# Students' meanings of inclusion in mathematics – implication for practice

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*The purpose of this paper is to highlight implications for practice reflecting on the results of a study of students' meanings of inclusion in mathematics education. The main result from the prior study suggest that three Discourses influences students meaning(s) of inclusion: Discourse of mathematics classroom setting, of assessment, and of accessibility in mathematics education. The implication for practice building on these Discourses concerns construction of tests, grading in relation to what students perceive as mathematics, (un)challenge and theme of tasks, a pedagogical stance and tactfulness of the teacher, valuing of students, organization in terms of the use of textbooks, discussions and "going-through", variation in teaching approaches, being in a small group, and how the label of "SEM student" may affect participation and access.*

## Introduction

In a study of students' meaning(s) of inclusion in mathematics Roos (2019a) investigated what students in special educational needs in mathematics attributed to inclusion in mathematics learning and teaching and what framed students' meaning(s) of inclusion in mathematics learning and teaching. This paper is a reflective paper about how the results of the study (Roos, 2019a) can implicate practice in mathematics education, both at schools and for teachers' professional development. This implication can help both mathematics education and teachers and teacher education to highlight and enhance inclusive mathematics education. Hence, the overall aim is to highlight how students' meaning(s) of inclusion can implicate practice. The research questions are: how can the results of the prior study implicate practice on school level? How can the result of the prior study implicate teachers' professional development?

## Inclusion

To set the context of this paper there is a need to explain the notion of inclusion. This notion is frequently used in research to highlight education for every student in the classroom, or related notions such as *inclusive pedagogy*. Often, inclusion is used to describe an ideological stance or a way of working in mathematics (Roos, 2019a) to provide "a meaningful education for all" (Florian et al., 2017, p. 14). "For all" implies that the focus of inclusive education is not only on low attaining students and the difficulties they encounter but also on issues of diversity to avoid marginalization (Florian et al., 2017). However, at the same time, the notion *for all* affords a gaze on all students' learning, raising contradictions regarding who is seen, heard, and supported. This has been intensely debated in research with a fear of, instead of producing

inclusion, actually producing exclusion (e.g., Chronaki, 2018; Pokewitz, 2004). The notion of in(ex)clusion (Valero, 2017) has been used to describe this as an ordering and ranking of "individuals and populations in relation to how much their mathematical achievement indicates their human capital" (Valero, 2017, p. 2). In(ex)clusion can be seen as notion trying to frame the importance to always be careful when planning for inclusion, to reflect on who is seen, heard, and supported.

Inclusive settings and working inclusively can be defined as ways of accommodating all learning differences among students within a classroom and creating opportunities for every student to participate in the education (Barton, 1997). This definition has its origin in the paradigm of special education and the notion of inclusion has often been connected to special education rather than to a democratic education overall (Allan, 2012). The connection to special education is also highlighted in Swedish research (Magnússon et al., 2019). The connection can be seen in the light of the development of the notion of inclusion, from the use in the Salamanca declaration 1994 with a focus on special education and deficits towards its current state focusing education for all. This means that the notion has historically been tightly connected to deficits but has moved towards focusing a democratic education for all. Although the definition of the notion of inclusion has moved, what inclusive education is depends on the situation and context in both policy and culture (Magnússon et al., 2019). Göransson and Nilholm (2014) identified four different types of definitions of inclusive education when investigating how it is used in research literature; the placement of students in special educational needs in mainstream classrooms; social academic needs of students in special educational needs; social academic needs of every student; creating communities. This implies inclusion is interpreted and used differently, from a strong connection to special education to a community issue depending on the context and culture.

If considering the use of the notion of inclusion in mathematics education research, there are several different definitions. Often the notions diversity and equity (e.g., Askew, 2015) are used together with inclusion, which can be seen as indicating an ideological stance (Roos, 2019b) and a community definition. Also, as mentioned above research on inclusion in mathematics education also discusses processes of exclusion (e.g., Chronaki, 2018; Valero, 2017). On the other hand, there also research using words like interventions (e.g., Hart Barnett & Cleary, 2015) and inclusive classroom (Moorehead & Grillo, 2014) together with inclusion, which can be seen as using inclusion as a notion describing a tool to teach all students in the same classroom. This way of using inclusion indicates a placement definition of inclusion. Hence, mathematics education research on inclusion can be seen as working in two directions, one covering societal issues and having an ideological stance and the other covering classroom and individual issues having a practical stance using inclusion as a tool. These two directions are most often not overlapping in research on inclusion in mathematics, which leaves somewhat of a gap between ideology and practice (Roos, 2019b).

