A Cross-Disciplinary Approach to Supporting Mathematically Underprepared First-Year STEM Students

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Many first-year students intending to earn a degree in a science, technology, engineering, and mathematics (STEM) field begin their studies with inadequate mathematical preparation (ACTA, 2019). These STEM majors are also at a high risk of developing mental health issues due to the stress-inducing nature of their coursework and are less likely than their non-STEM counterparts to seek counseling services (Kalkbrenner et al., 2022). In fact, a third of STEM majors who abandon their degree plans report having struggled "with depression, high levels of stress, chronic anxiety, overwhelm, feelings of guilt, regret, shame, and self-blame" (Holland et al., 2019, p. 330). In response to these issues, the Mathematics and Counseling departments at Montclair State University (MSU) collaborated to integrate counseling services into a unique new introductory mathematics course, Approaches to College Mathematics (ACM).

The MSU Mathematics department developed the ACM course as a prerequisite for students whose placement exam scores indicate they are not ready to take Precalculus. In the past, nearly all first-year MSU STEM majors were placed into Precalculus, which had DFW rates that were sometimes as high as 48%. The content of ACM was therefore chosen to focus on mathematical skills necessary for success in Precalculus (e.g., solving linear and quadratic equations). The ACM developers were cognizant that traditional remedial mathematics courses often have negative impacts on students (Cohen & Kelly, 2020; Larnell, 2016), so they were committed to designing a course that would engage students with course content in a new way, and would help them develop other academic skills required for success in tertiary STEM coursework. The ACM developers created an extensive repository of in-class activities designed to leverage research-based pedagogies, such as engaging students in collaborative learning (Liljedahl, 2020) and situating course concepts in meaningful real-world contexts (Bernacki & Walkington, 2018). They also developed a list of "growth objectives" for the course that were interwoven into class assignments and activities, such as *budgeting time and prioritizing*, *studying effectively*, *learning from mistakes*, and *navigating resources*. Our poster will include examples of the ACM learning activities and how the growth objectives are integrated into coursework.

The MSU Counseling Department provided the ACM program with an experienced counselor to offer counseling services to struggling ACM students, usually identified by their instructors. Students choosing to utilize the counseling resource meet with the counselor through virtual or in-person therapeutic interactions, where the counselor provides support in a safe space where students can discuss the challenges they are facing. Additionally, the counselor visits classrooms at the request of ACM instructors to give presentations and lead classroom discussions about various mental health issues students may be facing. The ACM team is in the early stages of collecting data on students' pre- and post-semester attitudes towards mathematics, their feedback on the course, and the percentage of students utilizing the counseling services. We will also be collecting longitudinal data on their successes and challenges in Precalculus. Some of this data will be available by the time of the conference and will be shared in the poster. This work aims to generate and contribute to conversations about how educators can support mathematically underprepared STEM majors experiencing anxiety and stress in math.

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