

Teaching Quantitative Literacy to Non-Traditional Students with Math Anxiety

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Setting the Scene

- For this talk, when I say non-traditional student I mean a student over the age of 25 (this is different than the NCES's definition).

Setting the Scene: Math Anxiety

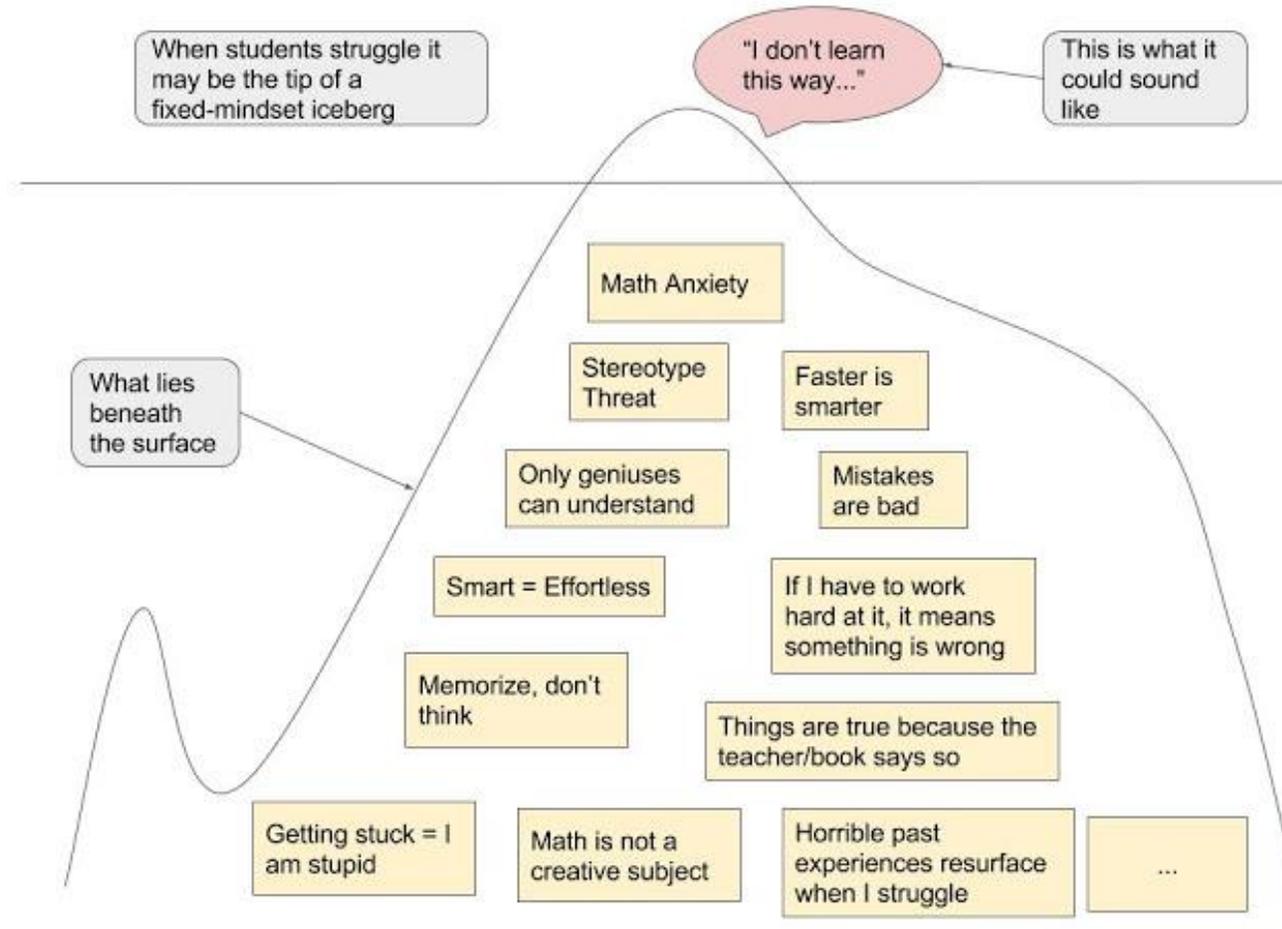
Quotes from Traditional Students

- “Math is not a creative subject.”
- “I am a right-brained thinker.”
- “Getting stuck is the same as being stupid.”
- “Being fast means I am smart.”
- “Only geniuses can understand math.”
- “Math is memorization.”

Quotes from Non-Traditional Students

- “My spouse is the one that deals with money.”
- “I would never _____ in the workplace, so I don’t know why I should learn this.”
 - Do group work, use excel, make graphs, etc.
- “I already know my opinion on issues that matter, so I do not need to read articles.”

