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Inclusion in mathematics education: an ideology, a way of teaching, or both?

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Abstract
This literature review focuses on the definitions and roles of *inclusion* in the field of mathematics education to help promote the sustainable development of inclusion in the discipline. Discourse analysis was used to analyse 76 studies published between 2010 and 2016. The results show that the term *inclusion* is used both for an ideology and a way of teaching, and these two uses are most often treated separately and independently of each other. When inclusion is treated as an ideology, values are articulated; when treated as a way of teaching, interventions are brought to the fore. When the notion of inclusion is used as an ideology, the most extensive discourse concerns *equity in mathematics education*; when it is used as a way of teaching, the most extensive discourse relates to *teaching interventions for mathematical engagement*. Based on the literature review, if sustainable development of inclusion in mathematics education is to be promoted, scholars need to connect and interrelate the operationalisation and meanings of inclusion in both society and in mathematics classrooms, and take students' voices into consideration in research.

Keywords Inclusion in mathematics education · Diversity · Equity · Participation · Interventions · Discourse analysis

1 Introduction

This research investigates the notion of inclusion and its definition and role in the field of mathematics education in an effort to help promote the sustainable development of inclusion in this field. Although the notion of inclusion has received increasing attention in educational research in the last few decades, there is no agreed definition for it (Graham-Matheson, 2012), either for what it is or what it is needed for. According to Artiles, Kozleski, Dorn, and Christensen (2006), the absence of an agreed definition is based on differences of perspective and context in research on inclusion, which can be seen in the coverage of ethnic, social and

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special educational issues (Nilholm, 2007). In the educational context, which is the focus of this article, the notion of inclusive education (e.g., Armstrong, Armstrong & Spandagou, 2010) is sometimes used to promote support for diversity and equality, but it can also be used to describe a way of teaching children in special educational needs (SEN) (Ainscow, Booth, Dyson, & Farrell, 2006; Sheehy et al., 2009).

In mathematics education, the notion of inclusion is used in curriculum documents, in research and among teachers (e.g., Askew, 2015; Solomon, 2009). Three recent research overviews on SEN in mathematics (SEM) and inclusion in mathematics (Lewis & Fisher, 2016; Secher Schmidt, 2015, 2016) indicate a research interest in inclusion connected to mathematics education. However, these overviews deal with the manifestation of inclusion more or less implicitly, and none of them explicitly focuses on its definition or role in mathematics education research. The question of inclusion has also received attention in various ESM papers. Even here, the manifestation of inclusion in mathematics education is dealt with implicitly, foregrounding related notions such as equity (Hand, 2012; Lambert, 2015; Straehler-Pohl, Fernández, Gellert, & Figueiras, 2014) and participation (Foyn, Solomon, & Braathe, 2018; Ing et al., 2015). The reason for this gap might be the lack of a conceptual platform for inclusive education (Figureiras, Healy, & Skovsmose, 2016). Because of this, it becomes important to investigate definitions and ways of using inclusion in research.

One way to use the term *inclusion* is to describe what it means to be included in a society, as well as why it is crucial (UNESCO, 2009). The term can also describe a way of teaching, in which all students are taught in a regular classroom (e.g., Cornwall & Graham-Matheson, 2012). This dual use of the notion raises questions about what happens when the same term is used to describe both a way of taking part in society and a way of teaching in mathematics classrooms. And do these uses relate to each other? This article seeks to provide answers to these queries. Much research focuses on inclusion in general education, and this article strives to add to this knowledge through a literature review on inclusion in mathematics education. Hence, the aim is to investigate discourses of inclusion in mathematics education research to illustrate its meanings and operationalisation. The following research questions will be addressed:

- What different meanings are ascribed to the notion of inclusion in mathematics education research?
- How is the notion of inclusion operationalised and used in mathematics education research?

2 The study and its theoretical and methodological lenses

2.1 Data collection

In this literature review, various criteria were used for selecting studies to review. One criterion was that the studies connected inclusion to mathematics education and school. Only studies in English or the Scandinavian languages were selected, as I am fluent in those languages. Date of publication was a third criterion; to find research on the recent state of inclusion in mathematics education, the time span was set to 2010–2016. Finally, a quality criterion was used so only peer-reviewed research was included.

