

1 Outline

We will be covering the following in this class:

1. Wait time
2. Classifying mathematical tasks
3. Asking mathematical questions
4. Multiple representatives
5. Manipulatives
6. Symbols, notations, and communication
7. Educational technology
8. Math anxiety
9. Authentic examples
10. Assessments, worked examples, and diagnostics.

The following is the grading scheme for the class.

- 20% Weekly readings (5 readings, 4% each)¹
- 45% Reflection assignments
 - 20% Reflection Assignment 1
 - 25% Reflection Assignment 2
- 10% Participation
- 25% Communication project

You are expected to use the course materials to analyze and/or explain something you have experienced or witnessed as a student and/or instructor. In order to obtain an A in this class, you need to go above and beyond for the case-by-case analysis. Submit all assignments on eClass.

In this class, you're expected to

- Attend every class and take notes.
- Participate in each activity.
- Use the course materials heavily in the assessments.

¹Reading 0 will be a calibration activity and it will show you how the system works. This will be due next Tuesday.

- Ask frequent questions.
- Disagreements with each other.
- Listen and respond to feedback.
- Take advantage of the opportunity this courses provides in enhancing your unique skill set.
- 3 hours of class, 6 work outside the class.
- Solicit and respond to feedback.
- Model good pedagogical practice.
- Encourage to personalize your learning.
- Provide constructive feedback.
- Have high expectations.

2 Prompts

Prompt. *What was your best learning experience? (i.e. best teacher, best class, etc.)*

One of my best learning experiences comes from learning analysis throughout my university journey. I really do enjoy learning some of the theory behind some of the mathematical concepts that were taught previously, but have not gone much in depth of how it came to be. For example, in MATH 1300 Differential Calculus with Applications, there was the notion of the definition of the limit, and at the time, I thought that the definition of the limit was the limit that we have learned back in high school, but as it turns out it was a bit more complex than one may have expected. After going through the pain and suffering of learning from the definition of the limit to the definition of the derivative to integration, etc (basically transitioning through all of the analysis courses), I really enjoy the learning experience of analysis in general. In high school, I had one of the greatest teachers who inspired me to become a mathematician, partly to teach but partly to learn about the theory behind mathematics. His class was always structured very nicely and no time was wasted in learning.

Prompt. *What was your worst learning experience? (i.e. worst teacher, worst class, etc.)*

Learning high school English was one of the worst experiences throughout my years of high school. We were mainly focused on learning about shakespeare and novel studies that really made me bored throughout the time I learned English in high school. Mainly, English you would need to use to communicate, which is true in mathematics setting, especially when you need to write reports or papers, etc. However, it is not as important in English class to be learning about the novels that we have read, which to be is irrelevant, which make it one of my worst classes. I did not have a worse teacher however, all of my teachers were amazing.

Prompt. *“We have trained students to know that if they wait long enough, we’ll give them the answer.” What are your thoughts on this quote?*

There are definitely pros and cons when it comes to the quote, and certainly, there are some that are in the middle as well (i.e. you can see both pros and cons).

- **Pros:** Encouraging patience can be a positive learning experience, as learning requires time and effort. Some concepts may take longer to digest and learn about compared to others. Also, it acknowledges the teacher's willingness to assist and provide answers when needed, fostering a supportive learning environment.
- **Cons:** If students consistently relies on waiting for answers, then it may create a dependency that hinders their ability to think critically, solve problems independently, or take the initiative into their own learning. The above quote also suggests a potential issue with passive learning, as students may not be actively participating during class or the lecture, which leads to students missing out on the benefits of active engagement and critical thinking times. Furthermore, waiting for answers may slow down the learning process, especially if the students are not actively seeking solutions on their own.
- **Balance:** It is equally crucial to encourage students to try and solve problems independently first. Striking a balance between guidance and promoting self-reliance is key. Teachers can intervene whenever necessary, ensuring that students are not left waiting too long without assistance. This helps maintain a healthy learning environment and prevents frustrations among students. Teachers could also use the opportunity to instill a sense of curiosity and the importance of actively seeking knowledge. This encourages questions and explorations that can turn the waiting period into an opportunity for self-directed learning.

3 Wait Time

If teachers can increase their pauses after:

1. They ask a question and
2. After a student responds

There are significant positive changes. The threshold waiting time is 2.7 seconds, above which there are significant improvements and below which there is little effect.

Some of the benefits of wait time to students include

1. Length of student responses increases by 300%-700%
2. More student responses are supported by evidence.
3. Number of questions asked by student increases
4. Student-student exchanges increases
5. Fewer 'I don't know' responses
6. Less disciplinary issues
7. Increased variety of students participating.

8. Student confidence increases

Some of the benefits of wait time to teachers include

1. Teachers demonstrate greater flexibility
2. Teachers ask less questions, but the questions are higher-order (inviting elaboration or opposing viewpoints)
3. “Invisible students” become visible.