Setting the Scene: Math Anxiety



What MSU was Already Doing

- New course materials created in Spring 2018 with a significant portion of the class to consist of labs (both in time and grade weight).
- The labs included:
 - Computing a Course Grade
 - Probability of Unplanned Pregnancies and False Positives.
 - Creating a Country Happiness Index
 - Analyzing Data Visualizations
- Most labs started with a free-write and had a reflection due later.
- Nick piloted the new materials in Summer 2018.

What MSU was Already Doing: Student Response

- “Why are we using Excel in a math class, and why are we working in groups? This would never happen at my work.”
- Groups with members who had the above sentiment were off-track and complaining.
 - I addressed the comments, but students in these groups remained unhappy.
- Bad attitudes spreading through class and a bad classroom culture.

What MSU was Already Doing: Turning Point

- Working on probability lab about unplanned pregnancies and medical testing results.
- “Condoms are 99.99% effective, so this doesn’t make sense.”
- “Why do you insist on making up these words just to confuse us?” (In the context of true positives, false negatives)
- Students seemed to think that I was making up context for the class.

What have People Already Done?

- SERC
 - Repetition and scaffolding
 - Teach heuristics
 - Fun, exciting, and engaging classroom culture.
- AIBL
 - Starter problems
 - Coaching (scaffolding)
 - Active learning environments
 - Reading assignments and reflective writings
- Henrich and Lee
 - Service learning (tutoring students at nearby elementary and middle schools in math)
 - Reflective writing on tutoring
 - Reading Assignments
- Ricchezza and Vacher
 - Reading Assignment on Keith Devlin's *The Math Instinct*
 - Reflective writing on reading

What I Decided to Do

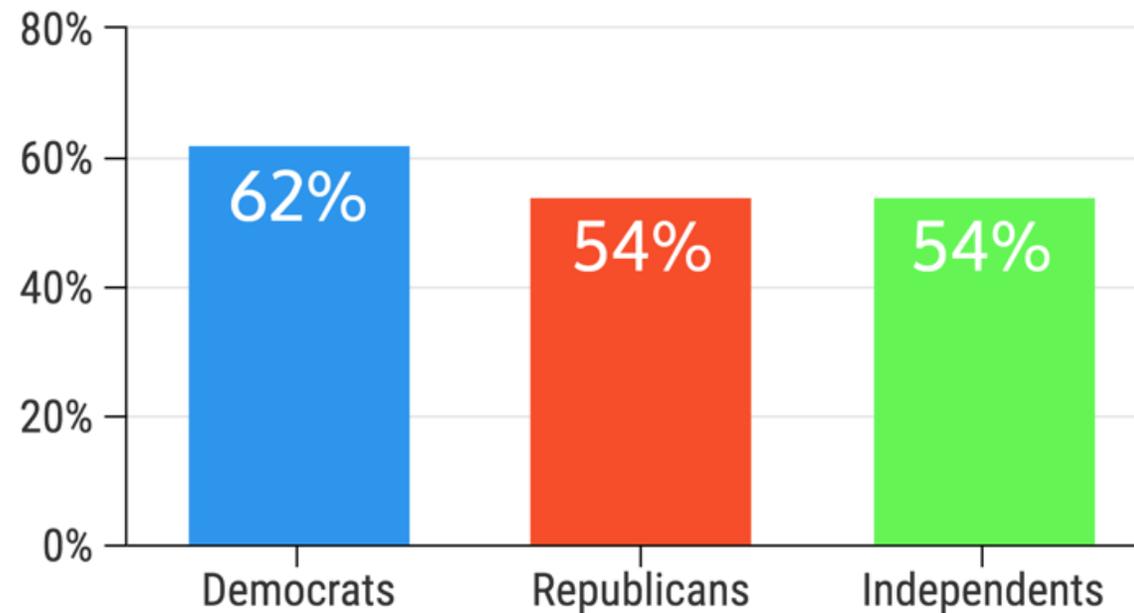
1. Give video lectures as part of homework
2. Allow students more independence in choosing the context of the lab
3. For the future: Plan on labs to depend on each other.

