

Collaboration in mathematics – What stimulates and what impedes mathematical progress?

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There is a substantial body of knowledge on the importance of language for learning in general, and for learning mathematics in particular. Hence, language skills and collaborative learning are emphasized in the Norwegian curriculum. There are, however, some precautions from researchers arguing that just putting pupils together will not always work (Mercer & Sams, 2006; Sfard & Kieran, 2001).

In this presentation, we set out to answer the question: *What stimulates and what impedes mathematical progress in the collaborative process of solving tasks?*

The study is video-based and carried out within a sociocultural framework, with a focus on tool-mediated activity (Vygotsky, 1987). Dialogues between selected groups of third-graders were video-taped. Parts of this recordings and the pupils' written work were discussed by researchers and teachers. This represents the first step in analyzing the data material as interesting sequences were identified.

We present contrasting dialogues between two pairs of eight-year-old pupils, two girls and two boys, working on word problems in multiplication. The dialogue between the two girls ends with the exclamation 'Yes, we did it' which we took as preliminary evidence of successful collaborative talk. The boys' dialogue, on the other hand, shows little enthusiasm and gives the immediate impression of unproductive competition.

The dialogs are analyzed both from a collaborative and from a mathematical point of view. Littleton and Mercer's (2010) notion of exploratory, cumulative and disputational talk informs the conversational analysis, while the use and shifts of representations, emphasized by e.g. Duval (2006), are central in order to grasp the mathematical progress. The analysis shows that both communication skills and use of tools have a profound impact on third graders' potential to solve tasks as a joint enterprise. Due to their communication skills the girls succeed in solving the task, while the boys competitive dialogue was counterproductive. The boys' failure was a surprise as the boys' skills in mathematics exceed those of the girls according to the teacher. Lack of intellectual challenge may have influenced the quality of the dialogue.