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Representations of Mathematics Education in Swedish Newspapers—Part of the Structural Influence on Mathematics Teaching

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Abstract There is an ongoing public debate about mathematics education. This dialogue influences policymakers as well as mathematics teachers who are affected by these public ideas. Consequently, exploring the public debate, for example, by studying news media, is relevant for understanding teaching and learning in mathematics and also pertinent for researchers to actively participate in the debate about mathematics education. Representations of mathematics education, which emerged in a study of three national newspapers in Sweden, were explored. Articles relevant to the study were found in systematic searches in a media archive every fifth year between 1992 and 2017. Findings show that the construction of mathematics education in Swedish newspapers is multifaceted and complex, foregrounded by achievements, measurements and various forms of teaching. Other parts of the construction involve teachers wanting to arouse positive feelings, but their attempts are often unsuccessful. Whilst the construction of mathematics education is increasingly varied, the resulting positive and negative feelings and the tensions between representations contribute new insights, which are important to the field.

Résumé L'enseignement des mathématiques fait constamment l'objet d'un débat public. Cette discussion influence les décideurs politiques ainsi que les enseignants de mathématiques touchés par ces idées échangées dans le domaine public. Par conséquent, afin de comprendre l'enseignement et l'apprentissage des mathématiques, en plus de faciliter la participation active des chercheurs à la conversation portant sur l'enseignement des mathématiques, il est pertinent d'étudier ce débat public, par exemple en examinant les médias d'information. Ainsi, nous avons analysé les représentations faites de l'enseignement des mathématiques qui sont ressorties de l'examen de trois journaux nationaux en Suède. Des recherches systématiques effectuées dans des archives médiatiques tous les cinq ans entre 1992 et 2017 ont permis d'identifier des articles pertinents à cette étude. Les résultats montrent que la conception de l'enseignement des mathématiques dans les journaux suédois est multiforme et complexe, qu'elle met l'accent sur les réalisations, les évaluations et diverses formes d'enseignement.

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D'autres éléments incluent le fait que les enseignants veulent susciter des sentiments positifs, mais que leurs tentatives sont souvent infructueuses. L'accent placé sur les réalisations et les évaluations est conforme aux études antérieures menées au Canada; alors que la représentation de l'enseignement des mathématiques est de plus en plus variée, les sentiments positifs et négatifs qui en résultent, ainsi que les tensions entre les représentations, apportent de nouvelles perspectives, importantes pour le domaine.

Keywords Large-scale tests · Mathematics education · News media · Public debate · Mathematics teaching

Introduction

Mathematics teaching and learning occur in social settings and cannot be separated from what is otherwise happening in society. People are interested in mathematics education and other school-related issues and participate in the ongoing public debate about schools, teaching and teachers. In this public debate, opinions and assumptions about mathematics teaching are expressed. Public opinions are shaped and reported by news reporting (Barwell & Abtahi, 2019), which means that the role of media in public discourse is ambiguous. On the one hand, media can be seen as a representative of the general debate, whilst on the other hand, its reporting influences public opinion. Hence, media is part of the construction of mathematics education through its reporting of discourses already visible in the public debate; but additionally, it can alter the public debate. The media, therefore, create and sustain meaning about mathematics education (Chorney et al., 2016).

Through this created and sustained meaning, actors outside the academic discourse may influence policymakers' ideas about and decisions of importance for mathematics education (Herbel-Eisenmann et al., 2016). Examples from Norway show that the media debate might significantly impact the schools' governance; furthermore, the time span between media news and decisions of importance for schools is sometimes short (Andersson-Bakken & Bakken, 2015). In addition, when mathematics teachers talk about their planning, they refer to something outside their practise, i.e., common sense about mathematics teaching (Grundén, 2020), which can be interpreted as the public debate. What teachers believe is important might frame their choices and guide their actions (Fauskanger, 2016). In a study with Finnish teachers, Luoto (2020) showed that different classroom practises might be motivated, for example, by concerns about students' well-being and learning. For some teachers, these motivations contradict well-established ideas about mathematics teaching. Hence, the public debate, and therefore, the news media as a representative of the debate, influences teachers. Firstly, it directly affects decisions made by teachers, for instance, when planning mathematics teaching (Grundén, 2020). Secondly, it influences important policy documents in the line of teaching.

