Assessment in the mathematics classroom in relation to how students are in(ex)cluded in mathematics

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Introduction and background

In this poster I would like to discuss the design of my PhD-project on assessment in the mathematics classroom in relation to how students are in(ex)cluded in mathematics, in early school years (ages 10-12), in Sweden. This poster uses in(ex)clusion as a concept for inclusion and exclusion. Here inclusion in mathematics is when students can access and participate in mathematics learning (Roos, 2019b, referred to in Roos, 2023). Exclusion is always present in the process, when working for inclusion (Valero, 2021, referred to in Roos, 2023).

This poster uses the following definition of assessment practice: All decisions the teacher makes when assessing, e.g., what is assessed, which tasks to use, when and in which situations (Boistrup, 2017). Hence, assessment is a part of learning and education, and therefore also in mathematics education. In mathematics classroom assessment the teacher gathers information about students' mathematical knowing to support learning but also to improve teaching practice (Nieminen et al., 2023). Assessment affects how the students are positioned when learning mathematics due to roles and responsibilities (Nieminen et al., 2023). This could indicate that students meet different kinds of assessment practices in different classrooms, which in turn in(ex)clude the students in relation to learning mathematics. Hence, this poster assumes that assessment is present in all teaching and is shown to the student when given as feedback (Boistrup, 2017).

Plan for upcoming study

The tentative aim of this study is to build an understanding of assessment in the mathematics classroom in relation to how students are in(ex)cluded in mathematics. The mathematical focus will be reasoning due to two reasons. One, different kinds of reasoning are generated by problem solving (Boesen et al., 2010, referred to in Säfström et al., 2024), which in turn is shown to be beneficial for students' learning of mathematics (Liester & Cai, 2016, referred to in Säfström et al., 2024). Two, reasoning can exist regardless of mathematical content, e.g. arithmetic or geometry. Hence, this study will explore students' perspectives on assessment in mathematics and how students are in(ex)cluded in relation to learning mathematics through reasoning in the classroom. The teacher matters in the classroom (Terhart, 2011) and in the assessment, so this study will also focus on the teacher. By doing this, it will be possible to gain insights into how equity-driven assessment practices could be used in the mathematics classroom. To meet the aims of this study, its design will be developed systematically structured by the following parts.

First, the aim is to examine how students are in(ex)cluded in relation to learning mathematics in the classroom. The tentative research question is: What traces of in(ex)clusion can be identified in

interviews with students and teachers? To answer this question interviews will be conducted with students and teachers, with a focus on their perspectives of assessment in the mathematics classroom. The results will be presented in the first article.

Second, the aim is to compare responses from students and teachers, to identify potential differences in assessment practices in relation to in(ex)clusion, within and between classrooms. The tentative research questions are: What similarities and differences due to in(ex)clusion can be identified in students' and teachers' perspectives on assessment in mathematics? What similarities and differences regarding assessment practices within and between classrooms can be identified? The earlier interviews will be used as a pilot study to design a survey with multiple-choice questions, to further examine students' and teachers' perspectives on assessment in the mathematics classroom. The results will be presented in the second article.

Third, the aim is to examine assessment practices in relation to how students are in(ex)cluded in relation to reasoning in mathematics education. The tentative research question is: How do different assessment practices in(ex)clude students in relation to reasoning in mathematics? A survey with open-ended questions will be used to examine teachers' perspectives on their own assessment practice. The results will be presented in the third article.

Fourth, the aim is to find ways to assess students reasoning in mathematics, on a classroom level, where the assessment practice promotes equity for all students. The tentative research question is: What can an assessment practice that promotes equity for all students look like? This case study will draw on findings from the earlier partial studies to develop assessment practices together with a teacher, in the mathematics classroom. The results will be presented in the fourth article.

References

Boistrup, L. B. (2017). Assessment in mathematics education: A gatekeeping dispositive. In H. Straehler-Pohl, N. Bohlmann, & A. Pais (Eds.), *Disorder of Mathematics Education: Challenging the Sociopolitical Dimensions of Research* (pp. 209–230). Switzerland: Springer International Publishing.

Nieminen, J. H., Bagger, A., Padilla, A., & Tan, P. (2023). Student Positioning in Mathematics Assessment Research: A Critical Review. *Journal for Research in Mathematics Education*, *54*(5), 317–341. https://doi.org/10.5951/jresematheduc-2022-0030

Roos, H. (2023). Students' voices of inclusion in mathematics education. *Educational Studies in Mathematics*, *113*(2), 229–249. https://doi.org/10.1007/s10649-023-10213-4

Säfström, A. I., Lithner, J., Palm, T., Palmberg, B., Sidenvall, J., Andersson, C., Boström, E., & Granberg, C. (2024). Developing a diagnostic framework for primary and secondary students' reasoning difficulties during mathematical problem solving. *Educational Studies in Mathematics*, *115*(2), 125–149. https://doi.org/10.1007/s10649-023-10278-1

Terhart, E. (2011). Has John Hattie really found the holy grail of research on teaching? An extended review of Visible Learning. *Journal of Curriculum Studies*, *43*(3), 425–438. https://doi.org/10.1080/00220272.2011.576774