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How mathematics teaching develops pupils' reasoning systems.

Bergsten, Christer (ed.) et al., Mathematics and language. Proceedings of MADIF4, the 4th Swedish mathematics education research seminar, Malmö, Sweden, January 21–22, 2004. Linköping: Svensk Förening för MatematikDidaktisk Forskning (ISBN 91-973934-2-8). Skrifter vrån Svensk Förening för MatematikDidaktisk Forskning (SMDF) 3, 20-34 (2004).

Recent theoretical discussions have pinned constructivism and social constructivism against each other. In this paper, the author argues that Piagetian constructivism and Vygotsky's social constructivism are coherent and complementary. By reaching a synthesis of these two theories, one will have a more encompassing approach to analysing how pupils learn mathematics and how mathematics teaching develops their minds. The author suggests that the theories are consistent because they are based on the same metaphor of the mind and that they are complementary because they explain different aspects of the development of reasoning. Together they can help to understand the developments in pupils' reasoning system that result from changes in the thinker (Piaget's contribution) and in the thinker's activity when using different thinking tools (Vygotsky's contribution). In order to develop these ideas, the author first discusses the concept of thinking systems. He then works with a simple example in mathematics education, multiplicative reasoning. He first considers the origin of multiplicative reasoning - i.e., the development of the thinker, and then discusses how mathematics teaching can affect pupils' reasoning systems in this domain. To conclude the discussion, the author considers a research agenda for mathematics education based on the conception of thinking systems.

Classification: C30 D20