Five databases were searched: ERIC, Web of Science, PsycINFO, SwePub and Mathematics Education Database. ERIC and Web of Science were selected based on the results of

Sheehy et al. (2009); the other databases were selected because they covered pedagogical and educational research both nationally and internationally. The search string contained the words (inclus* or inklu*) (education* or school or undervis* or skol* or utbildn*). Then, (math* or matemat*) was added. Then, the criteria for time span and peer-reviewed research were applied. To limit the search in PsycINFO, another criterion was added to search for research concerning 6–17-year-olds (school age). In Web of Science, the criterion research within education and special education was added in order to limit the result. In SwePub, the search string (inclus*) (education) (year) and (math*) was used because of the difference in structure of the database. The search resulted in 1296 research studies. Of these, 76 studies were retained after the criteria mentioned above were applied and 19 duplicates had been removed. These studies comprised 52 journal articles, 18 book chapters, 4 conference papers and 2 theses. Table 1 displays the distribution of the research selected by year.

2.2 Theoretical lenses

In this study, the focus was on written language and ways of making meaning in terms of communication of research, ideas, values, concepts and presumptions. Hence, language both gets its meaning from social practice (Gee, 2014a) and makes meaning in a social practice. In the investigation of texts in the studies reviewed, discourse analysis (DA) was used both as a methodological device and as a theory, meaning it was used both as an analytical tool and in the explanation of the results.

DA was used from Gee's perspective (2014a, b) because of its explanatory power regarding meaning making in text. This afforded an opportunity to grasp *meanings ascribed* to inclusion, and how the research *operationalises* inclusion in mathematics education. Here, meanings ascribed explain what inclusion is in the specific research, while operationalisation explains actions that need to be taken to promote inclusion. The theoretical notions *big and small discourses* provided by Gee (2014a, b) are used (henceforth referred to as Discourse with capital D and discourse with lowercase d respectively). (d)iscourse is focused on language in use, so-called *stretches of languages* seen in text (Gee, 2014a). Stretches of languages imply the relations between words and sentences. (D)iscourses are understood as ways of saying, doing and being, and the key is recognition. (D)iscourses are language plus actions, interactions, values, beliefs, symbols, objects, tools and places (Gee, 2014a). Hence, discourse and Discourse are interrelated since use of language is always affected by the context in which it is used, and the context is always affected by the use of language. This study accounts for this by looking at the relations and words used, and how they signal meanings and Discourses. Since the focus is on written language, Discourses are seen in the actions, values, beliefs, symbols, tools and objects visible in written text.

2.3 DA as an analytical tool

The discourse analytic procedure was begun by posing questions to the texts. The questions were chosen from those developed by Gee (2014b) and adapted to suit this study. The

Table 1 Distribution of the research material by year

Studies 2010	Studies 2011	Studies 2012	Studies 2013	Studies 2014	Studies 2015	Studies 2016	Sum
4	12	9	12	9	23	7	76

questions were chosen to illuminate the meanings, operationalisations and Discourses of inclusion in mathematics education research. The adaptations were made to highlight the context of this study—mathematics education and research on inclusion—using words like 'inclusion' and 'scholar'. This resulted in the following questions: 'How are the words and grammatical devices used to build a viewpoint on inclusion?', 'What is the theme for the text and why were these choices made?', 'Which subjects/topics are chosen and how do they relate to the theme?', 'What are the scholars saying about the subjects?' (In this sense, according to Gee, the subject is to be understood as the particular topic the scholar has chosen), 'How is what the scholar is saying and how she/he is saying it helping to create or shape what readers will take as the relevant context regarding inclusion?', 'Is what the scholar is saying about inclusion and how she/he is saying it just, more or less, replicating contexts of inclusion in mathematics education or transforming or changing them?', 'What is taken for granted by the scholars regarding inclusion?', 'What social groups, institutions, or cultures support and set norms for inclusion in mathematics education?', 'How are words being used to build up or lessen significance for inclusion?' and 'What Discourse is the language a part of?'

With the help of these questions, discourses (small d) could be construed based on the *meanings ascribed* to the notion of inclusion and/or *operationalisation* of inclusion. If a stretch of language defined inclusion or described access to mathematics overall, it was categorised as meanings ascribed. One such stretch of language was 'whenever possible, all children should be in the same classroom, forming meaningful peer group relationships, and finding success and challenge in the curriculum' (Tennant & Foley, 2014, p. 77).

