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Feedback for Everybody? Exploring the relationship between students' perceptions of feedback and students' socioeconomic status (SES)

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Abstract

In the paper, I describe teacher-student feedback as an active process shaped by both the teacher and the student and argue that feedback is influenced by the students' unique experiences and socialization. Drawing on sociological theories on interaction and communication, I argue that the type and quality of the teacher-student feedback perceived by the student is influenced by the student's background. While many studies have shown that feedback is a key determinant for student learning and achievement, only a few have examined how feedback is perceived by students and if the perception is related to their socioeconomic status (SES). I use data from the Programme for International Student Assessment (PISA) 2012 in a multi-level regression model to examine differences in students' perceptions of *directive* and *facilitative* feedback. The five Nordic countries of Denmark, Finland, Iceland, Norway and Sweden are used as cases. Regarding *directive* feedback, I find no relationship between this type of feedback and students' SES. However, the results indicate that students with high SES perceive more *facilitative* feedback in Denmark, Finland, Iceland and Sweden than students with low SES. These results indicate that students are not given equal opportunities to learn. I argue that this might create inequalities in the Nordic school systems. Implications of the findings are discussed.

Keywords

Directive and Facilitative Feedback, Student Perspective, PISA, Inequality

Introduction

A goal of education systems worldwide is to reduce inequalities in schooling outcomes. While there are numerous studies that investigate the causes of these disparities in relation to less privileged students' resources, aspirations and networks, the communication between teachers and their students has received much less attention. The aim of this paper is to look inside classrooms in the Nordic countries from the perspectives of the students to see if the teaching practices allow all students an equal opportunity to learn. More specifically, I look at differences between students with favourable socioeconomic status (SES) and students with less favourable SES and how they perceived the teacher–student feedback provided during math lessons.

Feedback is crucial in giving all students equal opportunities, as many studies have shown that feedback is a key determinant for student learning and achievement (see e.g. Hattie & Timperley, 2007; Muijs et al., 2014). Feedback can broadly be defined as information about the learning process from the surroundings that is available to active learners (Black & Wiliam, 1998; Shute, 2008). Two different *types* of feedback have been identified, each with different functions and aims. *Directive feedback* is described as teacher-directed and teacher-initiated, with very explicit information given to students about the learning process (Straub, 1996). *Facilitative feedback* takes the form of a conversation between equals in which information about the learning process is implicit, as the communication contains no directive about what to do next (Straub, 1996). These two types of feedback offer students different opportunities to learn. They both help students in the learning process; students who receive directive feedback learn to follow the strategies provided by the teachers, while students who receive facilitative feedback are prompted to come up with their own learning strategies. Therefore, the two types of feedback shape different types of students. Drawing on Bernstein's theories of visible and invisible pedagogy (1975), directive feedback can be described as using the most explicit pedagogical language, whereas facilitative feedback uses more implicit pedagogical language. Bernstein argues that the language of a school is class-coded, stating that the use of implicit pedagogical language excludes working-class students because they have a harder time perceiving and understanding the codes. If the use of directive and facilitative feedback is related to students' SES, this would be one way of creating inequalities vis-à-vis learning. However, no studies have explored how directive and facilitative feedback are related to students' SES.

Therefore, the goal of this paper is to examine if teachers' use of directive and facilitative feedback as perceived by students is related to students' SES. In attempting to create equal opportunities for all students, numerous countries look to the Nordic countries in improving their own school systems (Mortimore, 2013; Noonoo, 2015). In the Nordic countries, the student body in schools is very heterogeneous with respect to students' SES, ethnic backgrounds and gender (Sortkær, 2018), and there is no tracking until the age of 16. These factors are said to give all students equal opportunities to learn (OECD, 2012, Chapters 2 & 3). Nevertheless, considerable inequalities in learning outcomes and educational attainment can be observed in the Nordic countries. For example, there are major gaps in educational success in relation to students' SES. Numbers from the Programme for International Student Assessment (PISA) 2012 show that the economic, social and cultural status of students explains on average 10% of the between-student variation in the PISA mathematics score in the Nordic countries (OECD, 2013, Fig. II.2.2).

In this paper, I use the Nordic countries as cases to explore whether the use of directive and facilitative feedback creates equal opportunities for all students regardless of their SES and whether teacher communication might function as a subtle mechanism in creating inequalities in the Nordic countries.

