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Kapitel: LANGUAGE ASPECTS OF ALGEBRA

LANGUAGE ASPECTS OF ALGEBRA

This section considers theoretical and applied aspects of the languages and notations of algebra, in relation to teaching and learning. The evolution of algebra cannot be separated from the evolution of its language and notations. Historically the introduction of good notations has had enormous impact upon the development of algebra but a good notation for science may not be a good notation for learning. With new computer technology we are now seeing a flowering of new quasi-algebraic notations, which may offer, support or eventually enforce new notations. However, current theories of mathematics teaching and learning do not seem adequate to deal with learning about notation. It is therefore timely to focus on algebraic notations asking questions such as :

- How do theories of mathematics teaching and learning embrace the linguistic aspects of algebra and what can we propose to better take into account these aspects ?
- Algebra is not a language but it has a language and the two cannot be dissociated. What does it mean to talk about algebra as a language and what are the implications of such a perspective ?
- There is a wide range of theories of how mathematical concepts are learned and taught (in particular the constructivist theories) but learning a language is not just a matter of learning concepts. How do acknowledged theories of mathematics learning and teaching embrace the non-conceptual aspects of learning the language of algebra and what can we propose to better take these aspects into account ?
- Would some changes of algebraic language contribute to the development of algebraic thinking, communication and understanding ?
- Is it feasible and desirable to remove some of the ambiguities that are present in standard mathematical symbolism, for example in the use of the equals sign ?
- Should some effort be made in the teaching of mathematics to explain and bridge differences in notation between algebra as it is taught in mathematics courses and algebra as it is used in other disciplines ?
- What are the characteristics of good notation ? What does mathematics education research have to say on this ? Are some notational choices better for science but others better for learning ?

TEACHING AND LEARNING WITH COMPUTER ALGEBRA SYSTEMS

The advent of affordable computer systems and calculators that can perform symbolic calculations may lead to far-reaching changes in mathematics curricula and in mathematics teaching. This section addresses questions that arise from the increasing accessibility of computer symbolic manipulation. Answers to these questions will draw upon established research on the teaching and learning of algebra as well as reporting on recent experimental work. They may suggest new directions for research, including :

- For which students and when is it appropriate to introduce the use of a computer algebra system ? When do the advantages of using such a system outweigh the effort that must be put into learning to use it ? Are there activities using such systems that can be profitably undertaken by younger students ?