Given that mathematics teachers and their teaching are influenced by media reporting, differences between meaning created and sustained in the media and the debate within mathematics education research might be problematic (Chorney et al., 2016). Results from Norway show that the researcher's role in Norwegian media is primarily to comment on current news. When they comment, they mostly do so on issues regarding the physical and social environment and teachers' and students' competencies. Researchers seldom comment on what happens in the classrooms (Andersson-Bakken & Bakken, 2015). It seems reasonable that knowing more about the ways mathematics education is represented—and thereby constructed—in the media is relevant for teachers and also essential for mathematics education researchers in their possibilities to "intervene to shift these storylines and positionings to have greater impact on policy, practise, and public perception" (Herbel-Eisenmann et al., 2016, p. 103). This article aims to contribute to the understanding of media as an actor in the practise of mathematics education by presenting representations of mathematics education that emerged in Swedish newspapers between 1992 and 2017. In addition, we will discuss these representations and the tensions created amongst them.

Background

Ideas About Mathematics Teaching and News Media Reporting

When teachers plan their teaching, they make considerations and decisions that are influenced by various aspects, including different actors' ideas about mathematics teaching (Grundén, 2020). Sometimes, ideas that influence decisions are not explicitly connected to a specific actor, but are talked about as "how it is"—shared assumptions in society. Sometimes such assumptions cause teachers to act contrary to their own ideas about how mathematics teaching should be conducted (Grundén, 2020). Hence, shared assumptions have consequences for decisions teachers make about their teaching, and thereby, for students' opportunities to learn mathematics.

In everyday communications, assumptions are ever-present (Brookfield, 2012), which means that in discussions about school, teaching and learning, assumptions about, for example, mathematics education, are expressed. These educational issues engage a wide range of people across social contexts, and news media are amongst the most powerful sites for influencing the public debate over educational policy (Cohen, 2010). In a special issue of *Canadian Journal of Science, Mathematics, and Technology Education* focusing on mathematics education in the news, all authors agreed that media is a powerful actor that influences public opinion and policymaking (Barwell & Abtahi, 2019).

News media reporting is carried out by different people with different agendas, and the reporting always implies choices of content and words. These choices are based on what Abtahi and Barwell (2017) call the dual mission of news reporting: to inform and attract readers. However, it can be questioned whether media's mission to inform does justice to mathematics education. By presenting naïve, dichotomous discourses of, for example, traditional and discovery learning (Barwell & Abtahi, 2019) or by using words that average people understand (Andrade-Melina & Valero, 2019), media reduce the complexity of mathematics teaching and learning. By reducing the complexity, media give the impression that it is not possible that mathematics teaching and student learning can be "both-and"—for example, that students can learn both procedures and concepts (Abtahi & Barwell, 2019). In addition, Andrade-Melina and Valero (2019) argue that media uses strategies to draw attention and affect the public emotionally and morally. For instance, media can craft and legitimise a "crisis discourse," which can be interpreted as a frame and a way to present information. Frames used to present information are recognised by readers (Barwell & Abtahi, 2015; Scheufele & Tewksbury, 2007; Takayama et al., 2013) and influence how information is understood by the audience (Barwell & Abtahi, 2015). Another structure found in news media is the "morality frame" in which two methods, traditional teaching and discovery learning, are connected to values of good and bad (Abtahi & Barwell, 2019).

War, Performance and Purpose—Issues in News Media

Different researchers have focused on varying issues in media studies. Abtahi and Barwell (2017) explored construction of children in news reporting regarding mathematics education and found that they were constructed in negative terms, whilst there is an overarching implicit message that it is good to perform well in mathematics. This message can be related to the following storyline identified by Rodney et al. (2016): "Canadian students are getting worse in mathematics" (p. 399) and to the "general sense of decline" that Barwell and Abtahi (2015, p. 309) found in their study. If students do not perform "as well as they should," it is problematic in relation to the implicit message sent that performing well is a good thing. Related to performing well, Chorney et al. (2016) showed that the notion of competition is found in the international context as competition between countries, as well as in a national context and on an individual level where schools and individual students "compete."

