or not it is an important subject to understand.

This semester Agnes Scott was also part of the MegaMenger project, and we worked to build the world’s largest fractal! My students worked for months building and organizing the necessary materials. This project has also affected student attitudes in my Math for the Liberal Arts Course. One of the survey questions asks whether or not the students believe that mathematics is an art. Almost every student originally answered “no” and gave some explanation. In my most recent survey most students answered “yes” and said that the fractal we built is a beautiful piece of art. It was amazing to see this change! Below are a few pictures from the project.

(Left, Center) Students from my courses working on building fractal pieces.
(Right) Me with the final product.
1. Voting Theory Case Study
Voting theory is the mathematical study of voting methods. The main problem in voting is that when there are more than two candidates in an election, using a different voting method can produce drastically different outcomes even if nobody changes their vote. I developed a case study using the data from the 1970 presidential election in Chile, which was a particularly controversial election. The story is written from the perspective of a mother, Sofia Martinez, who lost her child in the riots after the election. She is trying to understand how Salvador Allende won the election with only 36% of the votes. The case follows excerpts from Sofia’s diary as she learns more about voting theory. In the end, she learns that if Chile had used a different voting system, then Allende may have not only lost the election, but he may have ranked in last place.

2. Simpson’s Paradox Case Study
Suppose we have data on several groups and have established a relationship or correlation between each of these groups. Simpson’s paradox says that when we combine the groups together the correlation we observed may completely reverse itself. I developed a case study using the 1973 graduate admissions data from Berkeley. The story follows a female student who applied to Berkeley and upon being denied admission decided to sue the school claiming gender discrimination. The case is presented as a series of letters between her lawyer and a Berkeley representative. In the first letter the lawyer presents aggregate data that show Berkeley admitted a higher percentage of male applicants than female applicants. In Berkeley’s response the same data are broken down by department, and we can see that each individual department actually admitted a higher percentage of female applicants. This situation is a surprising paradox. How did every department admit a higher percentage of females, while the entire school admitted a higher percentage of males? This case explores the motivation for this question, as well as the mathematics behind its answer.