Mastery-Based Exams Are Self-Evidently Better Than Traditional Exams

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Joint Mathematics Meetings
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What Is It?

- Clear Content Objectives
- Credit Only For Mastery
- Multiple Chances With Complete Forgiveness
Clear Content Objectives

Hydrostatic Force

- Compute hydrostatic force against a rectangle, triangle, trapezoid, or circle. (Section 8.3 Example 1–2)
Credit Only For Mastery

Will the student benefit from studying the objective again?

- **Not Mastered**: Computations all correct, but integrand suggests student has not understood the geometry.
- **Mastered**: Integral correctly specified, but there are some minor computational errors.
What Is It?

Multiple Chances With Complete Forgiveness

- Test 1: Objectives 1 - 4
- Test 2: Objectives 1 - 8
- Test 3: Objectives 1 - 12
- Test 4: Objectives 1 - 16
- Final Exam: Objectives 1 - 16

Master an objective eventually. No penalty for failed attempts.
Armchair Pedagogy

- Depth of Knowledge
  - **Points**: Understand everything superficially.
  - **Mastery**: Understand some concepts in great detail.
  - “I only want a B, but you’re forcing me to get an A.” – T. F.
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Meaningful Office Hours

- **Points:** “How can I easily pick up some points?” – All your students
- **Mastery:** “What should I study to better understand this concept?” – P. H.
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Perseverance
- **Points:** Try a problem once (maybe twice) and hope for the best.
- **Mastery:** Keep trying until you succeed (and I know you can).
Armchair Pedagogy

- Timely Review
  - Points: Review key concepts for the final (maybe).
  - Mastery: Review key concepts now.
  - “I didn’t understand vectors on Test 1, but I’m glad I got them on Test 2.” – L. D. in *Vector Calculus*
Timely Review

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Growth-Mindedness

- **Points:** Failure is undesirable and incurs penalties.
- **Mastery:** Failure is an opportunity to improve understanding.
- L. N.: 2/14 after midterm (and in tears), 12/14 after final (and celebrating)
Timely Review

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Reduced* Test Anxiety

- **Points**: Every test has the potential to “ruin” GPA.
- **Mastery**: No one test can harm grade.
- *Midterm with nothing mastered is very stressful*
Formative Assessment

- **Points**: How many points is this error worth? (punitive)
- **Mastery**: Will the student benefit from studying the concept again? (formative)
- **Mastery?**: Will *this* student benefit from studying the concept again? (differentiated)
Armchair Pedagogy

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- **Mastery?**: Will *this* student benefit from studying the concept again? (differentiated)

Faster Grading

- **Points**: Good answers are carefully checked. Bullshit is incentivized.
- **Mastery**: Mastery is spotted instantly. All attempts are genuine.
140 students across 6 institutions

- The exams deepened my understanding of the ideas in this course. (80% agreement)
- The results of my exams accurately reflect my knowledge. (77% agreement)
- I feel prepared to approach a wide range of problems in this course. (75% agreement)
- I was anxious before the exams in this course. (36% disagreement)
Contact Me
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Mastery-Based Testing Resources
www.AustinMohr.com