

Public Abstract

First Name:Travis

Middle Name:Austin

Last Name:Olson

Adviser's First Name:Douglas

Adviser's Last Name:Grouws

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:SP 2010

Department:Curriculum & Instruction

Degree:PhD

Title:Articulated Learning Trajectories Related to the Development of Algebraic Thinking that Follow from Patterning Concepts in Middle Grades Mathematics

The construct of an articulated learning trajectory (ALT) was conceived of and defined to provide a lens through which to view and analyze content development in middle grades mathematics textbooks. The ALTs identified and described were used to characterize the development of patterning and sequence concepts as they relate to algebraic thinking in four middle grades textbook series. The perspectives of clarity, comprehensiveness, accuracy, depth of mathematical inquiry and reasoning, organization, and balance were considered in analyzing the mathematical development of these concepts.

The ALTs that were identified and described included ladder-like and branching types of trajectories. The ALTs in each of the textbook series studied were quite different from one another with regard to the scope and sequencing of mathematics content. Comparisons based on the disciplinary perspectives showed key differences among the ALTs identified across textbooks, including the extent to which authors presented patterns in geometric versus numeric contexts. Mathematical sequences were not well defined in any of the textbook series. The differences in the nature and positioning of the ALTs identified across textbook series have implications for the development of pattern concepts leading to algebraic thinking and to the associated student learning that is likely to take place. In summary, textbook series which are conventionally assumed to be similar to one another were found to differ dramatically with respect to the content addressed, as well as the sequencing of the included content.