

## **Ongoing Research in Mathematics Education in School Context**

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### *Summary*

This paper discusses the ongoing project in mathematics education at University of Gävle. The aim of the project is to develop and test methods that refer to improve learning in mathematics from school to university level. Furthermore, the aim is to develop a research environment for learning in mathematics that can serve as a platform for the development of teachers' competence in mathematics education. Fundamental for this project is that it combines as well student's learning, teacher's learning as researcher's learning.

The project will promote the research question, which has to do both with the theory and practice. The overall research question is: Does the teacher's way to handle the object of learning (e.g. fraction concept, equation concept, function concept et al.) in the classroom influence on pupils'/students' learning? What are the critical aspects for pupils'/students' learning?

As a theoretical framework we use the Learning Study model designed by Marton<sup>1</sup> et al. (2004). The model is based on the variation theory (Marton et al. 2004), which originates from phenomenographic research tradition carried out in Sweden in the later 1960s and early 1970s. The variation theory has two fundamentals; learning always has an object and the object of learning is experienced and apprehended on different ways. According to this theory the most powerful factor concerning pupils' learning is how the object of learning is handled in teaching situation; what aspects are in focus - what aspects are variant and what are invariant.

Our ongoing study is three years research project. During the spring time 2007 we have done a preliminary investigation in a compulsory school. Our study deals with the fraction concept and how it is handled in the lesson. In this study one compulsory school teacher together with university teachers planned two lessons of the fraction concept for two classes in grade eight. The pupils were tested before and after the lessons and the lessons were video-recorded. The test-results for each class, before and after the lesson, were compared. The results from our preliminary investigation indicate that pupils have poor-developed conceptions about fraction concept. Especially, they have difficulties with addition and subtraction of fractions with different denominators. In order to increase the pupils' understanding of fractions, we propose a number of actions for future planning of learning studies. Autumn 2007 we have started our learning studies in upper secondary school and preschool. Two upper secondary teachers and one student teacher and one preschool teacher are involved. Year 2008 we are going to extend our project to other schools and districts. We have also planned to test Learning Study-model on studies on university level and to develop methods for distance learning in mathematics. The whole project will be evaluated and documented during 2009. Based on experiences from the study a new plan for future research is created.

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<sup>1</sup> Marton, F & Tsui, A. B. M. (2004). Classroom Discourse and the space of learning. Mahwah. New Jersey. London.