

Growth Mindset Assessments in Mathematics Classrooms

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Recent scientific evidence shows the incredible potential of the brain to grow and change. Equally important are the observations of the positive impact that having growth mindset has upon students' achievement. Students with a growth mindset view errors and obstacles as opportunities for growth. These students welcome challenges and the opportunity to learn from their mistakes. Although some university instructors are incorporating growth mindset into their lectures and attitudes, unfortunately, the traditional exam method used in undergraduate mathematics classrooms is a fixed mindset model. This poster shows the implementation of a growth mindset structured exam in a multivariable calculus class. The implementation includes structured opportunities to rework exam problems, give presentations, and papers. All of these focus on assessing the student's achievement of the objectives in the class.

Keywords: Growth Mindset, Assessment, Exam, Attitudes, Multivariable Calculus

A mindset is a self-perception that people hold about themselves. In a fixed mindset, people believe that traits like intelligence and talent are unchanging. They spend time documenting their intelligence instead of trying to learn and grow. In a growth mindset people believe that intelligence and talents can be developed through hard work and dedication. Growth mindset has been shown to have a positive impact on student achievement (Dweck, 2007).

Four techniques that teachers can use to increase the growth mindset of their students are as follows. First, let students know what growth mindset is and teach them that their brains can grow. Second, praise them for their efforts and not for intelligence (Dweck, 2007). Third, tell students stories of people that achieved great things with hard work and a growth mindset (Aronson, Fried, & Good, 2002). Finally, teach students that mistakes are how our brains grow (Moser, 2011) to create an atmosphere in the classroom that leads students to look at mistakes (theirs or others) without any shame, but instead opportunities to improve. Like the other techniques, openness to mistakes can be fostered through changes to classroom instruction. Importantly, it can also usefully be addressed when assessing the students' achievement of the course objectives.

In this poster we describe the implementation of a growth mindset exam structure in a multivariable calculus class at a large public university. Each exam consisted of a traditional in-class portion and a take home portion built on principles of growth mindset. The structure of the assessment had three main elements: students were able to rework, and then orally defend their learning on individual exam problems from the in-class portion of the exam, they gave presentations, including worked out board problems, on a relevant topic, lastly they wrote papers that focused on comprehension, communication and understanding of the objectives for the course.

In this poster, we will describe the course and exam structure; present examples of the exams, paper requirements, presentation descriptions, and corresponding rubrics; exhibit student work; and give feedback from students about the growth mindset exam structure.

References

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