

APPROACHES TO ALGEBRA

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- Should algebra be taught to all? There has been a call for algebra for all secondary students, but what aspects of algebra are of value to all? What should comprise a minimal curriculum? How do answers to these questions relate to regional or cultural differences?
- What do we expect of an algebra-literate individual? What are the values of algebra learning for the individual, especially in view of increasingly powerful computing capabilities? Access to higher learning and employment are two values, but what are the more immediate values and how can they be achieved?
- How can we reshape the algebra curriculum so that it has more immediate value to individuals? Can we identify explicit examples in contexts meaningful to students in which algebraic ideas have clear, unambiguous value? Are there undesirable consequences of such orientations to algebra?
- How can we reshape the algebra curriculum so that specific difficult ideas are more easily accessed?

APPROACHES TO ALGEBRA

Recent research has focused on a number of approaches for developing meaning for the objects and processes of algebra. These approaches include, but are not limited to, problem-solving approaches, functional approaches, generalisation approaches, language-based approaches, and so on. Problem-solving approaches tend to emphasise an analysis of problems in terms of equations and a view of letters as unknowns. Functional approaches support a different set of meanings for the objects of algebra; for instance, the use of expressions to represent relationships and an interpretation of letters in terms of quantities that vary. A somewhat different perspective is encouraged by generalisation approaches that stress expressions of generality to represent geometric patterns, numerical sequences, or the rules governing numerical relationships – such approaches often serving as a basis for exploring underlying numerical structure, predicting, justifying and proving. Some algebra curricula develop student algebraic thinking exclusively along the lines of one such approach throughout the several grades of secondary school; others attempt to combine facets of several approaches.

Synthesising the experience with and research on the use of various approaches in the teaching/learning of algebra leads to questions such as the following:

- What does each of these various teaching approaches mean?
- What are the algebraic meanings supported by each?
- What are the epistemological obstacles inherent in each?
- Which important aspects of algebra are favoured/neglected in each approach?
- What are the difficulties encountered by students in extending the meanings that are developed by each of these approaches to include the meanings inherent in other approaches?