SoTL

Snapshot

A synopsis of a scholarship of teaching and learning journal article

Mastery-Based Testing Can Motivate Deep Learning in Mathematics Courses

What is this Research About?

Mastery-based testing (MBT) is an assessment technique that helps foster a growth mindset approach to learning. Traditional high-stakes exams do not provide students with an opportunity to achieve success through effort and practice. Traditional testing often encourages students to focus on earning enough points to pass with partial credit rather than developing a deep understanding of the course learning objectives. MBT aims to teach students to take failure as an opportunity to learn with multiple attempts to display mastery. The idea is that a student should not have to fully comprehend new concepts immediately to be successful in the subject. This research examined the effectiveness of MBT as an alternative to traditional exams.

What did the Researchers Do?

MBT involves defining clear course concepts that students must master, awarding credit only for mastery, and allowing students multiple attempts to display mastery of the course concepts. Final course grades are then based on the number of course concepts that the student mastered. The researchers implemented MBT in several beginner to mid-level mathematics courses across six different universities. The methods used to achieve MBT varied based on the instructors teaching style. At the end of the semester, 135 students completed a survey about their perceptions of the MBT, including its effectiveness and fairness. The survey also included questions about the students' study techniques.

What did the Researchers Find?

The researchers found that most students strongly agreed or agreed that MBT deepened their understanding of course concepts and prepared them to solve a variety of problems. Also, most students agreed that the MBT method was fair and accurately reflected their knowledge. When students were asked whether they spent time memorizing solutions to past exams, 73.1% reported they did not. These results suggest that most students likely engaged in a deep learning approach rather than a surface learning approach. Students commented that it was important for instructors to have clear grading systems and enough opportunities to rest for MBT to truly appreciate the method.

⊙ How to Implement this Research in Your Classroom

This non-traditional assessment format forgives students for past performance and motivates them to revisit misunderstood concepts, thereby fostering a growth mindset approach to learning. To implement MBT in the classroom, it is important to make sure students understand how the grading system works. Instructors should emphasize that tests will be graded on an "all-or-nothing" basis, but that there will be several attempts to demonstrate mastery available for each concept. Suggestions for implementation include:

- Partitioning the course material into a dozen or more rich concepts
- Eliminating or reducing the use of partial credit
- Allowing multiple attempts for each concept

⊙ Citation

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⊙ Keywords

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