

## MATEMATISK OPERATIVITET

### En analys av relationen mellan form och innehåll i skolmatematik

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**Akademisk avhandling**

som med vederbörligt tillstånd av filosofiska fakulteten vid Linköpings universitet för avläggande av filosofie doktorsexamen kommer att offentligt försvaras i Eklundska salen, (1:101), Hus I, Universitetsområdet, Valla, fredagen den 8 juni kl 10.00.

**ABSTRACT**

In this thesis interest is focused on the relationship between conceptual and symbolic-notational aspects of elementary school mathematics. The literature indicated that students' conceptions of the integration of content and form are essential for their understanding of mathematics.

A unit of analysis, the "crystal", is based on the distinction between content and form of mathematics, on the one hand, and between structure and operation, on the other. The interplay among these four dimensions of mathematics is discussed with respect to its logical and psychological aspects.

The notion of mathematical form, modelled by formal systems, is defined as the spatial relationships between typographical units in written symbolic expressions. It is found that empirically based mathematical content is reflected in "genetic" mathematical forms. Mathematical operativity is then identified as the ability to integrate, in mathematical problem solving, the four dimensions of the "crystal".

An empirical study, including written tests and interviews, involving 54 students in grades 8 and 9 of the Swedish compulsory school, showed that conceptual and formal understanding are equally related to performance in school mathematics, while logical understanding could be viewed as a mediator for the creation of conceptual-formal links.

Finally, implications of the study for the teaching of elementary school mathematics are discussed.

Language: Swedish.

Key words: Cognitive abilities, form and content, formal systems, mathematics education, mathematical symbolism.

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