In Canadian newspapers, Barwell and Abtahi (2015), Chorney et al. (2016), and Rodney et al. (2016) found that mathematics education was constructed as a "war" between two ways of teaching, the traditional approach and the discovery approach. Chorney et al. (2016) argued that writing about mathematics teaching in these ways creates a false dichotomy of a right and wrong way to teach the subject. Another dichotomy, according to Takayama et al. (2013), constructed in the Australian and South Korean news media states, "The representation of British and US education reform acts as the 'antitheses' to Finnish education was used to highlight the distinctively egalitarian and human nature of the latter" (p. 320). These examples indicate that news media tend to simplify the view and use counterpoles.

In Norway, Lange and Meaney (2018) analysed a debate article about mathematics in kindergarten and found that the Minister of Education used news media to promote a shift from a "social pedagogy tradition" approach to a "readiness for school" approach. This shift indicates a departure from emphasising children developing to become democratic citizens to children being able to complete their way through the school system (Lange, 2019; Lange & Meaney, 2018). The focus on learning mathematics to succeed later in life corresponds with findings by Abtahi and Barwell (2017), who argue that the construction of children as passive subjects being processed by the school system implies ideas like "children must be prepared for the future for their own good" (p. 365).

Overall, outcomes from international comparisons, such as the Programme for International Student Assessment (PISA) studies, is a common theme in news media reporting (Barwell & Abtahi, 2019). Behind the construction of mathematics education in news media, there seem to be ideas in line with the overarching storyline in Abtahi and Barwell (2017), which state, "It is good to perform well in mathematics." Implicit messages that permeate the articles included in the different studies seem to be that if students are to perform well in mathematics, education needs to be provided in certain ways—the right ways. The reasons why it must be fixed are often found to be beyond individual students' well-being.

Purposes of education are highlighted in Chorney et al. (2016), who referred to Labaree and his three purposes of education: democratic equality, which is about schools preparing citizens; social efficiency, which involves schools training workers; and social mobility, which concerns preparing students for competition in social positions. In their study, Chorney et al. (2016) found storylines concerning two of the purposes: social efficiency and social mobility.

How purpose and other relevant issues of mathematics education are presented in media may differ from how actors within the school system, such as teachers and researchers, talk about their different practises. For example, the identified dichotomous approaches of writing about mathematics teaching (traditional and discovery) identified in Canadian newspapers are outside the view of many mathematics education researchers (Herbel-Eisenmann et al., 2016).

Methodology

Depending on the choices made when authoring an article, the writer contributes in diverse ways to the construction of mathematics education. Using a critical discourse analysis, each text is produced within a discursive practise, which, in turn, is part of a social practise (Fairclough, 2003). Authors of texts in newspapers influence the discursive and social practises in which the texts are produced, whilst at the same time, the discursive and social practises influence the authors. Any social process can be described as an interplay between structures, practises and events. On the one hand, practises mediate the relationship between structures that define what is possible, and on the other, what is actually happening, i.e., the event (Fairclough, 2003). In this study, what is written in the articles represents events in mathematics education. According to Fairclough (2003), the same phenomenon—the same events—can be represented by different perspectives, and "practises are socially constructed by representations" (Fairclough, 2001, p. 2). Hence, representations in newspapers contribute to the construction of the practise of mathematics

education. In the interplay between structures, practises and events, the construction becomes part of the structures that define the possible events—for example, how the teaching is conducted.

Searching for Articles

Newspapers are seen as representatives of the public debate. Hence, all types of material published in newspapers, including news articles, debate articles, notifiers, chronicles, or letters to the editor, are relevant to this study. We refer to all texts as articles. To find articles that were part of the national public debate, we chose the three largest daily nationwide newspapers in Sweden: the independent liberal *Dagens Nyheter* (DN), with 612,000 printed copies in 2017; the liberal-conservative *Svenska Dagbladet* (SvD), with 380,000 printed copies in 2017; and the independent *Metro* with 855,000 printed copies in 2017. *Metro* is a free daily newspaper. We chose the largest nationwide newspapers to capture the debate that concerns all schools in Sweden. All three newspapers have a publisher, who is responsible for all texts. Searches were conducted in the media archive Retriever, whose database includes the three selected newspapers. Retriever is the largest digital archive for media in the Nordic countries. We viewed the public debate as evolving slowly over time. Hence, searches were made every fifth year from 1992 to 2017 (DN), from 1997 to 2017 (SvD) and from 2007 to 2017 (*Metro*), which means that we conducted the searches during a period in which three different national curricula were utilised. The differences in the intervals depended on when each newspaper appeared in the media archive.