If the research discussed actions taken to promote inclusion—for example, 'effective teaching practices and intervention strategies' (Scherer, Beswick, DeBlois, Healy, & Moser Opotiz, 2016, p. 634)—it was categorised as operationalisation. Some research discussed both meanings ascribed and operationalisation and were categorised as both (e.g., Healy & Powell, 2013). From this categorisation, the stretches of language (d) were organised into meanings ascribed to the notion of inclusion, and/or operationalisation of inclusion. After this categorisation, a meta-analysis was done in which the similarities and differences in answers to the questions asked of the different texts were identified. By doing this, similar stretches of language could be put together, and demarcated discourses could be construed. These discourses were analysed by asking the same questions asked of the studies. Then, two Discourses were construed from them, with the help from the answers to the question 'What Discourse is the language a part of?'

3 Results

The results are presented with the two construed Discourses as main headings. Under each, operationalisation and meanings ascribed to the notion of inclusion in mathematics education research are displayed as discourses in subheadings.

3.1 Discourse of inclusion in mathematics in society

Of the 76 studies, 23 use words such as 'society', 'ideology', 'political', '(in)equity' and 'equality' in relation to inclusion. They also talked about inclusion in mathematics outside of the classroom. Thus, the meanings ascribed and operationalisation of inclusion in mathematics education that were recognised have two themes in common: general educational approaches

to inclusion in mathematics education and inclusion in mathematics education from an overall societal perspective. Hence, a Discourse of inclusion in mathematics in society (DIMS) is construed. The discourses construed within DIMS are presented below.

3.1.1 Meanings ascribed to the notion of inclusion in mathematics education research in the DIMS

Sixteen of the 23 studies in the DIMS discuss issues and meanings of inclusion on a societal level.

The discourse of equity in mathematics education This discourse construes and defines inclusion in terms of justice in mathematics education. The word (in)equity is frequently used, and most often not defined but taken for granted. The term is used in relation to different issues. For example, Feza (2014) uses it when identifying 'inequity factors [that] continue to exclude the majority of black children' (p. 888). Basile and Lopez (2015) investigate 'issues of equity with regard to students of colour' (p. 519). Thus, both studies chose the words equity and inequity as related to race. Neumann (2014) refers to inclusion in terms of equity but relate to the subject of gender. In her study, she challenged the norms of teacher education by investigating 'hidden beliefs and inequitable teaching practices' (p. 90) in mathematics education. Pais and Valero (2011) and Valero (2012) discuss equity in relation to inclusion and exclusion in 'society at large'. Valero (2012) discusses being 'school mathematics incapable' (p. 370), saying

> Not being able to cope, participate, or succeed in the demands of school mathematics is in no way a characteristic of the individual learner, but it is a result of how the whole set of participants in the practices and discourses of school mathematics subjectify certain students.

The theme is processes of inclusion and exclusion. The inability to participate in school mathematics is seen not as a characteristic of the individual but a result of subjectifying students. Similarly, Pais (2014) discusses inclusion from a socio-political viewpoint through social justice and equity—in contrast to exclusion. Pais stresses the significance of inclusion by saying, 'achieving equity means to fight different battles (for groups of people considered to be in disadvantage, inequity of resources, teacher formation, mathematical content for social justice etc.)' (p. 1088).

A different perspective on equity is seen in a study where the subject is gifted students and their right to have opportunities to learn mathematics and the 'relationship between the equity principle in mathematics education and the views on the education of gifted' (Leikin, 2011, p. 167). In regard to social level, Leikin (2011) poses the question, 'What type of ability grouping is the most effective for mathematically gifted students?' (p. 180). Hence, equity and inclusion are being used with words focusing on ability. Healy and Powell (2013) focus on equity where the subject is disadvantaged students, stating, 'by understanding the learning processes of such students we may better understand mathematics learning in general' (p. 69). Inclusive education is discussed using words such as 'empowerment' and 'equity', and the authors highlight the significance of understanding the learning processes of disadvantaged students and thereby being able to address differences and create a more equitable mathematics education. Thus, the starting point is the individual student, but Healy and Powell (2013) also use statements such

as 'what macro social conditions are necessary for their [the disadvantaged students] inclusion' (p. 87), implying inclusion from a societal perspective. Accordingly, they highlight why we should work with inclusion in terms of equity, and in terms of how to understand connections between students and societal levels. Hence, there is an attempt to provide an understanding of connections between meanings ascribed and operationalisation of inclusion. Panizzon (2015) chooses the theme of geographical location in relation to diversity and inclusion. The words 'overcome inequity' (p. 41) are used as well as 'enhancing greater inclusivity' in relation to 'political imperative' (p. 56), indicating the significance of inclusion in society.

