

STUDENT LOGICAL IMPLICATIONS AND CONNECTIONS BETWEEN SYMBOLIC
REPRESENTATIONS OF A LINEAR SYSTEM WITHIN THE CONTEXT OF AN
INTRODUCTORY LINEAR ALGEBRA COURSE EMPLOYING INQUIRY-
ORIENTED TEACHING AND TRADITIONAL LECTURE

Abstract

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This study aimed to explore how inquiry-oriented teaching could be implemented in an introductory linear algebra course that, due to various constraints, may not lend itself to inquiry-oriented teaching. In particular, the course in question has a traditionally large class size, limited amount of class time, and is often coordinated with other sections of the same course. Additionally, I aimed to explore student understanding of mathematical connections within this classroom context. I considered two types of mathematical connections that are often emphasized within introductory linear algebra: *connections between symbolic representations of a linear system* and *logical implication connections*. Thus, this study was conducted with the goal of answering the following research questions:

- What does it look like when a teacher attempts to incorporate inquiry-oriented teaching in an undergraduate introductory linear algebra class?
- What mathematical connections do students appear to evoke within the context of an introductory linear algebra course that employs inquiry-oriented teaching?

To answer these questions, I conducted an action research study in three consecutive introductory linear algebra courses that I taught. Throughout the study, my inquiry-oriented teaching evolved and took form

in response to my teaching goals of helping students develop mathematical connections and in response to the constraints that I faced in teaching this particular course. Inquiry-oriented teaching was largely reserved for the teaching of mathematical connections; in an attempt to create more time for inquiry-oriented teaching of mathematical connections, lecture was utilized for the teaching of other concepts. I have defined the resulting implementation as a *hybrid approach to inquiry-oriented teaching*. The hybrid approach shows great potential as a tool for helping instructors transition to inquiry-oriented teaching; in particular, the hybrid approach is useful for accomplishing a specific set of teaching goals, for example, the teaching of mathematical connections. The mathematical connections that students evoked throughout this study appear to have formed, at least in part, as a result of the opportunities that students had to engage in mathematical inquiry throughout the course.