

Analyzing the Effects of a Revised Curriculum in a Content Course for Middle & Secondary Mathematics

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Introduction

This research is an extension of previous research done to create a revised curriculum that would replace the texts that previously guided Elon's preparatory math content course for middle and secondary prospective math teachers, MTH 308. The revised curriculum included warm-up activities, small group activities, readings and problem sets.

During SURE 2020, the student researcher and mentor analyzed the effectiveness of this coursepack based on preliminary qualitative feedback given from biweekly journal entries.

Background

This research began as a result of suspicions from student researcher and mentor alike that the two textbooks that led the class, *Mathematics for Secondary Teachers* and *Mathematics for High School Schools: Advanced Perspective* were inadequate for the preparation of prospective mathematics teachers.

Not only did we uncover that these texts were misaligned to both Common Core and Praxis Standards and were overly complex for middle grades prospective teachers but we also discovered many other books on the market shared these shortcomings.

Research Questions

1. In what ways does this course-pack affect prospective teachers' understanding of mathematical concepts?
2. How do middle school and high school prospective teachers' perceptions and knowledge changes compare?
3. How could this course pack be improved in subsequent course offerings?
4. In what ways can course content be packaged to best be understood by prospective teachers?

Methods

Qualitative feedback followed guidelines put forth by Creswell in *Qualitative Inquiry and Research Design*.

Following those guidelines, there were several rounds of analysis.

1. During the first round, journal entries were read and mental notes were made of possible themes.
2. The next round involved making notes in the margins of potential themes
3. The third round involved organizing those notes into categories of emergent themes
4. Emergent themes were then tallied for totals, minimums and maximums and put into a spreadsheet

Top-three themes per week and overall were then highlighted.

Journal Response Prompts

1. Provide a brief summary of the content that was addressed in class this past week (or since your last journal entry).
2. What activities do you feel best contributed to the development of your understanding of the course content?
3. How will the activities that you listed in (2) affect your future teaching practices?
4. Which math problem this past week was the most challenging and why? (Feel free to list more than one.)

Topics	Journal I	Journal II	Journal III	Journal IV	Journal V	Journal VI	Total	Minimum	Maximum
Perspectives	8	4	2	2	3	0	19	0	8
Warm-Ups (Good)	4	1	0	2	1	0	8	0	4
Warm-Ups (Bad)	1	0	0	1	0	0	2	0	1
Collaboration	5	4	6	2	3	0	20	0	6
Visuals	1	1	5	4	2	4	17	1	5
Hands-On	0	2	0	1	2	2	7	0	2
Explanations	4	5	2	1	0	0	12	0	5
WHY	1	3	2	0	0	0	6	0	3
Difficulty	3	5	4	4	6	3	25	3	6
Notes	0	0	0	1	1	2	4	0	2
Content Tensions	0	0	3	3	2	2	10	0	3
Integration	0	0	3	1	1	0	5	0	3
Real World	0	0	1	2	3	2	8	0	3
Zardoian	5	2	0	0	0	0	7	0	5
Cookie Jar	0	0	5	0	0	0	5	0	5
Functions	0	0	0	4	0	0	4	0	4
Radicals	3	0	0	0	0	0	3	0	3
Refreshing Skills	4	0	2	1	0	0	7	0	4
Definitions	0	0	4	3	0	0	7	0	4

Results

Top Emergent Themes:
Scaffolding, Collaboration, and Perspectives

Scaffolding was the most ticked category with a total of 25 tally marks while collaboration received 20 tally marks and perspectives received 19 tally marks.

However, there were other important themes that emerged in the top three of biweekly findings such as explanations, visuals, real-world connections, and the use resources and notes.

Topics such as Zardoian Math, the Cookie Jar Problem and the Functions unit each made the top-three in the week they were taught for either positive or negative feedback

With eleven students in this course, themes could have a maximum of 66 tally marks total and 11 tally marks per week.