The discourse of mathematics (not) for all This discourse construes inclusion in terms of making mathematics education accessible for (not) all students. Pais (2014), who chose the subject *not for all*, stated, 'perhaps we should acknowledge the crude reality that mathematics is not for all. Schools, however uncomfortable such awareness may be, are places of selection and teachers are agents of exclusion' (p. 1091). Similarly, Diaz (2013) defines inclusion as equal mathematics for all, but also questions this by stating that 'embedded in the relationship between math education and questions of inclusion a particular logic of equality paradoxically reinserts notions of inequality as differences between children' (p. 36). That is, to be able to include *all,* children become objects that can be measured, compared and calculated. The subject of both studies (Pais, 2014; Diaz, 2013) is what 'all' children actually means, and is mathematics for all? Even Borges and César (2013) use the phrase 'education for all students', but in relation to the phrase 'to achieve this we need to pay close attention to all vulnerable groups and promote equity' (p. 1). Accordingly, 'for all' implies comparing groups. Similarly—yet differently—Sullivan chooses to discuss the subject of mathematics for all by saying, 'On one hand, the goal might be to reduce differences between groups of students. On the other hand, the goal might be to improve the outcomes of all students' (2015a, p. 13). These words increase the significance of problematising education for all students. It could mean focusing on all students, but it could also mean focusing on specific groups of students to reduce differences. Scherer et al. (2016) favour using 'learning situations' instead of 'normality' of students when discussing inclusive education. By using 'new forms of providing meetings among differences' and 'constructing learning situations that permit such meetings' (p. 640), they are bringing focus to the meetings, understanding differences and meeting needs of every student.

The discourse of including (or excluding) SEM students This discourse construes inclusion in terms of students in difficulty in mathematics having (or not having) access to mathematics education. The stretches of language stress the theme of a relationship between inclusion and students in some kind of difficulty, either disabilities or poor performance. Barnard-Brak, Wei, Schmidt, & Sheffield (2014) chose the subject of national rankings in mathematics in relation to inclusion. By using the words 'referring to the education of individuals with disabilities within general education setting' (p. 118) and 'how the inclusivity of students with disabilities at the classroom level across countries may be associated with achievement scores' (p. 120), they take the definition of disabilities and education for granted, setting the norm for inclusion from a disability perspective. Schuelka (2013) uses the words 'students with disabilities' when discussing international tests of achievement (TIMSS, PISA and PIRLS) and how these tests 'exclude students with disabilities from the culture of achievement' (p. 218). Even Secher Schmidt (2016) discusses inclusion in relation to disadvantaged students. However, Secher Schmidt uses the words '*in* maths difficulties' with 'pupils' (p. 7) instead of '*with* disabilities'.

The subject of inclusive practices is described as practices the students have (or do not have) access to in general mathematics education. Thus, there is a difference among the studies described above, as well as in their point of departure. In some, the focus is on the students with disabilities who are included in the education, and in others on how the education is including the students.

3.1.2 Operationalisation of the notion of inclusion in mathematics education research in the DIMS

Seven of the 23 studies in the DIMS talk about *how* to work with inclusion on a societal level, meaning these studies operationalise inclusion in relation to issues such as curriculum in society, rather than in the classroom or at school.

The discourse of inclusion in relation to exclusion The discourse of inclusion in relation to exclusion within operationalisation in DIMS identifies ideological actions for inclusion based on exclusion. Straehler-Pohl and Pais (2013) chose the subject of exclusion in relation to inclusion and used the words 'pinpoint ideological injunctions' to stress their interest and the contrast with 'providing solutions' (p. 1795). They challenge the norms of school by stating 'schools need to be presented as inclusionary and emancipatory places, places where phenomena such as exclusion and failure are seen not as necessary parts of the same system which purports to be trying to abolish them, but as contingent problems, malfunctions of an otherwise good system' (p. 1802). Hence, they describe the development of inclusion implicitly, in that a school as an institution needs to make issues of exclusion visible to be able to address them. Lindstrom (2010) chose the subject of educational approaches and accommodations to include students with learning disabilities (LD) in doing mathematics tests. The words 'fairly, and validly assess students with LD' in relation to 'testing accommodations' suggest that the students with LD can be seen as excluded if not given accommodations.

The discourse of valuing diversity This discourse encompasses striving for inclusion in mathematics education by ideologically valuing diversity. Askew (2015) chose the subject of diversity when discussing inclusion, stating that inclusiveness is supported in mathematics classrooms by 'welcoming diversity' (p. 143). The use of words like 'reconsideration of how we think about curriculum' and 'starting from the position of building learning communities' (p. 130) suggests that an ideological change of perspective, valuing diversity, is being sought in order to embrace inclusion in mathematics education. Aragón, Dovidio, and Graham (2016) chose the subject of implementing inclusive ideologies in relation to differences. Here, diversity is brought to the fore by using an ideology that 'takes into account that all people are not the same, and equal treatment may not be beneficial for all' (p. 2). Inclusion is then operationalised in terms of advocating for an ideological stance of valuing diversity in mathematics classrooms.