Since this study aimed to explore representations of mathematics education in Swedish newspapers, articles included had to pertain to mathematics education or aspects relevant to mathematics education. Consequently, we considered the topic as two units: "mathematics" and "education," and words that captured these terms were used as search terms. The search was done in Swedish, and all search terms presented here are translated, except for one, "räkna," as there is no immediate English translation. Three searches for each year were conducted. In the first search, one or both of the words math* and räkn* and at least one of the words teach*, student* and school* had to be in the article. The Swedish word "räkna" includes counting and doing all forms of calculations. Often, it means working individually with routine tasks. In the second search, one or both of the words math* and räkn* and one or both words class*, lesson* and teaching* had to be included. The third and final searches had to include one or both of the words math* and räkn* and at least one of the words book* or homework*. Table 1 presents an overview of the combination of search terms.

Selecting Articles

The search resulted in 3166 articles, and the first step in the selection process was to read the titles. Titles that obviously had nothing to do with mathematics teaching in Sweden, such as "Burmansson slipar OS-formen hemma i trädgårdsbacken" (Burmansson (a Swedish freestyle skier) prepares for the Olympics in the garden hill) or "Tv-drottningen öppnar upp om livet bakom kamerorna" (Queen of television opens up about life behind cameras), were excluded. After that, introductions were read in the remaining 1715 articles, and we selected three types of articles to be read in their entirety. These included (1) the ones in which the introduction was somehow concerned with mathematics, school, students and teaching, (2) articles in which the introduction did not indicate whether the article was relevant and (3) articles

Table 1 Keywords in the search process

Mathematics	Teaching
math* and/or räkn*	teach* and/or student* and/or school
math* and/or räkn*	class* and/or lesson* and/or teaching*
math* and/or räkn*	book* and/or homework

without an introduction. This selection process resulted in 667 articles that were read in full. A total of 147 articles contributed, to some extent, to the construction of mathematics education, and hence, they were included in the study and analysed.

Analysing Articles

Humans construct mathematics education. In news media, journalists and others are authors of articles, letters to the editor, debate articles, etc., thereby contributing to the public debate and the construction of mathematics teaching. We chose to work inductively when analysing the material to reduce our influence to the extent possible. In each of the 147 chosen articles, sections that represented mathematics education were marked. In the analysis, nouns, verbs and adjectives were marked and sorted separately. In this article, we present and discuss results based on the further analysis of nouns. Nouns that captured what each sentence was about were regarded as elements. Elements that we considered to be about similar things were grouped for our content analysis. In this process, four themes of representations emerged: *forms of teaching*, *achievement and measurement*, *governing and organization* and *feelings and characteristics*. An example of the analysis is shown in Table 2.

In the first example, the underlying meaning is that when a student has been absent, the biggest consequence is that the student has not progressed as far in the textbook as the classmates. We interpreted this as a representation of mathematics education showing that working with a textbook is a main form of teaching. The second example consists of two parts. The first part relates to international comparative studies, which we sorted into the category of achievement and measurement. The second part shows how the subject of mathematics is represented as a "problem-child," which we sorted into the category of feelings and characteristics.

In the next stage of the analysis, the text was filtered so that sentences with elements from each theme were grouped, respectively. Each sentence was read with the following question in mind: "In what way does this clause or sentence represent mathematics education?" Sentences that concerned the same topic, for example, national tests, were grouped. Sometimes the sentences represented mathematics education differently, e.g., by describing tests with positive or negative connotations. Thus, dimensions and tensions within each theme became apparent, and these different representations contributed to the construction of mathematics education. In "Results," examples from the material are given to exemplify representations that contributed to the construction.