## The prior study

The study which is reflected upon in this paper is situated in the intersection between the research paradigms mathematics education and special education focusing on inclusion from a student perspective. It is a collective case study (Stake, 1995), as it focuses three students in grade 7 and 8 in a public Swedish lower secondary school. The students are all regarded as being in special educational needs in mathematics (SEM) by the teachers, one of them because he is in access to the mathematics presented in the classroom but in need of something else to get access to learning in mathematics, and two of them because they are struggling to get access to the mathematics presented in the classroom. The school has approximately 550 students and 5 classes in each grade from Grade 7 (13-year-olds) to Grade 9 (16-year-olds). The catchment area is both urban and suburban, and there is cultural as well as social diversity. This school has set out to work inclusively, meaning its aim is to include all students in the ordinary classroom in every subject and to incorporate special education into the ordinary teaching with no fixed special educational groups. The school states that inclusion is a core issue and that everybody is welcome in the classroom where the support will primarily take place by co-teaching between the teachers and special teachers.

The object of the study was the meaning(s) of inclusion in student talk and the data consists of both interviews and observations conducted during one semester. The students were interviewed at least five times each during the semester. The observations took place in the Grade 7 and Grade 8 classroom where the interviewed students were enrolled. The use of the observations in the research was two folded, firstly, they situated the interview questions to be near the students in time and content, and secondly, they were used in the analysis. This study is discursive and discourse analysis (DA) as described by Gee (2014a, 2014b) is used, both as a theoretical frame and as an analytical tool. This implies the focus is on the students' interactions, both spoken and written. The theoretical notions *Discourse (D)* and *discourse (d)* are used. Discourse represents a wider context, both social and political, and is constructed upon ways of saying, doing, and being: "If you put language, action, interaction, values, beliefs, symbols, objects, tools, and places together in such a way that other *recognize* you as a particular type of who (identity) engaged in a particular type of what (activity), here and now, then you have pulled of a Discourse" (Gee, 2014a, p. 52, Gee's italics). When looking at discourse (with a small d), it focuses on language in use – the "stretches of language" we can see in the conversations we investigate (Gee, 2014a, 2014b), meaning the relations between words and sentences and how these relations visualize themes within the conversations.

### Result of prior study

The results of the prior study stems from the discourse analysis made and answer to the following research questions: What meaning(s) do the students ascribe to inclusion in mathematics learning and teaching? And what frames students' meaning(s) of inclusion in mathematics learning and teaching? These questions helped to show how meaning(s) of inclusion in student talk can be described by three overarching and interrelated Discourses: *The Discourse of mathematics classroom setting, of assessment, and of*

*accessibility in mathematics education*. Within these Discourses, smaller discourses make issues of meanings of inclusion for the students visible. The relation between the D(d)iscorses is displayed in Table 1 below.

| **Discourse(s)** | **discourse(s)** |
|---|---|
| Discourse of assessment | Testing<br>Grades |
| Discourse of accessibility in mathematics education | Tasks<br>The importance of the teacher<br>(Not) being valued<br>Dislike |
| Discourse of mathematics education setting | Classroom organization<br>Being in a small group |

Table 1. The relation between D(d)iscourses in the prior study.

Hence, in the **Discourse of assessment** all the students somehow talked about assessment and how it influenced inclusion in mathematics negatively in terms of different tests and grades. Regardless of if the students were in struggle to get access to the mathematics presented in the classroom or were in access to the mathematics presented in the classroom, their inclusion in mathematics was limited by assessments. Also, in the **Discourse of accessibility** the students highlighted the importance to get access to the mathematics education by tasks that helps their mathematical development. They also highlighted the importance of being valued in the classroom as a student in SEM and the importance of having variation in the teaching and learning to not dislike mathematics. In the **Discourse of mathematics education setting** the students struggling to get access to mathematics highlighted the importance of sometimes being able to be in a small group getting instructions from the special teacher. Also, variation in the teaching approaches was something the students talked about as a positive factor for inclusion. In relation to that they all talked about the importance of the teachers, reflection on what and how to present on the white board.