The remainder of the paper is organized as follows. The next section covers the literature on feedback and differentiates feedback into two types according to function. Subsequently, the literature on variations in students' perception of feedback is covered, and hypotheses for the analysis are presented. Next, I present the data, measures, methods and results. The final section consists of a summary, in which the implications of this study for research on feedback and for practice are discussed.

Feedback to enhance learning

Lev Vygotsky (1978) argues that children's cognitive development is improved through interaction with more educated individuals. Teacher–student feedback as it takes place on an everyday basis comprises such interaction and has the function of helping students improve their learning processes. Empirical educational research has indeed found that feedback is related to students' learning progress. Two international meta-studies have shown that feedback is among the most influential factors in explaining the learning outcomes of individual students (Hattie, 2009; Meyer, 2005). Hattie and Timperley (2007) found an average effect size of feedback of 0.79 on learning outcomes and placed feedback in the top 10 of more than 100 factors influencing educational achievement. In a more dated review, Black and Wiliam (1998) conclude that 'the gains in achievement [as a result of feedback and the overlapping concept of formative assessment] appear to be quite considerable, and [...] amongst the largest ever reported for educational interventions' (p. 61).

Yet, several literature reviews have shown that the effect size of feedback on learning varies substantially. In their review, Kluger and DeNisi (1996) found an average effect size of 0.4 on learning outcomes and that more than one-third of the included effect sizes were negative. They therefore suggested that the effect of feedback on learning outcomes is moderated by the *type* of feedback given, a line of thinking that has been pursued in a number of literature reviews (see Kluger & DeNisi (1996) and Shute (2008) for excellent reviews). Among other things, these literature reviews describe how feedback can be categorized according to two main functions—*directive* or *facilitative* (Black & Wiliam, 1998; in Shute, 2008). *Directive feedback* is characterized as information from teachers that explicitly guides students in the learning process and provides strategies for improving their performance. This type of feedback does not offer much room for self-regulated learning and is described in some studies as 'controlling' (Straub, 1996). *Facilitative feedback* is characterized as information with which teachers facilitate a process of self-regulated feedback, that is, without any explicit guidance on what to do next. In some studies, facilitative feedback is described as more supportive and motivating than directive feedback (Straub, 1996). In an empirical classroom study by Torrance and Pryor (1998) investigating 4 to 7-years-old kids, the authors found that most of the time the teachers used what the authors term a scholastic discourse or convergent assessment, where the agenda was to reveal whether or not the child knows the answer. However, occasionally the teachers used what the authors term a conversational discourse or divergent assessment, where the teachers were not looking for the right answer; rather they were interesting in expanding and elaborating on the task in collaboration with the child (p. 106 and p. 151ff). *Convergent* and *divergent assessment* are comparable in their description with how I describe directive and facilitative feedback and is claimed to promote student autonomy (Hargreaves, 2013).

A similar differentiation is used by Orsmond et al. (2013), who describe feedback as being either a monologue or a dialogue. When feedback is given as a monologue it is one-way communication that encourages students to be reactive, whereas feedback given as a dialogue is two-way communication that encourages students to be proactive. Furthermore,

feedback as a dialogue explicitly encourages self-regulation (see also Marshall & Jane Drummond, 2006; or, Nicol, 2010, for similar discussions). Feedback that promotes self-regulation is described by some as the most effective way to enhance learning (Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006). Moreover, self-regulation is described as a key 21st-century skill that is central to success in work and life (P21: Partnership for 21st century learning, 2015).

It can therefore be argued that the use of directive feedback promotes a different type of student than the use of facilitative feedback. If the amount of directive and facilitative feedback perceived by students is different based on students' SES, this would create inequalities in school and beyond.

However, if feedback is to be effective, students first must *perceive* the feedback (Ilgen, Fisher, & Taylor, 1979). Unfortunately, not much has been written on between-student differences in the perception of feedback.

Students' perception of feedback

Most empirical studies in educational research have implicitly assumed that feedback information is equally distributed and equally perceived by all students. There has been a common focus on teachers' actions and thinking in the feedback process (Perrenoud, 1998) and therefore little consideration of between-student differences in the perception of feedback (for exceptions, see Blair, 2009; Havnes, Smith, Dysthe, & Ludvigsen, 2012). Consequently, in many studies and literature reviews, authors call for further research on how individual student characteristics are mediators of the relationship between feedback and learning outcomes (Black & Wiliam, 1998; Hattie & Gan, 2011; OECD, 2008; Perrenoud, 1998). Shute (2008) recommends that we take a 'multidimensional view of feedback' whereby, amongst other things, the individual characteristics of learners are considered (p. 176). The Organisation for Economic Co-operation and Development (OECD; 2008) explicitly recommends examining whether feedback has a differentiated impact on students with different SES (p. 12). The argument is that research into this area 'may prove extremely important [in] addressing long-term challenges of closing equity gaps in student achievement' (p. 12). Furthermore, several studies found that feedback might have a specific and powerful effect on low-SES students (see Dietrichson, Bøg, Filges, & Jørgensen, 2015 for a review).

