

Building Bridges Through Mentoring: Graduate Student Instructors' Pedagogical Development

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This action-research project examines how peer mentoring supports novice precalculus graduate student instructors (GSIs) in developing as reflective, collaborative teachers. Grounded in *communities of practice* (Wenger, 1998) and the notion of *boundary crossing* (Akkerman & Bakker, 2011), we explore how mentoring can help GSIs navigate between the communities of academic mathematics and mathematics education (see also Darragh, 2022; Fried, 2014). We conceptualize mentoring as a structured, dialogic process (Roberts, 2000) to promote reflection, pedagogical growth, and participation in professional learning communities. Our team, comprised mostly of graduate students serving as mentors, investigated the following: (1) what motivates GSIs to engage in mentoring, (2) how do GSIs perceive mentoring's purpose, and (3) how does participation shape GSIs' teaching reflection and active-learning (AL) strategy use.

At a Midwestern public university, five GSIs teaching precalculus for the first time were mentored by a third-year PhD student ("Morgan"), who had completed a mathematics education mentoring PD program (Yee et al., 2024). During a 15-week semester, Morgan facilitated seven bi-weekly small group meetings emphasizing reflection and active learning, and Morgan observed each novice teaching twice. After Week 5, GSIs completed a three-question survey identifying motivations for participation and desired supports. Their feedback guided revisions to subsequent sessions, including the addition of a collaborative AL activity design task. Data included survey responses, observation notes, and post-observation conversations. We analyzed these data thematically to identify patterns in motivation, reflection, and pedagogical change.

Survey results revealed novices primarily valued *sharing experiences* but less often identified *improving teaching* or *learning AL strategies* as motivators. Few novices articulated an explicit desire for pedagogical development. In response, mentoring sessions were restructured to foreground collaborative design and AL implementation. After this change, novices exhibited greater engagement and reflection: one novice transitioned from individual practice problems to structured group work with conceptual questioning; another novice displayed increased confidence in facilitating AL activities; and a previously disengaged novice remained for a full session to design lessons. Although overall engagement increased, inconsistent attendance across meetings also shaped participation patterns and represents a limitation in this study.

Individual post-observation conferences revealed novices' growing awareness of instructional challenges and their need for pedagogical support. These shifts suggest that intentional, practice-oriented mentoring can help GSIs cross boundaries between disciplinary and pedagogical communities, fostering deeper instructional reflection. In conclusion, peer mentoring, when explicitly framed as both community-building and pedagogical development, can motivate GSIs to engage more meaningfully in teaching reflection and AL design. The process also served as professional growth for mentors, who refined their facilitation and research practices. This project highlights the potential of peer mentoring as a means for theory-informed, sustainable professional development that bridges the math and math ed communities.

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