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Mindset Training for Undergraduates in Developmental Mathematics

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Mindset Training for Undergraduates in Developmental Mathematics

Abstract

This poster highlights the work of an individual study that student Kate Van Weelden did in Dr. Zonnefeld's Math 100 class. Kate was a teacher assistant who led a lab session for 6 of the students in the Math 100 course. Throughout the semester Kate implemented incremental mindset training for her 6 students. The results showed a promising avenue for improved achievement, especially among males.

Keywords

mathematics, research, training, learning, attitude change, achievement

Disciplines

Educational Assessment, Evaluation, and Research | Higher Education | Mathematics

Comments

Presented in a poster session at the Learning and the Brain Conference: Shaping Student Mindsets, February 12, 2016, San Francisco, California.



Mindset Training for Undergraduates in Developmental Mathematics

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Background

Mathematics ability is a domain where individuals commonly hold entity mindsets (Good, Rattan, & Dweck, 2012). Developmental mathematics is a key area for improved achievement since increasing numbers of students are unprepared for college-level mathematics.

This quasi-experimental research took place at a small Midwestern liberal arts institution. Students in the mathematics course were first or second-year undergraduate students with Math ACT scores of 18 or less.

Objective

The goal of this research was to examine the impact of incremental mindset training on student achievement in an undergraduate developmental mathematics course.

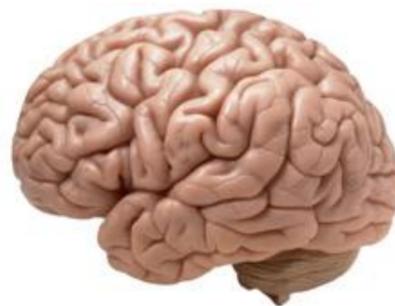
Methods

All students participated in two study sessions per week led by a teacher assistant in addition to three class sessions led by the professor. Six of the 23 students received incremental mindset training in their study sessions with the remaining 17 students serving as the control.

Research-based mindset practices from Dweck, Boaler, and others were utilized. The mindset trainings were led by both the teacher assistant and professor. Students in the treatment learned about incremental mindsets using the following topics and methods.

Mindset Training Topics

- Entity and incremental mindset characteristics
- Physiology of the brain
- Setting course goals
- Response to feedback
- Helpless and mastery responses
- Performance and learning goals
- The role of effort
- The value of mistakes
- The importance of depth of learning over speed



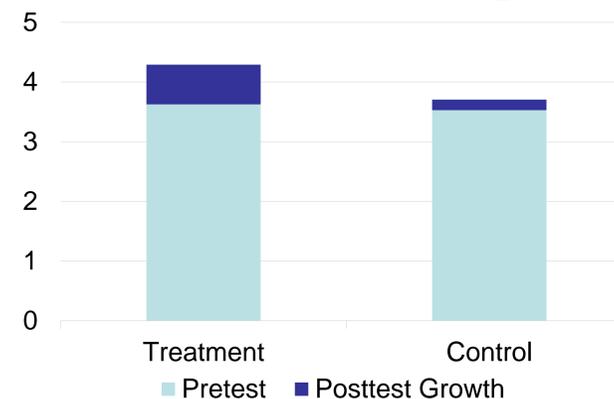
Mindset Training Methods

- Establishing positive classroom norms
- Viewing video clips
- Examining role models with incremental mindsets
- Sorting cards with entity and incremental descriptors
- Discussing insights
- Writing and sharing reflections
- Valuing mistakes as learning opportunities
- Reading and discussing articles

Results

Students responded positively to the mindset activities, providing promising evidence of increased achievement. Pretest to posttest change in students' mindsets towards mathematics revealed that students in the treatment demonstrated greater growth ($\mu_{\text{Treatment}} = 0.67$, $\mu_{\text{Control}} = 0.18$). Additionally, students in the treatment received higher final grades by an average of 1.8%.

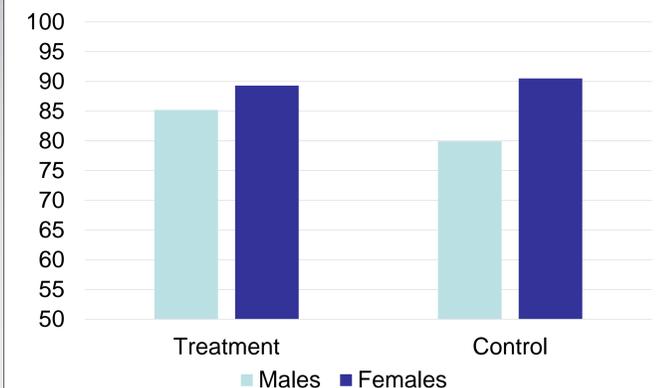
Pretest to Posttest Mindset Change



The stacked bar graph illustrates students' pretest and posttest scores on the Theories of Mathematical Intelligence Scale (Dweck, n.d.).

Males in the treatment experienced greater mindset growth than females ($\mu_{\text{Males}} = 1.50$, $\mu_{\text{Females}} = -0.17$). This is in contrast to the modest increase noted among males in the control group ($\mu_{\text{Males}} = 0.22$). Males in the treatment also outperformed males in the control on the final course grade by 5.3%.

Final Grade by Gender and Treatment



Conclusions

This research suggests a promising avenue to support students in developmental mathematics; training is continuing for the current semester. Further research is needed to explore possible benefits for student achievement at other levels and in other courses.

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