Student background and feedback

Here, I consider feedback from a student perspective and regard teacher–student feedback as an active process in which the student interact with their surroundings (Palincsar, 1998; Vygotsky, 1978). In such an interaction, individual students are influenced by the present but also their past; thus, they are shaped by their own unique experiences and socialization (Bourdieu & Passeron, 1990; Bruner, 1996). Bourdieu uses the concept of habitus to describe embodiment in social dynamics in what he called an '*open system of dispositions*' (Bourdieu & Wacquant, 1992, p. 133). While the habitus of students does not have deterministic power, it reveals some students to be more confident in and responsive to one type of pedagogical communication over others (see also Bernstein, 1975; Frykman, 1998). Bruner (1996) emphasizes the role of culture in the construction of meaning and how students' characteristics and status, such as SES, shape their learning experience. The argument in the present article is that students' SES influences both teacher–student interactions *and* how these interactions are perceived by the students.

Below, I discuss the empirical literature on how feedback is related to students' backgrounds. First, the literature on how students' backgrounds influence teacher–student interactions is presented. Second, the literature on how teacher–student feedback is perceived differently by different students in relation to their SES is presented.

The influence of students' backgrounds on teacher–student interactions

In an ethnographic study of 9- and 10-year-old students in the US, Lareau (2011) found systematic differences in teacher–student interactions in relation to students' social backgrounds. She argues that the schooling system favours middle-class students 'trained [by their parents] in "the rules of the game" that govern interactions with institutional representatives' (p. 6). Working-class students, however, are trained by their parents to follow directives rather than to use argumentation and reasoning (p. 3). Consequently, middle-class students have a firm sense of entitlement and are able to communicate with teachers as virtual equals, whereas working-class students have a sense of distance to the school and teachers, and teacher–student communication is more directive than conversational (see also Calarco, 2014 for similar findings). Similarly, in her ethnographic study of a Danish kindergarten, Palludan (2004) differentiates between the kindergarten teachers' use of instructional language and conversational language. The findings reveal that the former is more frequently used in interactions with working-class children, whereas the latter is used more frequently in interactions with middle-class children. None of these studies use the term 'feedback' explicitly. However, I argue that the notion of facilitative feedback is closely related to the interactions that involve middle-class children in the above studies, whereas the notion of directive feedback has many similarities with the interactions involving working-class children in the same studies. Consequently, there is a reason to expect that high-SES students would get the most facilitative feedback, whereas low-SES students would get the most directive feedback.

The influence of students' background on the perception of feedback

Differences in the perception of feedback in relation to students' characteristics, such as gender (Carvalho, Santos, Conboy, & Martins, 2014; Havnes et al., 2012; Younger, Warrington, & Williams, 1999; Younger & Warrington, 1996) and ethnicity (Gipps, 2012), as well as institutional setting (Carvalho et al., 2014; Havnes et al., 2012) have attracted some attention. However, a search of the literature on feedback and students' perceptions of feedback did not reveal a single paper examining the differences in the perceptions of feedback between students with varying SES. The studies by Lareau (2011) and Palludan (2004) are both based on ethnographic fieldwork and did not explicitly include the perspectives of the students. However, Bernstein (1975) describes how language and class are closely related and how the implicit pedagogical language of schools excludes working-class students. Understanding facilitative feedback as being closely related to Bernstein's concept of implicit pedagogical language and directive feedback as being related to his concept of explicit pedagogical language supports the expectation that facilitative feedback favours high-SES students.

Hypothesis

Based on the presented theory and empirical literature, I hypothesize that high-SES students will perceive more facilitative feedback than low-SES students. In contrast, low-SES students will perceive more directive feedback than high-SES students.

