

Sustaining students' participation in mathematics

Malin Gardesten
Linnaeus University

Based on a classroom study conducted in a Swedish Grade 3, this presentation explores students' participation in mathematics. Video-recorded observations were analyzed based on two theoretical approaches connected to teachers' pedagogical and subject matter knowledge, and relational abilities. Instances, where the two theoretical approaches intersected, were analyzed focusing on students' participation in mathematics framed by a social practice theory. The tentative results show that when the teacher in interaction with the students, uses both her mathematical knowledge for teaching and her relational abilities, the students sustainably participates in solving an open number sentence.

Introduction

Historically, students *in* special educational needs in mathematics (SEM) (Roos, 2019) have been excluded from learning environments that provide opportunities for them to thrive in mathematics education with qualitative depth (Gervasoni & Lindenskov, 2010). The study presented is grounded in earlier research stating that inclusive mathematics education requires the teacher to have mathematical, didactical, and pedagogical skills. Further, relational leadership promotes inclusive mathematics education (Schmidt, 2015), where the relationship between the teacher and the student is critical for the student's participation in mathematics (Bagger, 2020), implying the teacher seeing each student as a person and understanding their needs (Roos, 2019). This study aims to explore students' participation in mathematics based on empirical examples identified through the coordination of two theoretical approaches, on teachers' pedagogical and subject matter knowledge, and teachers' relational abilities.

Theoretical frame

This study has a social perspective on learning, which implies learning as social participation (Wenger, 1998). In this paper, the concepts *communities of practice*, *negotiation of meaning*, *participation* and *reification* from Wenger (1998) are used to understand students' participation in mathematics. The community of the mathematical classroom where the participants negotiate the meaning of the mathematical content is of interest. Participation refers to students taking part, engaging in mathematics, and contributing to the practice of mathematics in the community of the mathematical classroom. Reification implies processes or products congealing mathematical concepts and affects what is experienced. Learning as participation occurs through engaging in actions and interactions with students' peers and teachers concerning mathematics.

Methods used in the study

In this paper, teachers and students in grade 3 were chosen as samples. They were chosen since they explicitly strived toward inclusive teaching already before the study. The data used in this paper consisted of video-recorded observations of mathematics lessons carried out in an intervention during one school year. Instances identified through coordination of the two theoretical approaches, the Knowledge Quartet (KQ) (Rowland, 2013) and the Pedagogical Relational Teachership (PeRT) (Ljungblad, 2019), were inductively analyzed regarding students' participation framed by the social practice theory (Wenger, 1998). The analysis processes are in progress, exploring instances categorized into three groups: i) both KQ and PeRT, ii) only KQ, and iii) only PeRT.

Expected contributions from this study

The tentative results show that the teacher uses both her mathematical knowledge for teaching and her relational abilities when the student participates in solving the task. The teacher aligns with the student's experiences and skills. The student and the teacher negotiate the meaning of the strategies of calculating a subtraction. The student aligns to the joint enterprise of solving the open number sentence, participating sustainably.

References

- Bagger, A. (2020). Opportunities to display knowledge during national assessment in mathematics: a matter of access and participation. *European Journal of Special Needs Education*, 1-14.
- Gervasoni, A., & Lindenskov, L. (Eds.). (2010). *Students with 'special rights' for mathematics education*. Springer.
- Ljungblad, A.-L. (2019). Pedagogical Relational Teachership (PeRT) – a multi-relational perspective. *International Journal of Inclusive Education*, 23, 1-17.
- Roos, H. (2019). *The meaning (s) of inclusion in mathematics in student talk: Inclusion as a topic when students talk about learning and teaching in mathematics* [Doctoral dissertation, Linnaeus University Press].
- Rowland, T. (2013). The Knowledge Quartet: the genesis and application of a framework for analysing mathematics teaching and deepening teachers' mathematics knowledge. *Sisyphus-Journal of Education*, 1(3), 15-43.
- Schmidt, M. C. S. (2015). *Inklusionsbestræbelser i matematikundervisningen: En empirisk undersøgelse af matematiklæreres klasseledelse og elevers deltagelsesstrategier i folkeskolen* [Inclusion Efforts in Mathematics Teaching. An Empirical Study of Maths Teachers' Classroom Leadership and Pupils' Participation in the Danish Public School (Primary Education): PhD dissertation] Institut for Uddannelse og Pædagogik (DPU), Aarhus Universitet [Department of Education, Aarhus University].
- Wenger, E. (1998). *Communities of practice: learning, meaning, and identity*. Cambridge University Press.