Results

We begin this section with an overview of the number of elements within each theme sorted by year. Next, we present the four themes of representations that emerged in the analysis: *forms of teaching*, *achievement and measurement*, *governing and organization* and *feelings and characteristics*. The

Table 2 Examples from the analysis

Article	Quotation	Elements	Resultant theme
1:11	"He has missed a chapter in the textbook and wants to catch up with his classmates."	Chapter Textbook	Forms of teaching Forms of teaching
2:25	"Swedish pupils' results continue to weaken in the latest international studies of pupils' knowledge, PIRLS and TIMSS. Above all Mathematics remains a 'problem-child.'"	Results International studies TIMSS Problem-child	Achievement and measurement Feelings and characteristics

presentation of each theme begins with an introduction that describes it and a presentation of elements that led to the theme. Subsequently, the theme is presented chronologically from 1992 to 2017, with support from selected illustrative examples.

The analysis showed a variation in the elements, and thus, the themes, which became visible in the articles in the different years. Table 3 shows an overview of the number of elements within each theme sorted by year with the number of articles per year given in parentheses.

Forms of Teaching

The theme "forms of teaching" involves representations of the activities and the materials used in the mathematics classroom. Elements, i.e., nouns that captured what the sentences in this category were about, included textbooks, problem-solving, instructions and "räkning."

The theme, "forms of teaching" is hardly visible in the material before 2007. One rare example was found in DN 1992:

> The children are sitting in groups playing a game with dice and numbers that allows them to practise multiplication and strategic thinking […]. Then it is time for math and the children solve tasks, adapted to their level, in their books (Hernbäck, 1992, p. 6).

In this example, it is apparent that although the students practised multiplication and strategic thinking, playing games was not part of the mathematics teaching. The author points out that "then it is time for math" and, thus, shows that the activity that was part of mathematics teaching was solving tasks in the textbooks.

In 2007, working with textbooks still seemed to play a dominant role in school mathematics. However, at the same time, multiple forms of teaching were emphasised as beneficial, and language emerged as a resource in mathematics teaching. Language as a resource is one example of adaption to individuals, which is emphasised as important for student learning. Internal initiatives, i.e., initiatives organised within the schools, such as individualization and variation in teaching, are highlighted as important for learning. At the same time, external initiatives, i.e., initiatives organised outside schools by external actors, are common in the material. An example of such initiatives is after-school activities where students meet and work with textbooks or other tasks with help from older students or tutors.

In 2012, digital tools were presented for rote learning, and external after-school initiatives remained prominent in the material. One example was found in DN: "It is the non-profit organization 'Mattecentrum' (Math Center) that arranges a study time in the middle of the city" (Haimi, 2012, p. 2). This example shows that students could join the after-school activity to work on tasks and get help from coaches at Mattecentrum. In addition to elements regarding external activities that focus on individual work with textbooks or other tasks, internal initiatives such as variety in teaching, cooperation and communication are emphasised as beneficial for student learning. In some articles, it is problematised that textbooks play a fundamental role in mathematics teaching and learning and that "räkning" is the most prominent activity. An article in DN emphasises the desire for more varied teaching:

Table 3 Number of different elements in each theme per year (number of articles per year in parentheses))

Theme	**1992** (8)	**1997** (18)	**2002** (19)	**2007** (38)	**2012** (41)	**2017** (23)
Forms of teaching	14	22	13	35	75	79
Achievement and measurement	–	8	21	25	21	46
Governing and organization	–	1	6	16	2	28
Feelings and characteristics	1	6	4	10	5	15

> One of the problems in Swedish mathematics teaching is that students work too much individually in their textbooks, which leads to superficial learning. To break the pattern, some schools have applied for money to work practically with manipulatives (Åman, 2012, p. 4).

Mathematics education in 2017 is represented as varied both in terms of activities and materials, and this is emphasised as being beneficial for student learning. In 2017, there was an even stronger emphasis on diverse forms of teaching, including cooperation and communication, as being advantageous for students. No single form of teaching was highlighted, although it is worth noting that programming appears as an activity in the mathematics classroom.

Achievement and Measurement

Within this theme, achievement, measurement and representations are significant on an individual, group and national levels. Elements included in this theme concern testing and assessing students' knowledge in mathematics, levels of students' knowledge, and comparisons between students and countries. Examples of words that led to this theme were "tests," "results," "PISA-tests" and "grades."