Even though the results are from a collective case study with only three students, the students can be regarded as extreme and critical cases because they are in SEM and are cases within the overall collective case. A claim is that these extreme cases provide with vital information about the meaning(s) of inclusion. These critical cases help us to reflect about the collective case, as what is seen as valid for the collective case, may apply to all cases (Flyvbjerg, 2011). Another claim is that this is an in-depth and an information-rich case to get "a best-case scenario". This because the choice of a school setting out to work inclusively. Accordingly, if students' meaning(s) of inclusion are not explicit in this case, then where are they made explicit?

## Discussion of implications for practice

The previous described study is conducted at one school and is in depth with three students. The study does not claim that the results are valid in every school with every student, but it opens for a possibility of transferability when reflecting on the results. Though, important to consider regarding this possible transfer is limitations in moving from students' interpreted meanings to implications for schools and teachers' professional development. This move and reflection on the results needs to be situated in a practice to show potential implications for that particular practice. This move also needs to be considered in possibilities for teacher development. Here there is a need reflect on the results in relation to teacher practice in mathematics education. This limitation shows that there is a need to be reflexive and situate the results. Though there are merits in this, because when reflecting on a specific practice other local from a student perspective issues that was not visible may appear.

When reflecting on the results of the study of the meaning(s) of inclusion in mathematics education in student talk on an overall level, one can conclude that the overarching issues are the same, yet different when looking into detail. This displays the need to always reflect on the result in relation to the practice and the students at hand. Even though, this study shows some overarching issues that can be of help when reflecting on how to enhance inclusion for every student (table 2).

| **Discourse(s)** | **discourse(s)** | **Implications for practice** |
|---|---|---|
| Discourse of assessment | Testing | The construction of tests and the demands on the students, in terms of explaining, influences both participation and access. |
| | Grades | Grading influences what students perceive as mathematics and thereby limits their participation and access. |
| Discourse of accessibility in mathematics education | Tasks | The (un)challenge in tasks influencing participation and access. |
| | | The theme of the task influencing participation and access. |
| | The importance of the teacher | The pedagogical stance and tactfulness of the teacher enhancing or diminishing students' participation. |
| | (Not) being valued | How the mathematics education values students is of importance for students' participation. |
| | Dislike | The meaning of mathematics as something boring challenges students' participation. |

| | | |
|---|---|---|
| Discourse of mathematics education setting | Classroom organization | How the organization, in terms of the textbook, discussions and "going-through"[1] frames students' participation and how variation in teaching approaches increases students' participation. |
| | Being in a small group | How being in a small group enhances or diminishes students' participation in mathematics education; also, how the label of "SEM student" may affect participation and access. |

Table 2. Implications for inclusion in mathematics in relation to the discourses in the study.

Below the discussion of implications for practice is divided into two sections. The first section describes how the results of the prior study implicate practice on school level, and the second section describes how the result of the prior study implicate teachers' professional development.

**Implications on school level**

An explicit implication for practice regarding inclusion is that inclusion is not equivalent with every student being in the same classroom always, the placement definition of inclusion (Göransson & Nilholm, 2014). Although the investigated school set out to work inclusively from an ideological point of view, focusing on the placement with all students in the same classroom, some D(d)iscourses show a limitation in students' participation in mathematics education. Thus, the *possibility* to be in a small group outside the classroom is expressed as positive for the students. Consequently, one implication is that the education needs to move beyond seeing inclusive classrooms as a physical room where every student is always present physically to a more dynamic view on inclusion, which is more situated and related to the students and their prerequisites. This implies that education needs to move from implicitly trying to fit the students into what is considered "normal" of all students towards departing from the opportunities of *every* student. With this stated, there is a need to be mindful and careful so as not to label students in SEM and not create stigma, as highlighted by Civil and Planas (2004). If the construction of a SEM student changed and diversity would be taken as a point of departure in the mathematics education, maybe the D(d)iscourses would change, and as a result, the way school and the society look upon special needs would change. Here it might be helpful for school development to look upon contextual influences that bear on the way schools carry out their education (Ainscow, 2020). Ainscow (2020) suggests four bearing influences: Inclusion and equity as principles; the use of evidence; administration and community involvement. These influences can work both as encouragement and hinders for inclusive education depending on the direction of views upon inclusion and equity at the school at hand.

