

Can Prerequisites Be Predictors?

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According to constructivist and cognitivist theories, students learn through the reconstruction of new knowledge using related, existing knowledge (Rach & Ufer, 2020). The greater the depth of a learner's prior knowledge, the easier it is to integrate new information into existing cognitive structures (Kollar et al., 2014). Prerequisite courses provide access to “domain-specific prior knowledge, [which] has been found to be the most important variable influencing student achievement” (Hailikari et al., 2007, p. 59).

This study examines two prerequisite pathways, Quantitative Literacy (QL) and College Algebra (CA), leading into the target course, Elementary Mathematics for Teachers (EMT), at a public, state university in the United States. QL courses are typically taken by non-STEM majors and focus on building data literacy, while CA courses are typically taken by STEM majors and focus on building procedural fluency. This university's QL courses are assessed non-traditionally, opting for projects and article analyses, whereas the CA courses are assessed conventionally, using tests, quizzes, and homework.

Our exploratory analysis was guided by the following question: How, if at all, does a student's prerequisite pathway impact their final course grade in EMT? We began with institutional course-tracking data across the past two academic years (Fall 2023 to Spring 2025) to compare final course grades (4.0 GPA scale) between students entering EMT from these two pathways. After cleaning the data (e.g., removing duplicates), we generated visualizations (e.g., grouped bar chart) and used both descriptive (e.g., comparing median grades) and inferential (e.g., Kruskal-Wallis test) statistical methods to conduct our analysis.

Preliminary findings indicate that students entering from the CA pathway tend to earn higher final grades, on average, than those entering from the QL pathway. This result in isolation, however, obfuscates the complex nature of student outcomes; to claim that one pathway is stronger than the other inherently dismisses the multifaceted nature of students' mathematical experiences and learning outcomes. Instead, it encourages further questioning of the pathway's underlying mechanisms. Are certain skills emphasized within the CA pathway more easily transferable to EMT? Do similarities in assessment modalities between the EMT course and courses within the CA pathway positively facilitate this transfer? Could pedagogical choices within the CA pathway be positively influencing affect?

Future work will extend this analysis by incorporating additional contextual variables, such as class size and start time (Hurdle & Mogilski, 2022), to identify potential sources of student performance variation. If information about students' past experiences can offer insight on their future experiences, then a student's outcome in a pre-requisite course could indicate a positive experience to be had in the following course.

References

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