

Relational values in inclusive mathematics classrooms – an intervention study

Malin Gardesten
Linnaeus University

The focus of this paper is on the methodological approach in a design research study. The aim of the study is to explore how primary mathematics teachers coordinate mathematical and relational proficiencies for education to make the mathematical content accessible for every student. The researcher together with the participating teachers (n=5) identified the existing and desired teaching situation in two mathematical classrooms. An intervention was implemented and documented by observations, video recordings and interviews with the teachers and the students. The intervention explored the interactions between the teachers and the students, to explain possibilities of how students can be given access to the mathematical content.

Introduction

This methodological paper presents an educational design research (EDR) study on student participation in inclusive mathematical classrooms. Earlier research shows that relational values in education have significant influence on students' engagement to learn and their content specific performance (Hamre & Pianta, 2005; Hattie, 2008). However, research on relational aspects in education has not been conducted with focus on students' learning of mathematics. Thus, relational aspects in mathematics education may differ in relation to other subjects. The aim is to explore and develop knowledge on how teachers' mathematical and relational proficiencies for education can be coordinated in mathematics education. An intervention is realized to understand if and how each student can be given access to the mathematical content in primary school. The overarching research question is: How can teachers' mathematical and relational proficiencies for education be coordinated to promote every student's access to a mathematical content?

The design of and the methods used in the study

Two mathematics classrooms where cooperative teaching (cf. Cook & Friend, 1995) is used to promote an inclusive mathematics education were selected for the study by purposive sampling (Bryman, 2011). The intervention is conducted together with three primary mathematics teachers, two special education teachers and their students in grade 3 and grade 5 (approximately 50 students). The study has a mixed method design (Creswell, 2014) and is in line with the characteristics of EDR in that the intervention is conducted in real world settings through the cyclic design of three phases (Gravemeijer & Cobb, 2006). The focus is to

understand the responses an intervention engenders. Thus, this EDR study is conducted through an intervention, not on an intervention. Phase one focuses on analysis and exploration of the ongoing mathematics education. The students' attitudes towards mathematics and their self-efficacy in mathematics are documented by interviews and self-assessment questionnaires. Their mathematical skills are investigated orally and by written tests. Classrooms observations and video recordings that capture, gestures, gazes and voices document the ongoing mathematics education. Sequences from the video recordings form the basis for interviews with students and teachers as a stimulated recall (Haglund, 2003) on their reflections on the mathematics education. Based on the analysis of the empirical material, an intervention on teachers' mathematical and relational proficiencies for education is developed. A literature review on earlier studies in the areas of teachers' mathematical and relational proficiencies underpins what the researcher and the teachers together formulate as a hypothetic learning trajectory (HLT). This HLT addresses predictions of how to make the mathematical content accessible for every student. Phase two, focuses on the design and implementation of the intervention based on this HLT, operationalized by a series of instructional activities and are documented by similar procedures as in phase one. Phase three focuses on evaluation and reflection of the wholeness of the intervention. When conclusions can be drawn, design principles are constructed.

Expected contributions from this study

The expected contributions are both practical and theoretical. The practical contributions are connected to the context of mathematics classroom. The theoretical contributions are the design principles as descriptions of how teachers' mathematical and relational proficiencies can be coordinated to promote students' access to a mathematical content.

References

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