Another implication for practice is that a student in access to mathematics education also can be in special educational needs since she or he might not be in access to *learning* in mathematics. This implies a need to acknowledge these SEM students and offer special mathematics education to enhance their participation in mathematics education and access to mathematics learning. Yet another implication for practice is to critically reflect on the organization of the mathematics education, changing it from being governed by a textbook to a more flexible way of organizing, with more variations in how to actually do mathematics when learning. More variations would perhaps change the D(d)iscourses and thereby perhaps the students' meanings of inclusion in mathematics would change as well. Perhaps a way of looking at the mathematics education as an inclusive landscapes of investigation (Skovsmose, 2019) would help to develop the education at the school and have more variations in the teaching. Skovsmose (2019) describes it as a way of facilitating meeting amongst differences promoting inclusion in mathematics. These inclusive landscapes have three major elements: facilitate investigations, accessible to everybody and facilitate collaborations.

**Implications for teachers' professional development**

When looking at the Discourse of of accessibility in mathematics education, implication for teachers' professional development is visible how a relational perspective in terms of pedagogical stance and tactfulness of the teacher can enhance or diminish students' participation. This relational perspective has also been shown in another Swedish study made by Ljungblad (2016). This implies that teaching mathematics is so much more than just communicating a mathematical content. It is just a small part of what it means to teach mathematics and promote every students learning. Hence, there is a need in teacher development to discuss how to have a relational perspective in mathematics education. In relation to this it is of importance to reflect on how the teacher (and the mathematics education) value students. This to be able to enhance students' participation and change the meaning of mathematics as something boring.

Yet another implication is when working with assessments, as a teacher be aware of how it can affect students' participation and access in terms of the construction of tests and the demands on the students when taking tests. For instance, in terms of the demands of depth in explanations (Roos, 2019a). A thing to be aware of in relation to grading is that grading can influence what students perceive as mathematics and thereby limits their participation and access (Roos, 2019a). Hence, there is a need as a teacher to be aware of inequalities involved in assessment in mathematics (Bagger, 2017).

**Conclusions**

Looking back at this reflection on implication for practice from the study of students meaning(s) of inclusion, it is striking how complex and challenging teaching mathematics is when considering the individual student(s) need. This depends partly on the prevailing discourses on what mathematics is and how it is supposed to be taught and learned. This challenges the teaching when the students need something else. Partly it depends on the diversity of students, and the mathematics education in the classrooms

needs to be able to meet diversity in the education (Askew, 2015). Accordingly, diversity among students demands diversity in mathematics education. This implies that the prevailing discourses on how mathematics is supposed to be taught and learned needs to be challenged. This is not at all an easy task and researchers, as well as mathematics teachers and special teachers in mathematics needs to take on that challenge. Researchers need to highlight important issues and needs regarding inclusive mathematics teaching and collaborate with teachers to interpret them in practice. Mathematics teachers and special teachers need to collaborate at both an organizational level as well as a group and individual level meeting the needs of every student (Roos & Gadler, 2018).

Teachers are expected to be able to handle students' diversity and promote every students' mathematical development. To enhance students' inclusion in mathematics education demands that the teacher knows her or his students, is flexible, has a pedagogical stance and tactfulness (Ljungblad, 2016), and is knowledgeable in mathematics and mathematics education. Also, in relation to assessment it demands that the teacher can take a critical stance and resist the prevailing discourse of assessment and to try to resist the processes and systemic patterns prompting inequalities in assessments (Bagger, 2017) that can sometimes overshadow the mathematics education.

Taking a student perspective on inclusion shows how complex and challenging it is being a student in mathematics. Students are expected to relate to, understand, and participate in all the Discourses existing at the same time in a single mathematics classroom. This needs to be acknowledged and reflected upon both from a school organization, and teacher perspective.

## Note

1. "Going-through" is used to describe genomgång in Swedish. Andrews and Nosrati (2018) point out three instances of what can be considered "going-through": when the teachers inform the students of what to work with, when presenting new models, and when demonstrating solutions to problems the students find difficult.

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