The discourse of equity in mathematics education The discourse of equity in mathematics education within operationalisation in the DIMS construes inclusion in terms of equity in relation to gender, tests and ethics. Tan (2015) chose the subject of gender in relation to equity and inclusion, asking, 'What kinds of questions should we ask about gender and technology that help us to be more inclusive?' (p. 98). This shows how inclusion is operationalised by asking questions about the teaching overall. Leder and Lubienski (2015) also use the theme of

equity, but connect it to the subject of large-scale tests. They use the words 'detailed analysis of gaps can help mathematics education scholars more effectively target their efforts to promote equity' (p. 37) to stress this viewpoint on inclusion. One study uses equity with the theme of ethical issues in relation to mathematics teaching and inclusion (Forgaz, Bleazby, & Sawatzki, 2015). Here, 'an inclusive approach means that every facet of human experience and all knowledge domains have ethical dimensions' (p. 155), and 'teachers are responsible for deciding how to implement and enact an inclusive mathematics curriculum' (p. 162). Hence, inclusion is operationalised by focusing on the choice of examples.

Summing up, the most common way of using inclusion in DIMS is with equity and mathematics for all. Also, the ascribed meanings dominate in DIMS.

3.2 Discourse of inclusion in mathematics in the classroom

Of the 76 studies, 54 dealt with inclusion using words like 'instruction', 'interventions', 'implementations', 'strategies', 'effectiveness of instruction' and 'impact of instruction' in relation to mathematics taught in the classroom. Accordingly, the studies have inclusion in mathematics in the classroom in common. Hence, a Discourse of inclusion in mathematics in the classroom (DIMC) is recognised. The discourses identified within DIMC are presented below.

3.2.1 Meanings ascribed to the notion of inclusion in mathematics education research in the DIMC

Nine of the 54 studies in the DIMC discuss issues and meanings of inclusion in the mathematics classroom.

The discourse of participation This discourse construes inclusion in terms of every student having opportunities to participate in mathematics activities in the classroom. The theme of the studies was what form inclusion in mathematics might take in the classroom. Two were my own (Roos 2013, 2015), where the emphasis on participation is clear in these statements: 'Inclusion is seen as a social process of participation in the mathematical practice' (2013, p. 2861) and 'To be included can be seen as a process of participation' (2015, p. 27). Secher Schmidt (2015) highlights participation by asking about the 'pupil's possibilities to participate in mathematics' (p. 7). Tennant and Foley (2014) chose the theme of inclusive approaches to learning and teaching mathematics, and they described inclusion as follows: 'Whenever possible, all children should be in the same classroom, forming meaningful peer group relationships, and finding success and challenge in the curriculum' (p. 77). This signals participation in relations both between peers and with the content. In addition, success is a part of inclusion. Kleve and Penne (2016) talk about inclusion in terms of 'stories about participation' (p. 42) (or lack of it) in (mathematical) discourses, using the terms 'insiders' and 'outsiders' to describe students' participation.

The discourse of inclusion in relation to exclusion This discourse in DIMC focuses on the contrast between inclusion and exclusion. Four of the studies used the theme of the effects of being excluded from the general mathematics classroom versus being included in the classroom. Inclusion in relation to exclusion is seen in words such as 'inclusion and non-inclusion settings' (Kurth & Mastergeorge, 2010, p. 146), 'inclusion versus specialised interventions' (Fuchs et al., 2015, p. 134), 'Were the interventions in the inclusive classroom as effective as in

special education?' (Zhang & Xin, 2012, p. 305) and 'More access to general education context would be positively related to achievement in mathematics' (Cosier, Causton-Theoharis, & Theoharis, 2013, p. 325).

3.2.2 Operationalisation of the notion of inclusion in mathematics education research in the DIMC

Forty-five studies discussed operationalisation of inclusion in mathematics in terms of how to work in school and in classrooms, using words like 'teaching', 'classrooms', 'lessons' and 'instructions'. However, 21 of the 45 studies did not discuss inclusion per se but took its meaning for granted. These studies used wording like 'inclusive classrooms' (e.g., Moorehead & Grillo, 2014), 'inclusive settings' (e.g., Powell, 2015), 'inclusive schools' (e.g., Eisenhart et al., 2015) and 'inclusive teaching' (e.g., Watson & De Geest, 2012), without defining or discussing their meaning.

