

Synthesizing Your College Experience

Educator: Dylan Helliwell, Associate Professor, Mathematics

Context: Out of class; Senior Synthesis

Keywords: academic identity, seniors, capstone

Student Activity Time: 10-20 hours throughout the academic year

Students reflected on their college experience as mathematics majors in a senior synthesis course.

Introducing the Reflection Activity

As students approach the culmination of their undergraduate careers, taking an opportunity to reflect on their academic pathway can help inform their next steps. An educator used a series of five assignments related to students' experience within the mathematics major. The purpose of this activity was to support student reflection of their educational experience and plan their next steps after graduation.

Throughout the senior synthesis course for mathematics majors, an educator used five reflection activities, dispersed throughout the academic year, to prompt student reflection of various features of their undergraduate experience. The activities are for both students' direct benefit and provide an informal, departmental level assessment of the program.

The first assignment for the course was a mathematical autobiography. Students were to respond to the following prompts in a 1-3 page essay:

1. What classes have you taken?
2. What have been your best experiences?
3. What have been your worst experiences?
4. What subjects within math do you like the most?
5. What would you like to be doing in 5 years?

The educator used this essay as an opportunity to get to know students and used the responses to support the subsequent topics and conversation in the senior synthesis course.

The sequence of the remaining assignments was inconsequential for the course, but included four specific topics: connections, perceptions, use of technology, and experience with the core university courses. Each assignment included a 1-3 page essay that was used to develop the final paper for the course.

The connections assignment focused on different topics in mathematics and other technical and non-technological subjects. The educator assigned the article *The Unreasonable Effectiveness of Mathematics in the Natural Sciences* [1] by Eugene Wigner and for students to find and read a response to this paper by another author. Students were assigned to write an essay about their perspectives on connections between math and other subjects and include commentary about the article they found. Students then brought their essay and response article to class and discussed connections within mathematics and between other subjects.

Another assignment focused on students' perception of mathematics and how that perception changed over their time as a math major. The educator assigned students to read *Logicomix: An Epic Search for Truth* [2], a graphic novel about the life of Bertrand Russel and write an essay about how their perceptions of mathematics have changed. The educator facilitated an in-class discussion about how students' perceptions of mathematics have evolved over time within the major.

The third assignment focused on the core university classes taken by students. Students were prompted to recall the core courses that they took outside of the math department and discuss the influence those courses had. Additionally, they were prompted to identify one core course and write about their thoughts on that course as it related to their experience as a mathematics major. Their work needed to be supported by at least one scholarly work from the core course. As a whole, this assignment resulted in a 3-5 page paper.

The fourth reflection assignment prompted students to reflect on and share how technology had been used in their classes at the university and specifically within the major.

The culminating assignment required that students merge their four reflection assignments and mathematics autobiography into one 10-15-page report due at the end of the academic year. The report was graded primarily on the extent to which students responded to the given prompts within prescribed guidelines (including length, depth of analysis, appropriate references) and secondarily on the quality of the writing. The particular views or opinions of the students did not impact the grade.

As a result of this activity, students had the opportunity to reflect on their choice of major, future goals, and how their experience as a mathematics major at the university influenced their identities, knowledge, and plans for the future. The assignment allowed students to make personal meaning of their coursework and college experience in a holistic fashion.

Recreating the Reflection Activity

	Description
1	Introduce the Senior Synthesis course, purpose, and goals.
2	Assign the mathematics autobiography at the beginning of the term.
3	Assign, grade, and return the remaining four assignments throughout the academic year.
4	Assign students to merge the autobiography and four assignments into one, cohesive report.
5	Grade and return the final report.

In the words of the Educator: Tips and Inspiration

Prompt students to start questioning themselves. A lot of students end up as seniors and it's not clear to them why they are math majors. The activity really gives students a chance to confirm their place in the world – why are they a math major? Why are they doing the things they find themselves doing? A lot of students end up as seniors in math simply because that is the path they were put on and it's clear to me that they haven't yet reflected on their path, which is somewhat unfortunate. It would be nice if we had a mid-college career opportunity to help students think about what they have done so far, what they like and dislike so that they can choose a path from there. I catch them at the end with the assumption that they are passionate about math and sometimes that's not the case. This activity gives students a chance to make sense of and redirect their path if need be.

Facilitate a discussion for each prompt and focus on the cohesive paper. In the past, the focus really was on the individual assignments as stand-alone artifacts. We've moved to focus on students putting together a cohesive, large document and committing a full class to discuss each prompt. Even when students try not to be introspective, the need to discuss as a class and later combine each piece into one whole story requires that you spend some time with it.

What was the inspiration for the reflection activity? This is a core class and it is required among all senior synthesis courses to include an opportunity to reflect on the entire core. Some components of the course were just inherited, but I wanted to give students a chance to think about their whole story and tell us, as faculty, things that we can do to improve. Essentially, I try to use this as a barometer for the department. I let the students know that we're very invested in their answers and will bring back their responses to the rest of the faculty.

[1] Wigner, E. P. (1960). The unreasonable effectiveness of mathematics in the natural sciences. Richard Courant lecture in mathematical sciences delivered at New York University, May 11, 1959. *Communications on pure and applied mathematics*, 13(1), 1-14.

[2] Doxiadis, A., Papadimitriou, C. H., Papadatos, A., & Di Donna, A. (2010). Logicomix: An Epic Search for Truth. *Mathematical intelligencer*, 32(3), 51-52