Reviewing materials from 1992, 1997 and 2002, the theme is rather invisible. In articles from 2007, there is a significant focus on measuring of knowledge through testing and on the specific levels of knowledge that students must achieve. Grades are used to compare levels of knowledge amongst students in Sweden, which was detailed in an article in *Svenska Dagbladet*:

> Not in ten years have so few ninth graders received passing grades in mathematics, English, and Swedish. Primarily, students' knowledge in mathematics has decreased. (Malmström, 2007a, b, p. 8)

In this quote, it appears that the author equates grades with a certain amount of knowledge and missing grades with a lack of knowledge. Thus, the author sees grades as an objective measure of knowledge levels. Altogether, mathematics education is represented as focusing on tests, grades and results, which indicate a short-term view of knowledge that is never problematised in the material. In the material, ambiguity exists regarding who is responsible for results and knowledge. On the one hand, individual students seem to be responsible for what they learn; on the other hand, student knowledge and results seem to be the schools' responsibility.

In 2012, there was a focus on tests, especially standardised national and international tests, from which results can be compared amongst countries or groups of students. Within this theme, it seems crucial that Swedish students perform better on international tests than students from other countries. It also seems important for individual students, as well for the nation, that students perform well on national tests. Several examples present initiatives that serve as last-minute help before national tests, which can be viewed as emphasising a short-term view of knowledge. Mathematics education is represented as a national concern and as a subject in which the most important aspect is test preparation.

A common theme in the material from 2017 is achievement and measurement. In the texts from 2017, there is an even greater focus than before on tests, especially international tests such as TIMSS and PISA, and comparisons between countries are a common theme in the articles. Swedish students' performance on the tests compared to students in other countries seems to be significant. When the results do not match expectations, media emphasises this as a national trauma, as expressed in an article in DN:

> Sweden entered a national shock in December 2013 when the large PISA study showed that Swedish students lagged behind the outside world (Silberstein, 2017, p. 5).

Student results are also discussed at an individual level, and there is pressure on them to perform well. A common view is that what students know can be—and should be—measured with tests, such as national tests. From this viewpoint, what students know is equated with how well they perform on

tests. Another issue raised in the articles is the relationship between knowledge and grades. There are two sides to this discussion. On the one hand, the grade a student receives seems to be equated with a specific amount of measurable knowledge, but on the other, knowledge is seen as more focused on understanding and not as easily measured. In this view, there is not a one-to-one relationship between a student's knowledge and the grade the student receives.

Governing and Organization

Another theme concerns what governs mathematics education and how mathematics teaching is organised. Representations within this theme contribute to the construction of mathematics education by showing that politicians govern time and content and that decisions, at least to some extent, are based on students' results in international comparisons. Examples of words in this theme are "school law," "government," "ability grouping" and "language support."

There are a few elements in this theme that were found prior to 2002. In 1997, there are indications that regular teaching is insufficient, and initiatives such as summer school need to supplement instruction for some students. In 2002, governing had become more visible. One article in *Svenska Dagbladet* stated, "(Politicians) have introduced common levels of knowledge requirements" (Asker, 2002, p. 13). This example shows that politicians decide on the criteria teachers should use to assess students' knowledge. However, there is also an article in which individual teachers resisted governmental decisions, which appears in a quote from 2002:

> Some teachers drove 'in their own lane' and worked with mathematics in a way that did not match the knowledge requirements in the national curriculum (Jällhage, 2002, p. 12).

Regarding organization in 2002, support initiatives were more visible, including initiatives that complement regular teaching, such as language support and ability grouping. However, ways of organising support are problematised in a few articles, such as ability grouping contributing to segregation.

In 2007, political influences on teaching were significant. Politicians allocated funds and governed content, time, aims and knowledge requirements that students were expected to achieve. The stated reasons for these political decisions were based on students' different needs and the wish for equality. It became apparent in 2007 that other competencies and professions were needed in addition to mathematics teachers, including special needs teachers and mother-tongue teachers. For example, in DN, it was written that schools could "go for bilingual teaching with teachers who know students' mother tongue" (Jällhage, 2007, p. 10). Other initiatives described actors outside the school organising activities to complement regular teaching.