The discourse of teaching interventions for mathematical engagement This discourse construes inclusion in terms of strategies for including students in mathematics education. Words and phrases signalling interventions are 'schema-based instruction' (Jitendra & Star, 2011); 'interactive groups' (Garcia-Carrión & Diez-Palomar, 2015); 'cognitive guided instruction' (Guðjónsdóttir & Kristinsdóttir, 2011; Hankes, Skoning, Fast, & Mason-Williams, 2013; Moscardini, 2014); 'cluster-based instruction' (Sunardi, Anwar, & Andayani, 2016); 'techno-kinaesthetic visually based activities' (Tabur, 2014); 'cognitive strategy instruction on math problem-solving' (Montague, Enders, & Dietz, 2011); 'problem-solving procedures' (Fletcher, 2014); 'explicit instruction' (Hinton, Flores, Schweck, & Burton, 2016); 'simultaneous prompting procedure' (Heinrich, Knight, Collins, & Spriggs, 2016); 'universal design for learning' (Hunt & Andreasen, 2011; Lambert & Stylianou, 2013); 'anchored instruction' (Bottage et al., 2015; Mannheimer Zydney, Bathke, & Hasselbring, 2014); 'prompting' (Davenport & Johnston, 2015); 'regulated learning strategies' (Ness & Middleton, 2012); 'teacher coaching' (Duchaine, Jolivette, & Fredrick, 2011); and 'use of math apps' (Zhang, Trussell, Gallegos, & Asam, 2015).

In a review, Hart Barnett and Cleary (2015) found two types of interventions in studies of 'inclusive classrooms' (p. 172). One type involves classroom instruction (in this review, these are cognitive-guided instruction, schema-based instruction, cluster-based instruction, cognitive strategy instruction on math problem-solving, anchored instruction, simultaneous prompting procedure, explicit instruction, teacher coaching). The other type involves designed tasks (in this review, these are universal design for learning, techno-kinaesthetic visually based activities, math apps, problem-solving procedures). Thus, the subject of these studies, which highlight a variety of interventions in relation to inclusion, is on how these interventions can achieve meaningful engagement in mathematics classrooms.

The discourse of teaching for maximising opportunities in mathematics for all This discourse construes inclusion by focusing on teaching to enable all students to participate. Even though their points of departure are different and the studies discuss different subjects, the common theme is teaching to maximise opportunities to learn. This is visible in the words used, such as 'what constitutes successful mathematics pedagogy for all students' (Gervasoni, Hunter, Bicknell, & Sexton, 2012, p. 193); 'effective teaching practices and intervention strategies' (Scherer et al., 2016, p. 634); 'to develop the potentials of all children to the fullest possible extent' (Nolte, 2013, p. 1225); 'to reach all students in mathematics classrooms'

(Freiman, 2011, p. 161); 'teaching mathematics to all children' (Bengtsson, 2012, p. 17); 'to achieve a quality education for all' (Borges & César, 2013, p. 1666); 'effective teaching practices in elementary mathematics classrooms' (Martinez & Benedetti, 2011, p. 19); 'a positive and an inclusive approach to the (dis)engagement situation' (Bishop & Kalogeropoulos, 2015); 'indicators of effective mathematics teaching' (Griffin, League, Griffin & Bae, 2013, p. 9); and 'implication of […] strategies learning and participation in mathematics lessons' (Radford, Blatchford, & Webster, 2011, p. 627).

Six of the studies have students with disabilities as their subject when discussing effective teaching practices to maximise opportunities in mathematics education. This subject is visible in words such as 'low-attaining students' (Watson & De Geest, 2012, p. 213), 'children with SEN' (Radford, Bosanquet, Webster & Blatchford, 2015, p. 1), 'LD' (Mundia, 2010, p. 151), 'emotional disturbance' (Davis Skerbetz & Kostewicz, 2015, p. 14), 'autism' (Kurth & Mastergeorge, 2012, p. 45) and 'deafness' (Vosganoff, Paatsch & Toe, 2011, p. 70). Two of the studies focus more on teachers' roles (Radford et al., 2015) and teachers' attitudes (Whitty & Clarke, 2012). Another subject is collaboration between teachers and between teachers and parents. This is visible in the words 'can show a general education and a special education teacher how to team teach' in relation to 'a merger between general education and special education' (Dieker, Stephan & Smith, 2012). Nelson (2011) also highlights collaboration, saying, 'Parents and teachers collaborate to achieve equity and quality in mathematics' (p. 533).

