

USING ASSISTMENTS FOR COLLEGE MATH: EVALUATING THE EFFECTIVENESS OF SUPPORTS AND TRANSFERABILITY OF FINDINGS

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Online homework systems are widely used in the instruction of college algebra at the post-secondary level (e.g., Boyce & O'Halloran, 2020; Hauk & Segall, 2005). The immediate feedback and variety of tutorial supports in these systems provide an opportunity for students' autonomy in their learning (Boyce & O'Halloran, 2020), encourage students to correct their mistakes (Affouf & Walsh, 2007), and participate in a cycle of learning of attempt-feedback-reattempt (Brewer, 2009). Studies from middle to post-secondary school indicate that students prefer to complete online assignments, which provide a source of motivation (Hauk & Segall, 2005; Ostrom & Heffernan, 2014). One no-cost system, ASSISTments (www.assistments.org) has been used in large quasi-experimental studies at the middle and high school level (Murphy et al., 2020; Singh et al., 2011). Research on the use thereof to support student learning and the use of formative feedback in instruction in middle-school and secondary classrooms is very promising (e.g., Feng et al., 2014; Kehrer et al., 2013; Kelly et al., 2013; Koedinger et al., 2010; Mendicino et al., 2009). Three of these studies provided insight into the effectiveness of "Best so far" supports, namely video hints vs. text hints (Ostrow et al., 2014), worked examples vs. hints (Shrestha et al., 2009), and single vs. multiple template questions (Jiang et al., 2020) and showed positive learning gains for students with these supports. Given this promise, we proposed adapting ASSISTments for use at the undergraduate level.

This research study conducted at two southeastern universities over two years aims to replicate the three aforementioned studies using ASSISTments in college algebra courses. The goal of this study is to determine whether the use of ASSISTments at the college level leads to similar gains in mathematics learning and analogous changes in pedagogical practices as reported in younger grades. Using the E-TRIALS platform, action-level data will be collected from individual students at the universities and combined with administrative data. Preliminary results on the use and effect of support within ASSISTments will be reported.

An understanding of the efficacy of different support can provide insights into the impacts of the design, implementation of education materials, and pedagogical practices. This speaks to research in the areas of learning sciences and technology, and mathematics education. Further, examining how college students use within-problem supports compared to younger students could help understand how mathematics learning changes chronologically. Finally, we can report average effect sizes on performance disaggregated by student characteristics to ensure findings do not inadvertently harm underrepresented groups in college mathematics courses, which was a component missing in many of the prior studies at the K-12 level.

Kosko, K. W., Caniglia, J., Courtney, S., Zolfaghari, M., & Morris, G. A., (2024). *Proceedings of the forty-sixth annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Kent State University.

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