What I Decided to Do: Lecture Response

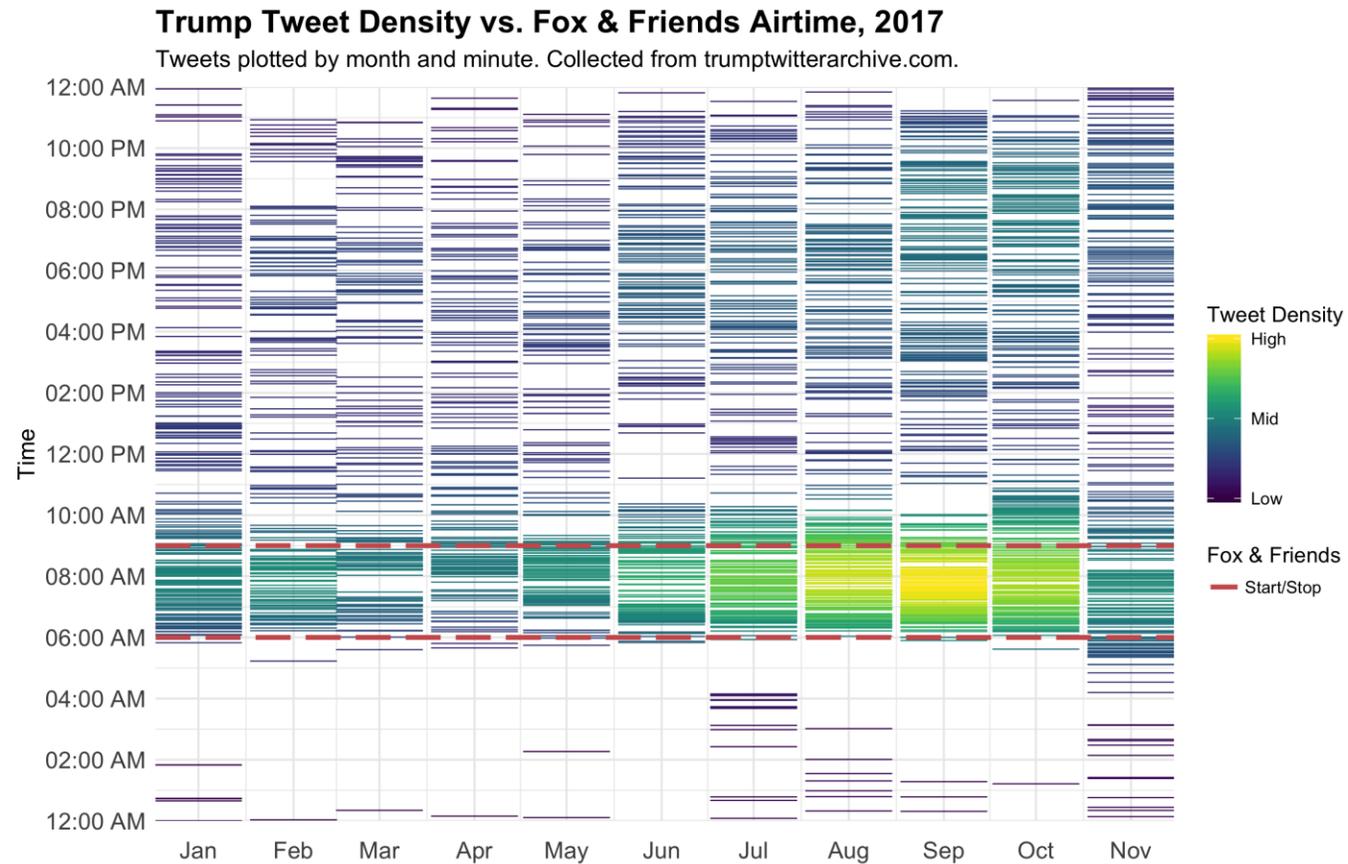
- “He tends to teach for long periods to time...”
- “[I am] ...struggling due to the lack of information that was given during lecture.”
- “[the lecture material] ...is not university level.”

What I Decided to Do: Contextual Independence Response

Percent Who Agreed With Court



What I Decided to Do: Contextual Independence Response



What I Decided to Do: Contextual Independence Response

- <https://www.nytimes.com/interactive/2018/03/19/upshot/race-class-white-and-black-men.html>

What I Decided to Do: Contextual Independence Response

- “This was very interesting! Gender inequality is scathingly obvious in these graphs....how sad. Me & my spouse had a good conversation heavily related to this article & the previous one about boys. He watched a program on Netflix called “Explained”. The first episode was about the racial wealth gap. Entire thing supported these articles, and what I was talking about regarding the “deep well” of multigenerational wealth among white men. The wealth gap stats are terrible.”

What I Decided to Do: Contextual Independence Response

- “You could probably tell I was not excited to be here, but in the end I found it kind of interesting.”
- “I never knew there was so much to be said about graphs, and there is even a job where you just make graphs. I have been thinking about switching majors.”

Weird Side note from Talking with Students

- When interviewing my past non-traditional students, many of them found anecdotes to be what they remember most from class.
 - “Geography majors from North Carolina, on average, make more than geography majors from any other school.”

Questions from Me

- How can we make sure that ULAs will understand the context enough to be able to lead labs.
- What other resources are out there for working with “extreme math anxiety?”
- What are other peoples’ experience working with non-traditional students?
- How can we assure that there is sufficient scaffolding on a lab, but enough contextual freedom?

Thank You!