The discourse valuing diversity This discourse encompasses striving for inclusion in mathematics education by taking diversity as a point of departure in teaching. This is evident in these words: 'the teacher is expected to be aware of the needs of each of their students and adapt the classroom environment and curriculum so that each child makes progress' (Brown, 2015, p. 256). Hence, Brown highlights the importance of taking diversity as a point of departure in teaching. Krainer (2015, p. 185) also uses words valuing diversity in classrooms: 'Diversity is more regarded as a strength and opportunity than a weakness'. Sullivan (2015b, p. 251) uses the words 'it is not so much the method of grouping but the approach that teachers take to addressing diversity that ensures that the needs of all students are addressed'.

Summing up, we notice that interventions are common in DIMC. The interventions often have a specific type of SEN student in mind, such as students with LD. It is notable that only one of the studies in DIMC has a student perspective on inclusion (Kleve & Penne, 2016).

To conclude, the discourses within DIMS present an overall picture in which (in)equity and access to society are central in the meanings ascribed to inclusion. In operationalisation, identification of exclusion processes, valuing diversity and being vigilant to issues of equity from an ideological stance are central. The discourses within DIMC present an overall picture in which participation and inclusion in relation to exclusion in education are central in the meanings ascribed to inclusion. In the operationalisation of inclusion, mathematics teaching is in focus in the form of interventions, teaching to maximise opportunities for all and taking diversity as a point of departure.

4 Discussion

In this research, DA contributed on both a theoretical and methodological level to construe discourses and Discourses. This has provided insights into different foci present in research regarding inclusion in mathematics education today.

The aim of this research was to investigate discourses of inclusion in mathematics education research. Two Discourses were construed—the Discourse of inclusion in mathematics in society (DIMS) and the Discourse of mathematics in the classroom (DIMC). The focus in the DIMS is on the ideological meaning of inclusion, which was seen in the themes and subjects in the discourses (e.g., equity, valuing diversity, gender). In contrast, research studies in the DIMC focus on operationalisation, with little or no reflection on the meanings ascribed to the notion of inclusion in mathematics education. This was seen in the themes and subjects, and the use of words like 'classroom', 'interventions' and 'effective teaching'. Accordingly, there is a focus on *teaching for inclusion* in the DIMC. Here a discrepancy within and between the DIMS and the DIMC is visible regarding the ascribed meanings and operationalisation of inclusion. In the DIMS, a political and core value stance is present, and many scholars commonly use words that mediate values connected to human rights and equity. In DIMC, the focus is on actions for inclusion, which is not strange since there is a focus on the operationalisation of inclusion in mathematics education. It is worth mentioning that very few studies address both equity and actions for inclusion. A possible explanation could be that researchers prefer to work within one Discourse, using familiar theoretical and methodological approaches, rather than developing new theoretical and methodological lenses that could bridge the two Discourses. Moreover, most studies in DIMC and some in DIMS refer to inclusion as something assumed to be already known and do not define it. This could also be an explanation for the research focus in either DIMS or DIMC; since inclusion is not explicitly discussed and defined, other issues might be foregrounded.

Returning to the first research question—What different meanings are ascribed to the notion of inclusion in mathematics education research?—the results show that in the DIMS, equity in mathematics education is the main discourse. Other discourses that make ascribed meanings of inclusion in DIMS visible are mathematics (not) for all and including (or excluding) SEM students. In the DIMC, two discourses describe meanings of inclusion—*participation* and *inclusion in relation to exclusion.* When comparing the discourses in DIMS and DIMC regarding ascribed meanings, equity dominates in DIMS but is not visible in DIMC. Instead, in DIMC, the word 'participation' seems to be essential, highlighting the importance of the students' active involvement.

Returning to the second research question—How is the notion of inclusion operationalised and used in mathematics education research?—the results show that few studies in DIMS operationalise inclusion, and when they do, it is connected to doing and thinking of inclusion ideologically. Conversely, in DIMC, the results show prevailing discourses of operationalisation of inclusion, dominated by discourses of teaching interventions for mathematical engagement and teaching for maximising opportunities in mathematics for all. In both DIMS and DIMC, discourses of valuing diversity are construed within operationalisation. In addition, even though there are similarities in operationalisation, there is a difference in what valuing diversity is connected to. In DIMS, diversity is connected to societal issues, and in DIMC diversity is connected to students, schools and classrooms. Diversity and inclusion in relation to exclusion were visible in both the DIMS and in DIMC. However, even though the same wording is used, the underlying message is different since the discourses connect either to contexts in society or within the classroom. Similarly, mathematics for all is found in both DIMS and DIMC, but a closer look at the phrasing reveals differences. For instance, in DIMS, *for all* is used with the words 'what all children actually means' and 'vulnerable groups and promote equity'. In DIMC, *for all* is used with 'maximising opportunities to learn' and 'teaching'.

