Effects of Growth Mindset and Metacognition Interventions in Calculus

Abstract:
Nationally, Calculus I has a history of high DFW rates. In an attempt to improve student success, instructors at UW-Whitewater have incorporated growth mindset and metacognition interventions into the course. This presentation will describe the interventions and their impacts in Calculus I and subsequent courses.

Intervention 1: Growth Mindset

Watch the “Four Boosting Messages from Jo & Her Students” video on the YouCubed website:
https://www.youcubed.org/resources/four-boosting-messages-jo-students/

In a 1.5-page written response, answer the following questions:

1. Describe the difference between a growth mindset and a fixed mindset in mathematics. What was your mathematical mindset prior to watching this video? Give two or three specific examples from your life as supporting evidence.
2. Why is it good to make mistakes in math? Describe an experience when you learned something important from making a mistake in math class.
3. What are some important things you learned from these videos about mistakes, struggle, and speed that everyone your age should know?

References for Intervention 1:
Intervention 2: Metacognition and Study Skills

After returning the first graded exam, instructor gives an in-class metacognition and study skills presentation using PowerPoint slides from the link below. Students who miss class can watch “Learning Strategies Video Presentation” at the same site.

https://styluspub.presswarehouse.com/landing/TSHL

In a 1.5-page written response, answer the following questions:

1. Do you feel that you were successful on the exam? If yes, to what do you attribute your success? If no, why do you think that was the case?
2. Did you reflect on what you learned in each section (not including studying for the exam)?
3. Did you review the sections and class handouts to understand them for life, or were you mainly trying to concentrate on memorizing what you thought you had to know for the test?
4. Reflecting on your answers above, what will you, as a student and learner, do differently to produce better results?

Reference for Intervention 2:
Teach Students How to Learn by Saundra McGuire, Stylus 2015 (ISBN 9781620363164)

Intervention 3: Letter to a Future Student

Re-watch the “Four Boosting Messages” video and review your previous writing assignments on growth mindset and metacognitive study skills.

Write a 1.5-page letter to a future Calculus I student in which you give advice about how to succeed in Calculus and mathematics more generally. Your letter should address the following questions:

1. What (if any) messages from the growth mindset video would you share?
2. How would you encourage the student to structure their study time?
3. What do you wish you had known before taking this course?
4. If you feel successful in this course, what should the student do to be successful as well? If you feel unsuccessful, what would you fix if you had to take the course again?

Reference for Intervention 3:
Creating Self-Regulated Learners by Linda Nilson, Stylus 2013 (ISBN 9781579228675)