

# Success, Struggle, Surprise, and Short-term Goals: Reflections from Mathematics Graduate Students Teaching

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Math Alliance Doctoral Scholars Session at JMM

# Outline & Goals of the Talk

Success,  
Struggle,  
Surprise, and  
Short-term  
Goals:  
Reflections  
from  
Mathematics  
Graduate  
Students  
Teaching

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Benedict A.  
Cristobal

Mathematics  
Education  
Research

The Four S's

The Doctoral  
Experience

- What is doing research in Mathematics Education like?  
(an unorthodox explanation)
- One key product I have from doing this research
- Reflecting on my doctoral experience, tying my research and Math Alliance

**Step 1.** What about mathematics education intrigues you? Is there a problem that you want to fix or get some solutions for?

For example, in teaching mathematics, to what extent is the lesson you've planned or taught actually learned by the students?

**My Connection:** What about mathematics intrigues you? Is there an open problem that you want an answer to?

**For my dissertation:** I wanted to know why instructors teach the way that they do. Do we just mimic the same things we saw as students?

Why is this important to ask and to answer?

**Step 2.** Pick a framework.

We take our question or problem, and we find a way to understand it. As opposed to trying to tackle it in every space and configuration, we focus our attention.

My Connection: Choosing to work with one Sobolev space over another in posing and solving a PDE. Choosing to work on the torus as opposed to a sphere or  $\mathbb{R}$ .

**For my dissertation:** I wanted to know why instructors teach the way that they do. And so, I focused on **graduate student instructors** teaching for the first time, because this is one point where we start to enact our teaching techniques.

And, for this talk, I choose to further focus on **written reflections about teaching** as a way to understand why we teach the way we do.

### Step 3. Design the study.

How are we going to collect the data, how are we going to analyze the data?

**My Connection:** What model or computation or algorithm are we going to use to perform numerical computations?

**For my dissertation:** I gave people reflective prompts each week of a semester to write about how their week of teaching went. Then, I used multiple rounds of thematic analysis on the written reflections, building categories and making connections between ideas in the reflections.

**Step 4.** From the data and results, draw conclusions and implications.

We have the results (just like propositions, lemmas, and theorems), but that's not where the journey ends!

**For my dissertation:** The main result I want to share today is the Four S's and my belief that this is a good structure for reflective writing in being an instructor and a researcher.



## One Key Product: the Four S's

Success, Struggle, Surprise, and Short-term Goals:  
A reflective 'tool'

- One semester (Fall 2023) at a mid-Western US, large, public R1 university.
- 3 mathematics graduate student instructors (GSIs) teaching for the first time as the main instructor of one of the following courses:
  - Intermediate algebra, College algebra, or Mathematics for liberal arts.
- To reiterate, I was concerned about what things about (the experience of) teaching stood out to these GSIs in their written reflections.

From the perspective of the [researcher](#), reading about...

- **Successes** could point to experiences that can build more confidence in teaching.
- **Struggles** could point to aspects of teaching that professional development programs can preemptively address before the start of a new semester.
- **Surprises** could point to what situations are unexpected to (new) instructors and could be demystified ahead of time.
- **Short-term Goals** could point to what instructors valorize and attend to for their development as instructors.

From the perspective of the **instructor**, writing about...

- **Successes** lets us think about teaching events that we can be proud of and take confidence from.
- **Struggles** allow us to mentally unload and unpack negative teaching situations which may be putting undue stress on our shoulders.
- **Surprises** lets us take note of our own expectations surrounding teaching and reconciling these with the realities of teaching.
- **Short-term Goals** allows us to set goals to achieve in short-term which can be an accountability system and a pitstop for our development as instructors.

## Andy in Week 6 (College Algebra)

**Many students went to office hours this week and seemed engaged during help hours and also seemed to get something out of it...** Students conflate different ideas pretty often, which makes sense when you're learning a lot of new material at once, but I'm still **always caught a little off guard** when students mix the linear and exponential forms together. **I want** to encourage students to talk to each other more in addition to providing more structure to the course. **I want** students to have correct answers written in their workbooks, so more whole-class review of questions/participation would be good.

## Successes:

- Evidence of student learning
- External validation
- Good time management

## Struggles:

- Feelings of inadequacy
- Time management issues
- Uninterested students

## Surprises

- Students conflating concepts, getting overloaded with information, and disinterested in the material.
- Students preferred to be lectured at rather than doing group work.
- Definitions are a lot harder to explain than they anticipated, and having to attend to language more than solutions/algorithms.

## Short-term Goals

- Encourage student participation and collaboration, and keep them engaged ("be less boring").
- Be more useful for students' learning.

There's only three graduate students here, and what people share in written journals *most likely* differ depending on if it's private or will be looked at by someone else (a researcher like me).



Graduate student instructors want to do a good job which to them means that they see students learning and engaging with the material, but it could also mean they're pacing the lecture well.

Having these three graduate students reflect on a weekly basis also allowed them to see their progress ("looking back I saw a goal to make students talk to each other that I didn't follow up on and I think it would help them if I encouraged it more.")

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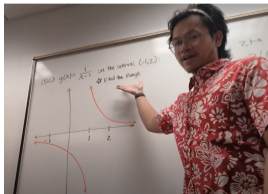
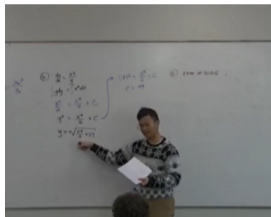
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# Reflecting on my Doctoral Experience

# The Four S's of my Doctoral Experiences



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A word cloud of terms related to academia and professional life. The words are in various sizes and shades of red and brown. The most prominent words are 'edit', 'dissertation', 'write math', 'teaching', 'research', 'graduation', 'publish', 'goals', 'success', 'job', 'struggle', 'pde', 'hope', 'tenure-track', 'surprise', 'conference', 'math', 'data', 'analyze', 'postdoc', 'optimism', 'revise', 'phd', 'anxiety', 'motivation', 'education', and 'struggle'.

Thank you for your time!

It was a pleasure to share this with you all. Thank you to the AMS Graduate Student Travel grant for funding my travel here. Many many many thanks to the Math Alliance, the F-GAP program, and the Field of Dreams Conference.

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