

Mathematics Credit Loss Upon Transfer: The Need for Specific Research

Cory Wilson
Oklahoma State University

Katie Bjorkman
Richard Bland College

Ahsan Chowdhury
George Mason University

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Introduction

Mathematics courses are often regarded as gatekeeper courses for not only STEM fields, but degree attainment in general (Kopparla, 2019). Entry-level or developmental mathematics courses in particular have high rates of repetition or failure across institutions (Fink et al., 2018; Schudde & Keisler, 2019; Zientek et al., 2020; Snead et al., 2022); in the case of students who begin at two-year institutions, this effect is more pronounced, as their mathematics courses must be transferred from the two-year institution to a four-year institution in order to earn their baccalaureate degree (Hodara et al., 2017). This type of transfer, called *vertical transfer*, has been the subject of limited study (Doyle, 2006; Bicak, 2023). We hypothesize that it is likely that losing credit for first- and second-year mathematics courses during vertical transfer is likely to have a similar effect on student outcomes as repeating a course for other reasons, and echo the call of Bicak and colleagues (2023) to urge that specific research on the vertical transfer of mathematics credit is needed.

Review

Vertical transfer of credit is the process by which a student completes work at a two-year institution and transfers to a four-year institution to complete their baccalaureate degree (Chase 2010). Among community college students, there are major inefficiencies in the credit transfer process; this is associated with delays in degree attainment (Doyle, 2006; Monaghan & Attewell, 2015), decrease in persistence to degree (Monaghan & Attewell, 2015; Hodara et al. 2017), and an increase in financial commitment to the degree (Fink et al., 2018; Sandoval-Lucero et al., 2024). Vertical transfer rate has been associated with successful completion of mathematics courses (Zhang 2019), and repetition of entry-level mathematics courses has been shown to be a contributor to attrition from STEM degrees or from higher education altogether (Kopparla, 2019; Bicak et al. 2023).

Academic study of vertical transfer tends to focus on snapshots of particular transfer programs at particular times and tend to measure success as the percentage of credits transferred for any kind of credit at the receiving institution (Doyle, 2006; Giani, 2019), due in part to limited data set availability (Giani, 2019). Credit loss is attributable to many things, including grade requirements, coursework content, program applicability, or state-by-state differences (GAO, 2017). A study done within the CUNY system found that approximately 47% of transfer students lost credits to vertical transfer, with an average of between 10 and 13 credits for each student (CUNY Office of Policy Research, 2022), while a similar study in Texas approximated that students lost approximately 12 credits upon transfer (Bicak et al., 2023). Monaghan and Attewell (2015) used national data to estimate that approximately a third of transferring students lost between 10% and 89% of credits upon transfer. Mathematics coursework, especially in entry-level courses, functions as a predictor of degree attainment and time to completion and excess credit accumulation (Fink et al., 2018; Schudde & Keisler, 2019; Bicak et al., 2023). Specific studies of the vertical transfer process for mathematics credits are necessary as a better understanding of the process will likely result in improvements of transfer student outcomes.

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