

Comparing Mastery-Based and Traditional Assessment in Calculus II Courses

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Introduction

- What is Mastery Based Testing?
- Setting for My Implementation
- Results of Two Year Study
- What's Next?

The Assessment Dilemma

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- Did the student demonstrate partial understanding on all of the learning objectives?

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- Reduce some anxiety -Mistakes are learning opportunities

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- Can implement this for numerous assessment types (eg. tests, homework, quizzes, etc.)

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- Allows the instructor to grade holistically instead of worrying about individual points

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Calculus II Project: 2 Year Project alternating between MBT & traditional testing

Gave end of year Assessment Quiz and Survey

- 3 classes of Traditional Assessment: (43 students responding)
 - Quizzes: 15%
 - Homework: 20%
 - 4 Exams: 45%
 - Cumulative Final: 20%
- 3 classes of Mastery Assessment: (53 students responding)
 - Quizzes: 15%
 - Homework: 20%
 - Mastery Exams: 65%

My Mastery Exams

- 5 Total Exams:
- Exam 1 will have 4 Concepts
- Exam 2 will have 8 Concepts
- Exam 3 will have 12 Concepts
- Exam 4 will have 16 Concepts
- Final Exam -no new Concepts
**Concepts stay the same, but
Questions MUST change each time**

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- Record the highest level of performance
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- 4 "Testing Weeks" (including Final Exam Testing Week)
 - Students are allowed to test any concept once during the week
 - Example: a student can test concept 2 on Monday and concepts 5 & 6 on Tuesday, but not concept 2.

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- Percentage based score
Example: Mastering 11/16 concepts your exam grade will be 80%

Student Comments

Revisit Old Ideas Without Penalty

- “Great way to relearn concepts and force oneself to master the concepts at the beginning.”
- “I saw how concepts were connected.”
- “Like them b/c I feel like it is the best way for us to actually learn and instill the core concepts we need for future.”
- “Mastery Exams are the best. I felt I learned more b/c of them.”
- “I liked them greatly. Being able to re-test until you have “mastered” a concept I think helped me retain information better.”

Student Comments continued

Encourage Growth Mindset of Learning

- “Loved them. Some sections I just needed more time to learn the material which these exams allowed.”
- “I liked the mastery exams because math revolves around practice. I noticed that when looking at an older problem later on, it was easier to understand and follow the steps.”

Teacher Comments

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- Worry about memorizing answers to an extent?
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Results

Used Chi-Square Test for Independence ($\alpha = .5$)

Independent (Assessment did not influence answers)

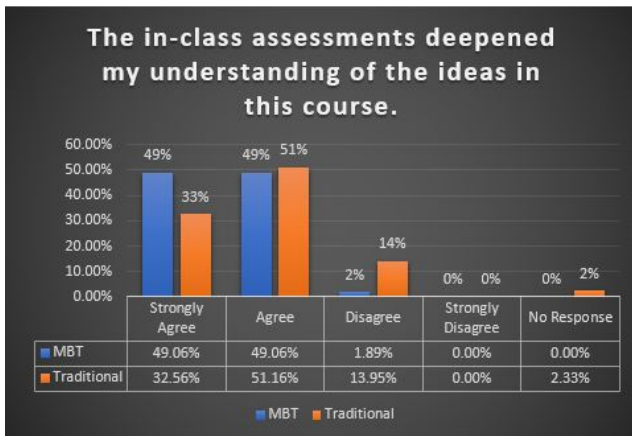
- Studying for the exams in this course helped me to learn the material.
- The results of my in-class assessments accurately reflect my knowledge.
- I relied mostly on memorizing solutions to earlier problems to prepare for in-class assessments.
- I feel prepared to approach a wide range of problems in Calc 2