Data

To explore this hypothesis, I used data from the five Nordic countries of Denmark, Finland, Iceland, Norway and Sweden. These countries' schooling systems share some distinct characteristics that differ from those of most other school systems (Arnesen & Lundahl, 2006). However, this is not a comparative study but includes five countries to broaden the scope of the results. The data was taken from the OECD PISA 2012. This large-scale international survey evaluates school systems worldwide by testing the skills and knowledge of 15-year-old students and by gathering background information on countries, schools and students. A special component of the 2012 edition of PISA was a focus in the student questionnaire on topics such as feedback and formative assessment in relation to mathematics lessons. Information on how individual students perceived feedback in mathematics lessons combined with information on students' demographic data, such as their economic, social and cultural status, made the PISA 2012 information very suitable for testing the hypotheses mentioned above.

The schools and students were randomly selected in a two-stage sampling design. In the first stage, the sampling units were schools, and in the second stage the sampling units were 15-year-old students at the selected schools. This sampling procedure made the data multilevel in nature. The PISA 2012 study employed a questionnaire rotation design whereby only two-thirds of the students were asked questions about their perceptions of feedback. These students were included in my analytical sample, which comprised 17,283 students in total at 1,169 schools in the five Nordic countries. Included were 4,163 students from 337 schools in Denmark; 5,427 students from 300 schools in Finland; 2,191 students from 132 schools in Iceland; 2,813 students from 195 schools in Norway; and 2,689 students from 205 schools in Sweden.

To examine between-student variations in the perception of feedback within schools, it was necessary to use data from countries with very heterogeneous schools in terms of student characteristics. If I analysed data from very homogeneous schools, a relationship between student SES and the perception of feedback could have been a result of differences in teaching styles between schools with different tracks and different ability levels, which are closely related to student SES. This was not the case in the Nordic countries, as these countries have a very low prevalence of ability sorting, no tracking before the age of 15 (Brunello & Checchi, 2006) and are very heterogeneous¹.

As a consequence of PISA not sampling classes, the students from the sampled schools did not necessarily attend the same class. This was clearly a limitation of the study but was not crucial for the analysis because the schools in the chosen countries are very heterogeneous and have very little ability sorting. This means that the differences between classes within schools were relatively small in terms of student body and level of heterogeneity.

Measures

All variables in this study were taken from two types of questionnaires and a mathematics test from PISA 2012; the questionnaires were filled out by individual students and the heads of schools, and the test was completed by the students. The dependent variables were the

¹ The average intra-class correlation in mathematics achievement in the Nordic countries was .10, whereas the average for the rest of the participating countries was .44 (min: .21 in Ireland, max: .71 in the Netherlands). *Own calculations on PISA 2012 data.

two types of feedback—directive feedback and facilitative feedback. The items for constructing these two dependent variables were taken from the PISA 2012 student questionnaire (all items are in Tables A1 and A2 in the appendix). Directive and facilitative feedback are not to be seen as two distinct and mutually exclusive types of feedback but must be regarded as existing on a continuum (Straub, 1996). All teacher–student feedback are in some way both directive and facilitative, but usually one of the two functions are in the foreground. For analytical reasons, I characterized different variations of feedback communication to be either at the directive end of the directive–facilitative continuum or at the facilitative end of the continuum. The items were all questions on how often the students experienced certain things in their mathematics lessons answered using a four-point Likert scale (one being ‘every lesson’ and four being ‘never or hardly ever’). I reversed the scale to have higher numbers, indicating a higher frequency of perceived feedback.

I tested the measure for directive and facilitative feedback country-wise, and a confirmatory factor analysis (Stata 14.2) clearly indicated there were two latent scales present in the data. The Cronbach’s alphas of the two scales ranged from .71 to .82 in the five countries and were considered acceptable. The approximate fit indexes all indicated good model–data fit in all countries (see Tables A1 and A2 in the appendix). Only the model test statistics did not indicate a good fit of the model (all χ^2 had p-values smaller than .001). The χ^2 is known to be affected by a large sample size, and this might partly explain the unsatisfactory test statistics (Kline, 2013); therefore, I proceeded with the proposed scales. A test for group invariance of parameters between the four levels of SES (the students were grouped into four groups of equal size based on their SES (see next section)) resulted in non-significant p-values, indicating parameter invariance across SES groups.

The central independent variable was student SES. To measure student SES, I used the index for the economic, social and cultural status (ESCS) that was calculated by the OECD (OECD, 2013, p. 136) as a standardized continuous variable and that is available in the original dataset. The index is based on student responses concerning parental educational level (coded as years of schooling according to the International Standard Classification of Education (ISCED)), parental occupational status (based on the International Socio-Economic Index of occupational status (ISEI)) and number of home possession, including books, in the home (OECD, 2014). In order to examine the relative difference in student perceptions of feedback between, for example, high- and low-SES students, I converted the index into an ordinal scale with four levels according to their distribution quartiles in the country samples going from low (1) to high (4), with the highest category being the reference. Students were considered to have high SES if they were among the 25% of students with the highest scores on the continuous index and low SES if they were among the 25% in the bottom of the index. This is in line with the definitions used by the OECD (OECD, 2016, p. 205).

