Relationship Among Classroom Climate, Self-Concept, and Interest in Undergraduate Mathematics Courses: What Can We Learn From a Literature Synthesis?

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Mathematics courses have become barriers for undergraduate students, including those pursuing STEM-related degrees (Olson & Riordan, 2012; Leyva et al., 2022). Some possible explanations for the difficulties that students have in mathematics coursework are the lack of belief in their mathematical abilities (Adlawon et al., 2022) and the lack of perceived relevance, as students wonder, “When am I ever going to use this?” (Chazan, 1999). The two aforementioned psychological processes, self-concept, and interest in mathematics, that influence learning are affected by several factors, including the multidimensional construct of the classroom environment.

Much research has focused on specific pedagogical practices teachers adopt, students’ views of those practices, and the effect of particular practices on learning outcomes. Some studies explored the relationship between specific pedagogical or instructional practices and student learning outcomes in terms of achievement-related outcomes and affective outcomes (e.g., Kerrigan et al., 2020; Downing, 2020). For instance, culturally relevant pedagogy in college algebra positively affected students’ attitudes toward mathematics and increased confidence in mathematics (Downing, 2020). However, a few studies have collected students’ perceptions of the classroom environment more generally using established surveys (e.g., University Mathematics Classroom Environment Questionnaire) and evaluated the relationship between those perceptions and students’ cognitive and affective outcomes.

In the present review, I synthesized quantitative studies examining how students' perceptions of their classroom environment are related to their interest and self-concept in math. In the poster, I include a table of the statistical evidence that the included papers showed of how different dimensions of the classroom environment are associated with constructs of students’ self-concept and interest in college mathematics.

Results indicate that most studies used correlational, multiple regression, and structural equation modeling techniques on data collected using various measurement scales of classroom climate, self-concept, and interest in math. Findings demonstrated positive correlations (values ranging from 0.2 to 0.58) or absolute standardized path (values ranging from absolute 0.11 to 0.2) characterizing the relationship between students’ perceptions of the components of classroom climate and their self-concept and interest in mathematics (e.g., Wang et al., 2017; Yin et al., 2020).

From the literature results on this poster, RUME researchers could identify research gaps of classroom conditions influencing affective outcomes and consider their classroom environment’s impact on students’ self-concept and interest in mathematics. This is an important avenue for future research as improving students’ learning experience will positively impact persistence in pursuing STEM degrees. I discuss how future research could build and test a theoretical structural model to investigate the causal relationships between the various dimensions of the classroom climate and students’ self-concept and interest in mathematics grounded in sociocultural theories, Krapp’s (2007) person-oriented theory of interest, and Bronfenbrenner’s (1977) ecological systems framework.

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