

Doing Math Instead of Watching Math: The Impact of In-Class Activities and Written Feedback in a Prerequisite Mathematics Course

Annie Edwards
Indiana University Bloomington

Corrin Clarkson
Indiana University Bloomington

Keywords: active learning, instructor feedback, student success, D/F/W rates

Research Aim

This study investigates how integrating frequent in-class mathematical problem-solving with individualized written instructor feedback influences student success in prerequisite postsecondary mathematics courses. Specifically, we examine whether redesigning daily instruction around structured engagement and descriptive feedback is associated with improved D/F/W rates and patterns of persistence.

Context and Rationale

Research shows that active learning and constructive feedback support deeper understanding and confidence in undergraduate mathematics (Cirillo et al., 2024; Vroom et al., 2022; Grove & Good, 2020; Bressoud & Rasmussen, 2015). Yet most studies examine calculus or upper-level courses, leaving open how these practices function in prerequisite mathematics courses where attrition is high. Few studies consider their combined influence or link instructional features to institution-level outcomes such as D/F/W rates and persistence. This study addresses that gap by analyzing success patterns following a redesign integrating in-class problem-solving, individualized written feedback, and scaffolded reflection, thereby extending and replicating prior findings in a critical gateway context.

Methods & Research Question

RQ: How does the integration of frequent in-class engagement and individualized written feedback relate to student success in prerequisite postsecondary mathematics as measured by patterns in D/F/W rates and persistence? Institutional outcomes from semesters before and after an instructional redesign, featuring structured problem-solving, individualized feedback, and reflective prompts, are compared using descriptive and comparative analyses.

Anticipated Findings

We anticipate that the redesigned instructional model will correspond with lower D/F/W rates and improved persistence, suggesting that prerequisite mathematics courses may benefit from greater emphasis on daily mathematical engagement and meaningful written feedback. By analyzing both instructional features together and focusing on a high-attrition gateway course, the study offers insight into how to move prerequisite mathematics from a barrier to a pathway for student success.

Implications for Practice

Findings may inform institutional reform efforts by highlighting how active learning, individualized feedback, and reflective practice can be integrated into daily instruction to promote engagement, confidence, and persistence. This work also demonstrates the value of replication studies in mathematics education and underscores the importance of systematically examining instructional redesigns in prerequisite mathematics courses, spaces where small pedagogical changes may yield large institutional impacts.

References

- Bressoud, D., & Rasmussen, C. (2015). Seven characteristics of successful calculus programs. *Notices of the American Mathematical Society*, 62(02), 144–146. <https://doi.org/10.1090/noti1209>
- Cirillo, M., Berk, D., LaRochelle, R., Bieda, K. N., & Arbaugh, F. (2024). Undergraduate students' perceptions of features of active learning models for teaching and learning to teach mathematics. *International Journal of Research in Undergraduate Mathematics Education*, 10(1), 172–200. <https://doi.org/10.1007/s40753-022-00191-y>
- Grove, M. J., & Good, C. (2020). Approaches to feedback in the mathematical sciences: Just what do students really think? *Teaching Mathematics and Its Applications: An International Journal of the IMA*, 39(3), 160–183. <https://doi.org/10.1093/teamat/hrz013>
- Vroom, K., Gehrtz, J., Apkarian, N., Alzaga Elizondo, T., Ellis, B., & Hagman, J. (2022). Characteristics of interactive classrooms that first year students find helpful. *International Journal of STEM Education*, 9(1), 38. <https://doi.org/10.1186/s40594-022-00354-y>