Results

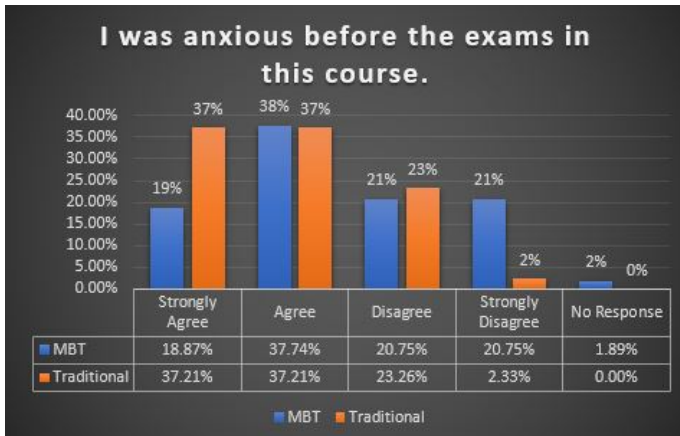
Not Independent (Assessment did influence answers)

- The in-class assessments deepened my understanding of the ideas in this course.
- I was anxious before the exams in this course.
- How many hours per week did you spend on this course outside of class time?

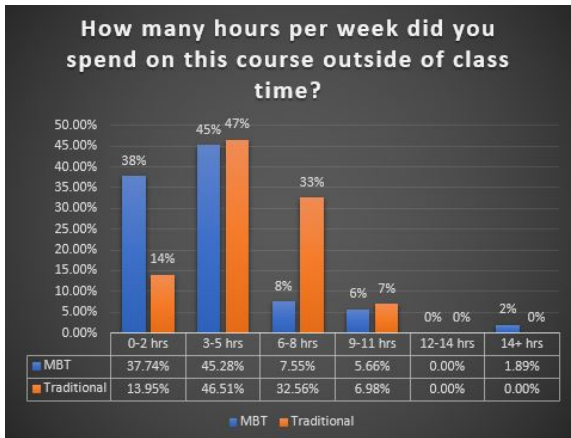
MBT students agree tests deepen their understanding



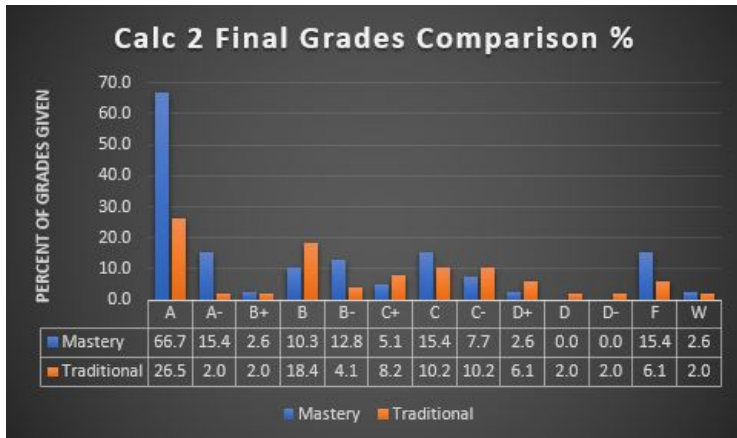
Does MBT Help Anxiety? Seems like it.



MBT Student Self Report Studying Less



Comparing Final Grades



Assessment Quiz Analysis

Out of 11 points

Graded all or nothing (harsher than Mastery!)

	Mastery	Traditional
Average Score on Final Quiz	5.0	4.70
Average Overall Course Evals	4.68	4.6

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- Watch out and monitor the weaker students!
- Allowed for students who have special circumstances -like missing 2 weeks for a major illness- to be able to catch up.
- It forced my students to learn the “difficult concepts”
- More grading, but easier to grade

Future Analysis

- **Revamp/Expand Survey:**
 - Add Pre, Mid, and Post Survey during the course
 - Add questions about Growth Mindset
 - Add Test Anxiety questions that “Dig Deeper”
- Include Stats Class from Wittenberg (A. Hoofnagle)
- Add Pre-Quiz
- Slight Change to Concepts -18 Concepts now

Thank you!

Thanks for Listening!

Feel Free to contact me at: amanda.harsy@gmail.com

Visit our Blog at mbtmath.wordpress.com/

Any Questions?