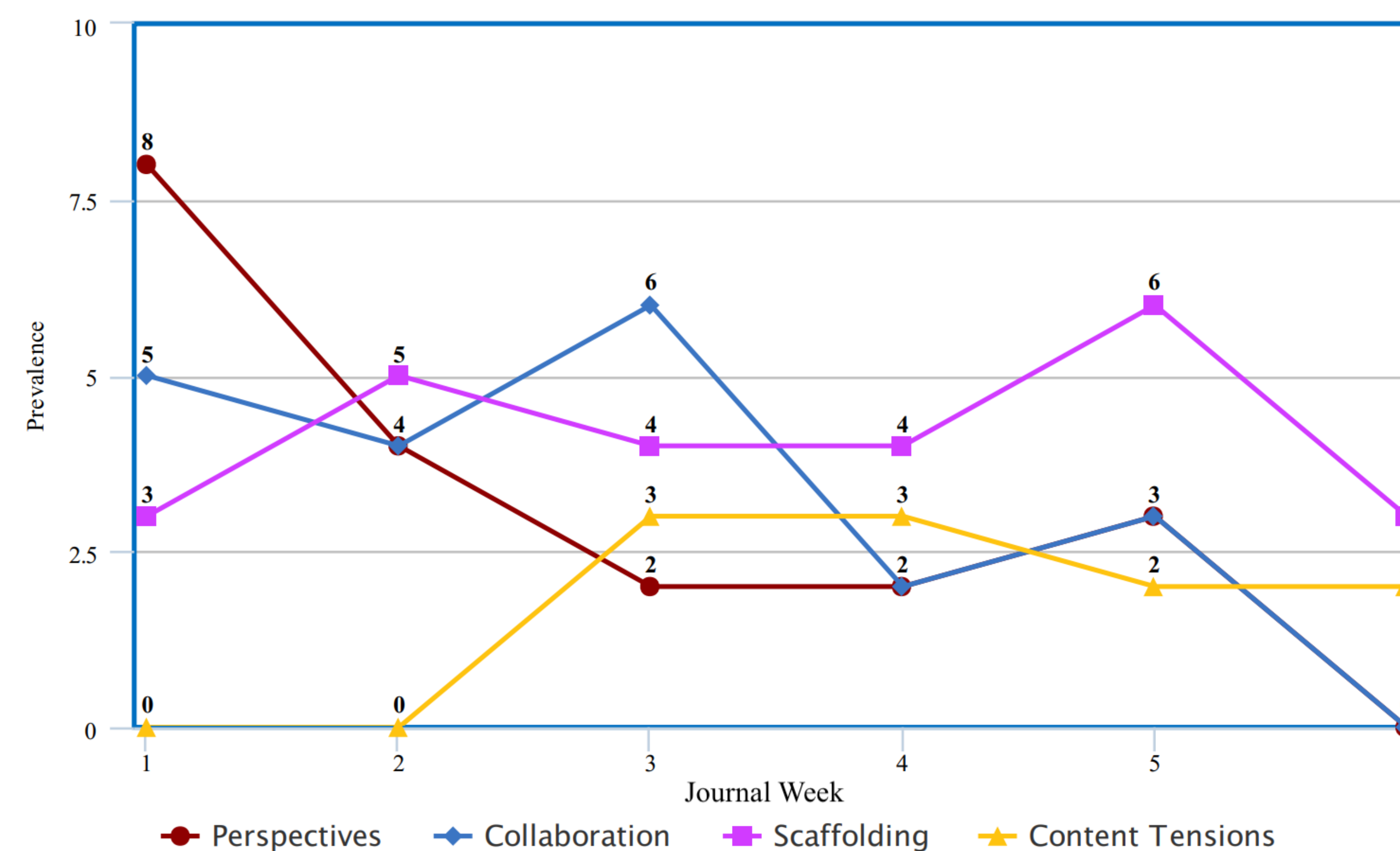
Discussion

The decrease in perspective's prevalence in later weeks signals the need for increased perspective enhancing activities later in the course.

Collaboration was positively referenced in 45% of Journals I-III. Decreased prevalence later in the course is theorized to correlate to increased tension between majors and potentially a need for increased scaffolding.

Tensions between middle and secondary prospective teachers is believed to have increased in response to the lack of overlap in content expectations and understanding

Trends of Top Emergent Themes Throughout the Course



Further Research

Reexamine aspects of the course for removal, reworking, or rewording.

Create hands-on, relatable, and visual notes and activities

Analyze quantitative data in the form of pre/post tests

Apply for publication in *Issues in the Undergraduate Mathematics Preparation of School Teachers*

Research how we can maximize productive struggle in a classroom with varying content expectations

Search and analyze more texts for alignment with Common Core and Praxis standards