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Exploring the Antecedents and Consequences of Undergraduates' Metacognitive Awareness in STEM classrooms

Min Zhong, Teng Zhao, Erin Garza, Yohannes Mehari, Scott Bowling

Auburn University, USA
(Metacognition Baseline Project)

Abstract

To foster students' self-regulatory skills, metacognitive strategies have been widely promoted in disciplinary teaching practices. Classroom research has shown students encountered problems in transferring and applying learned concepts to different contexts (Georghiades, 2000, Cao & Nietfeld, 2007), especially in STEM fields. However, differences in the effectiveness of using metacognitive intervention have been observed across student levels and class performance (Erlin & Fitriani, 2019; Stanton et al., 2015, Dye & Stanton 2017). This study aims to understand the differences in students' metacognitive awareness in different class levels, gender, ethnicities, and disciplines, as well as whether the goal orientation is an antecedent of the rate of change in students' metacognitive awareness. To assess students' basic level of metacognition, we administered the Metacognitive Awareness Inventory (MAI) at the beginning and end of the semester in multiple STEM classrooms (809 students, four classes, spring 2022). Preliminary results showed the natural growth of overall metacognitive awareness is not significant in all students, indicating the metacognition intervention is recommended. Furthermore, the results revealed discipline and its content learning might be a factor leading to the significant difference in developing metacognitive skills at similar levels of students. The correlation between the growth of metacognitive awareness and student academic performance will be further investigated in future studies.

Keywords: Metacognition, STEM discipline, MAI