

Public Abstract

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Examining Secondary Students' Algebraic Reasoning: Flexibility and Strategy Use

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Recent curricular recommendations (NCTM, 2000; RAND, 2003) have called for the development of student flexibility in relation to algebraic reasoning. This study focused on the algebraic strategies employed by secondary students and their flexibility in understanding various algebraic strategies when solving numeric situations. Algebraic flexibility consisted of two components: (a) Within-task flexibility (recognizing appropriate algebraic strategies that could be used for a particular task) and cross-task flexibility (recognizing when a strategy could be applied to various tasks).

Eleven tenth-grade students from two rural schools participated in interviews centered on solving contextualized algebraic tasks. After solving a particular task, participants were provided with alternative student solutions for the tasks to examine.

The results demonstrated that secondary students employ the same strategies as elementary and middle level students: explicit (closed-form), whole-object (multiples), recursive (term-to-term), and chunking (recursive/explicit hybrid). Participants used recursive (92.3%) and chunking (90%) strategies with the greatest success, while the explicit strategy was the least effective (correctly used 60% of the time).

Participants classified as exhibiting a high level of flexibility did not necessarily demonstrate that ability in initially solving the tasks. The participants fell along a range for both within-task and cross-task flexibility. Participants classified as exhibiting a high level of flexibility were able to determine the applicability of a strategy and develop rules tied to the context of the situation. Students with low flexibility were unable to determine the applicability of a strategy or justify their rules.