In 2012 and 2017, there were few results within this theme. However, the view of ability grouping as contributing to segregation became more apparent, and in 2017, political governance became more visible again, and results in international comparisons had consequences for decision-making. One example is taken from an article in SvD:

> The government's investment in more mathematics in middle school came after Sweden failed in international knowledge measurements such as Pisa and TIMSS (Thurfjell, 2017, p. 7).

Feelings and Characteristics

The theme "feelings and characteristics" concerns both feelings that students have and feelings that are wished for in mathematics teaching. The theme is also about characteristics attributed to students in relation to mathematics education. Elements that contributed to the emergence of the theme include math anxiety, curiosity, talent and difficulty.

The theme of feelings and characteristics was non-existent in the material in 1992 and rarely appeared in 1997. In 2002, the theme was not prominent, although claims indicated various categories of students, the desire for mathematics education to arouse emotions, and the fact that students were becoming more stimulated by the subject. By 2007, elements within the theme increased significantly. In the material, mathematics education was represented as arousing both positive and negative feelings in the students. Students were sorted into various categories based on their results in the subject. In an article in *Svenska Dagbladet*, a group of students is referred to as "math geniuses":

> Next year an elite class in mathematics will start at Norra Real in Stockholm. The idea is for students to be selected based on an entrance exam (Malmström, 2007a, b, p.18).

In 2012, it was emphasised that positive feelings were necessary for learning, and external actors wanted to elevate the students' feelings towards mathematics. In 2017, the importance of feelings continued. However, it is striking that there seemed to be a desire amongst teachers to arouse positive feelings. Often, variety in teaching is described as a key to positive feelings. Yet, in articles where students' perspectives are presented, it is emphasised that mathematics causes negative feelings amongst students. For example, "There are six-year-olds with math anxiety who think they are bad and hate math" (Sjöström, 2017a, b, pp. 20–21). Math anxiety is also described, which contributes to representing mathematics education as causing these feelings:

> Cold sweaty, dizzy, stomach ache, and a feeling of high stress. This is what math anxiety looks like. (Sjöström, 2017a, b, p. 14).

In 2017, there were also indications that mathematics education was represented as a subject in which students were sorted into categories based on their results in mathematics. However, what was new in the material from 2017 is that students sorted themselves into categories and labelled themselves based on perceived results.

Discussion and Conclusions

This article aims at presenting and discussing representations of mathematics education in Swedish newspapers. This section starts with a reflection on the quality aspects of the study. This is followed with a discussion about the key features of the construction and possible tensions in the construction.

The results stem from a thorough analysis of 147 articles. Many choices were made in the search and selection processes and the analysis. In each step, we made individual choices first. When different options were available, we discussed them before making a final decision. This approach contributed to higher reliability. Although results from the study are not generalizable, they can be transferable and thereby contribute to developing knowledge within the field (Flyvbjerg, 2011). The study was conducted in Sweden, and conclusions cannot be drawn outside this context. However, results from this study are in line with findings from Canadian studies (e.g., Abtahi & Barwell, 2017; Chorney et al., 2016; and Rodney et al., 2016), which make it reasonable to believe that the results may be applicable to other countries. A limitation of this study is that searches were made every fifth year, which might have resulted in missed events that may have had consequences for mathematics teaching. However, searching more frequently would have resulted in even more material to analyse, which would have negatively influenced the analysis. Hence, we chose the longer intervals, believing that any essential events we may have missed would have affected the debate to such an extent that they would be visible some years later.

In our analysis, we found four themes that built the construction: in mathematics education, the teaching consists of different forms of teaching, which should contribute to achievement that can be measured. To succeed with this, mathematics education is governed and organised in diverse ways, which generates consequences as to how students feel and are characterised. Representations of mathematics education

in Sweden is in line with prior research when it comes to large-scale tests and international comparisons. Firstly, international comparisons are a common theme in news media reporting (Barwell & Abtahi, 2019), which is consistent with our results. Secondly, our results show that an element of the construction in Sweden is that results from large-scale tests and international comparisons, such as TIMSS and PISA, are important and a concern for the entire nation, which has also been emphasised by others, such as Barwell and Abtahi (2019). Thirdly, our results support the idea that students will perform well—both as a collective and as individuals, which aligns with prior research that states that it is a good thing when students perform well in mathematics (Abtahi & Barwell, 2017). These results can be interpreted as society having expectations that mathematics teaching prepares students to perform well on large-scale tests.

