A Mixed Methods Approach to the Effectiveness of Corequisite Developmental Mathematics Classes

Written by: John Hamman, EdD Alumni

Supervising Professor: Dr. Valerie Klein

Abstract

The purpose of this mixed method study is to determine the effectiveness of the corequisite model on collegiate mathematics education. Corequisite models are designed to allow students who place into pre-college courses to complete the prerequisite material and college-level coursework simultaneously. Traditionally, students placed into developmental courses are charged full tuition to repeat coursework completed in high school, wasting both time and money for the student. In this accelerated model, students who need remediation receive "just-in-time" delivery of content. This saves the student from having to face a long sequence of developmental courses. The primary research question is to compare how corequisite students' feelings about the subject matter differ from their peers who took a traditional developmental math sequence and if this approach helps close the achievement gaps between racial groups.

Aim

Multiple studies have shown that developmental coursework is a significant barrier to most students, especially those from historically underrepresented groups (Atkins & Beggs, 2017; Bailey et al., 2010). Booth et al. (2014) claim that "if underprepared postsecondary students were a disease, the Center for Disease Control would declare a public health emergency" (p.8). This research was intended to determine if the corequisite structure can not only help students pass college-level math classes, but ultimately to help close the racial achievement gaps. Historically, students of color have been overrepresented in developmental education (Boylan et al., 2005). Simply improving pass rates of the first college-level

mathematics class is not sufficient progress towards equity, multiple reforms are needed to give students sufficient momentum to substantially reduce these gaps. Many students of color face stereotypes that they do not belong in college and placing them directly into credit coursework in their first semester can improve student self-image (Gardenhire-Crooks et al., 2010).

Problem

Developmental classes, which were originally designed to help underprepared students succeed in college, have become a substantial academic, emotional, and financial barrier for students, especially those from historically underrepresented categories.

Research Findings

The answer to one research question, which sought to identify qualitative differences between corequisite and traditional students' attitudes towards mathematics, found more similarities than differences. Both groups expressed a mix of enjoyment and stress associated with studying mathematics. Given that both cohorts showed similar success in their courses as well as similarity in the quantitative analysis of their non-math GPA, it is rational that the two groups would have similar mixtures of enjoyment and stress about mathematics. Both cohorts also had difficulty in seeing the usefulness of mathematics, but the corequisite students were more likely to express that mathematics was just a degree requirement.

The corequisite students were also more likely to state their anxiety about homework and class expectations. This result may be related to the fact that mathematics is often viewed as hierarchical. The corequisite students may feel like they have "skipped" a level and are being asked to do college-level work before completely mastering all the developmental content. However, this attitude is not reflected in the success rates of these courses.

Identifying quantitative differences between corequisite and traditional developmental students' grade point averages in other coursework was the basis of the second research question. This study found that there were no statistical differences in either the median or mean GPA between these two cohorts. Even when the cohorts were disaggregated by race/ethnicity, there were no significant differences. This result connects with the qualitative findings which show mostly similarities in attitude between the two groups.

Conclusion

The similarity of attitudes between the two cohorts shows that all developmental students tended to have feelings of embarrassment about needing extra help but overcame those negative feelings with additional exposure to college-level developmental courses.

The overall measurement of the effectiveness of corequisite developmental mathematics structure, defined as the degree to which a student believes they can succeed along with a quantitative measure of success, shows that corequisite courses are equally effective as traditional developmental courses. Therefore, the savings in both cost and time to a student in a corequisite course do not diminish the effectiveness of the education this structure provides.

Research Implications

Educators are trying to determine how to deal with learning loss resulting from the COVID-19 pandemic and to what extent standardized testing is needed to ensure students have mastered high school content before entering post-secondary education. This research shows that helping students to learn pre-requisite concurrently with new content may help educators to allow more students access to collegiate content.

References

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About the author

John Hamman is a proud Drexel Alum. He completed his EdD in June of 2023 and is the Chief Analytics and Insights Officer at Montgomery College, overseeing institutional research and helping leaders make sense of internal and external data. John has been at MC since 2006, previously serving as a professor, chair, and dean of the Math, Statistics and Data Science area. John has also served as a facilitator for the Charles A. Dana Center, helping statewide systems implement corequisite math pathways. In 2011, he won the Montgomery College Outstanding Service Award, and in 2012 he was recognized by a NISOD Excellence Award and as the

Maryland Professor of the Year. He currently serves as a consultant helping colleges support student parents and optimize their course scheduling practices.