From the results, the question arises of whether consensus on the meaning of inclusion is possible, or even desirable, since it is used for different purposes? This is in line with what Skovsmose concludes in Figureiras, Healy, and Skovsmose (2016)—that we should not expect well-defined meanings of inclusion and should be ready to assume that inclusion can comprise a variety of meanings (p. 23). However, based on this assumption that inclusion has a variety of meanings in mathematics education, there is a need for scholars to define inclusion in each particular context. This is also important to consider since many different research fields, such as mathematics education and special education, use inclusion and mathematics within their paradigms.

What happens when inclusion is used to describe both a way of taking part in society and a way of teaching in mathematics classrooms? We can conclude from the results of this review that several different meanings are ascribed to the concept and that most often inclusion was used either ideologically or as a way of teaching, but rarely as both. Consequently, we can say that even though it is rare in research today, the notion of inclusion *can* be used in both DIMS and DIMC within the same study, where issues connected to inclusion in mathematics education are visible both on a societal level and within the classroom (e.g., Borges & César, 2013; Scherer et al., 2016). This is important, because it is obvious that DIMS and DIMC interconnect even though scholars seem to separate them. Valero (2010) refers to this type of gap when discussing the importance of doing interconnected research so as to be able to cover the breadth of social practices. The reason for the gap between DIMS and DIMC might be that the research paradigms regarding equality issues and interventions, respectively, are moving in different directions and the ideologues have set their imprint in practice aside, and the interventionists have set politics at play aside. In addition, there are differences in theoretical and methodological approaches. If the research on inclusion within mathematics education could build theoretical and methodological interconnections as Valero (2010) suggests, the field would gain insights and a greater understanding of inclusion in mathematics education in both DIMS and DIMC. That said, both Discourses are needed to promote a solid development of inclusion in mathematics education in society and in mathematics classrooms. At the societal level, a vision and a direction are needed, while in the classroom, the vision and direction need to be made visible and made to happen. Hence, inclusion in mathematics education needs to be discussed and solid connections between research developed on both levels. Otherwise, there is a risk of inclusion becoming a purely decorative slogan, and not really changing perspectives or values in the school.

In addition, the results revealed that only one of the studies had a student perspective of inclusion in mathematics education. This seems strange since the results show discourses of equity that imply the participation of students and consideration of their needs. This is a research gap and we need to bring students' voices to the fore in future research.

A comparison of this literature review with others dealing with SEN and inclusion implicitly (Lewis & Fisher, 2016; Secher Schmidt 2015, 2016) shows this one has brought the notion of inclusion to the fore and contributes with insights on the use of inclusion in mathematics education research. It also illuminates issues that researchers need to address. Hence, this review builds on the prior reviews, putting SEN in the background and focusing on discourses of inclusion in mathematics education overall. It is important to point out, however, that this review does not claim to cover all inclusive research. I am aware that research has been conducted in the spirit of inclusion, though using other notions. This because of the vocabulary used in the specific research paradigm. For instance, research has been conducted within the field of bilingualism and mathematics (e.g., Domínguez, 2011; Planas, 2014; Takeuchi, 2018) and even

though the notion of inclusion is not used, the studies aim to create opportunities to include bilingual students. Another example is research with low-achieving students (Ben-David Kolikant & Broza, 2011) with the aim of promoting learning. Even though the notion of inclusion is not used, the research and its aim would certainly fit into DIMC.

In summary, when inclusion is used as an ideology, its meanings and values are articulated. These values are a vision of inclusion. However, if not connected to operationalising inclusion, the vision may not have any real impact in classrooms. On the other hand, if inclusion is only used to refer to a way of teaching, it is hard to justify why we need to work with inclusion in mathematics education. Instead, to promote a sustainable development of inclusion, the two uses need to be connected; a hope is that inclusion can be used more in terms of nuances of a colour, originating from the same core, but with variations expressing its various aspects and connecting and interrelating the ideological and operational aspects of inclusion.

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