Our study shows that when students do not perform well enough, different actors—both within and outside the school context—take the initiative for events aimed at overcoming the bad results. Initiatives taken by external actors seem to focus on individual work with tasks, in a textbook, for example, whilst internal initiatives vary and include ability grouping and language support. Some initiatives aim to increase students' aspiration and motivation, and these often include multiple forms of teaching, communication and cooperation.

These results can be viewed in the light of morality framing, an issue raised by Abtahi and Barwell (2019). In their article, they highlight that traditional teaching—back-to-basics—is characterised as morally good and discovery learning as morally bad. In the representations that emerge in our results, there is an ambiguity regarding what is morally good or bad. To some extent, back-to-basics is emphasised as morally good to provide a response to the negative results. There are indications that such teaching would prepare students better for the tests. However, multiple forms of teaching, including discovery learning, are also morally good because they lead to greater aspirations and motivation amongst students, which may be what Abtahi and Barwell (2019) seem to ask for: that students can learn both concepts and procedures. However, both types can also be considered morally bad. Traditional teaching implies students work too much individually, which leads to superficial learning. In contrast, discovery learning is vague and does not prepare students sufficiently.

The ambiguity in what is good or bad in mathematics teaching may have its explanation in different expectations from different actors and in Labaree's different purposes of education, highlighted in Chorney et al. (2016). The results indicate that an expectation in society is that Swedish students as a collective perform well, which can be connected to the purpose of education as social efficiency and social mobility. However, results also show that there is an expectation that students should feel valuable and be motivated in mathematics classrooms, which might be connected to the purpose of education as democratic equality. It seems contradictory in the construction in Swedish newspapers that teachers want students to feel positive towards their mathematics classroom education. However, results show that mathematics teaching arouses feelings such as stress and anxiety amongst the students. However, these elements do not merit the same headlines as "bad-results," which give the impression that the "negative-feelings problem" is less important. We interpret the "negative-feelings problem" in two ways based on the results. The first is, "Students have negative feelings. If only they had better results, they would be more encouraged." The second view is, "Mathematics education (and the possible focus on results) causes negative feelings. How can we change the teaching?".

An issue that might be connected to negative feelings is the increased labelling and categorising of students based on their performance in mathematics. One example is the initiative of ability grouping. According to results, this position was taken due to bad results and to meet the needs of different students, but it is also problematised because it can lead to segregation amongst students. This initiative, as well as the others, and the increased labelling and categorising of students raise questions about why students are categorised and labelled as certain kinds of students. Is it so that the teaching meets their needs to make them perform well on tests to raise the results for the school, the district and the country? Is it so teaching can meet individual student's needs in order to develop them as a whole person, contribute to their well-being and adjust teaching so that they develop based on their own conditions? Or is it possible to do both?

Suppose we allow ourselves to speculate about the constructions' possible consequences for mathematics teaching. In that case, we need to turn to an actor in the middle of the practise of mathematics teaching—the teacher. The teacher plans her mathematics teaching—has considerations and makes decisions—influenced by structures, including the construction of mathematics education in news media (Grundén, 2020). As stated above, there are tensions in the structural influence of the construction regarding the events that are desirable in the classroom, which the teacher needs to consider when planning. For example, multiple forms of teaching are seen as beneficial for learning. The teacher also wants the student to feel good in the mathematics classroom, so events are varied. These include communication, cooperation and discovery learning, which lead students to develop different abilities. However, there are also expectations of good results on large-scale tests and indications that students are often best met with traditional teaching. Another tension in the construction is whether ability grouping should be used. The events that actually occur in mathematics classrooms are decided by the teacher but mediated through the practise of mathematics education.

This study provides insights into the public debate that may allow teachers, school leaders and politicians to relate critically to some of the incentives that underpin decisions related to mathematics education. Hopefully, the results also will be useful for researchers who follow the call from, for example, Herbel-Eisenmann et al. (2016) and Wagner (2019), and intervene to shift the public debate. With results from this study in mind, we as researchers must ask ourselves how we represent mathematics education and contribute to constructing a practise of mathematics education that emphasises students' learning as well as their well-being.

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Declarations

Conflict of Interest The authors declare no competing interests.

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