I included four student-level variables to account for student characteristics and student achievement, as these variables might have been related to student perceptions of feedback. These were gender, ethnicity (measured using two separate variables) and mathematics performance. The variable on gender was dummy coded and named **female**. Two dummy variables indicated student characteristics related to ethnicity. The variable **speaks test language** indicated whether the respondent spoke the same language at home as the one used in the PISA test, and the variable **born in test country** indicated whether the respondent was born in the country where the PISA test was executed. The measure of mathematics performance (**math performance**) was taken from five plausible values derived from the test completed by all students. Instead of assigning one score to each student, the OECD assigned five plausible values to each student to incorporate the measurement error associated with the test score (OECD, 2014). I used the average of the five plausible values and converted the measure into an ordinal scale with four levels according to their distribution quartiles in

the country samples going from low (1) to high (4), with the highest category being the reference.

Finally, I included two school-level variables to control for systematic between-school differences due to school composition and school type. First, I controlled for SES composition at the school level (**school SES**) by averaging the continuous index for the SES of all respondents within a school. Second, I controlled for type of school (private vs. public school) with a dummy variable (**public**).

Missing values

The directive feedback scale had 568 observations with no answers to at least one item, and the facilitative feedback scale had 632 observations with no answers to at least one item. A closer look showed an overrepresentation of boys, students who did not speak the language of the test at home, students who were not born in the country of the test and low-SES students. Because answers were not missing completely at random, the simple deletion of these students might have created biased estimates. Therefore, multiple imputation was used to keep all observations in the analysis (five imputations using Stata 14.2) (Enders & Peugh, 2004).

To the dummy variables ‘speaks test language’ (1,059 missing), ‘born in test country’ (383 missing) and ‘public’ (591 missing) I added a third category representing a non-answer to keep the observations in the analysis. These third categories are not reported in the results section. There were 431 missing values for the SES variable. These were given the respective mean values of the schools the students were attending. See Table 1 for more information about means, dispersions and ranges.

--|| Table 1 about here ||--

Methods/methodology

I estimated multi-level models (Snijders & Bosker, 2012) separately for each country using the individual student as level one and the school as level two. By using a multi-level approach, I took into account the potential homogeneity within a school; therefore, the results were not just a result of individual teaching approaches at the different schools.

I started by running a null model for each country to estimate the within- and between-school variances and to test the relevance of a multi-level model. All the models showed significant variations between schools, which indicated that multi-level models were appropriate in all countries. The models also showed more variation within schools than between schools, indicating heterogeneous schools in the sample. A variance partition coefficient around .06 signified that 6% of the variance in perceived feedback could be attributed to differences between schools.

Afterward, I added covariates on both analytic levels:

$$\gamma_{ij} = \beta_0 + \beta_1 SC_j + \beta_2 ST_{ij} + \mu_j + \varepsilon_{ij},$$

where γ_{ij} is the perceived amount of either directive or facilitative feedback of student i in school j , SC_j represents school level characteristics, including the SES composition of the school, ST_{ij} represents student level characteristics, including student SES, μ_j represents

unobserved characteristics of school j and ε_{ij} represents unobserved characteristics of student i in school j .

Results

This section presents the results of the multilevel model investigating the relationship between student SES and perceived directive and facilitative feedback. Table 2 shows the results of the analysis using perceived *directive feedback* as the dependent variable, whereas Table 3 shows the results of the model using perceived *facilitative feedback* as the dependent variable.

The hypothesis for the *directive feedback model* is that low-SES students perceived more directive feedback than high-SES students. The coefficient estimates of the model indicated that this hypothesis could not be confirmed, as there was almost no evidence of a relationship between students' SES and the amount of directive feedback perceived (Table 2). Only in Denmark was there a statistically significant difference in the amount of perceived feedback between the high-SES students and the 'below average'-SES students. Here, the high-SES students reported perceiving the most feedback. The rest of the estimates were not statistically significant.

Regarding the estimates for the other independent variables in the model, the boys perceived substantially more feedback than girls in all Nordic countries. Students speaking a different language than the test language at home perceived more feedback than students speaking the test language at home in Iceland but not in the other countries. However, as there are only 87 students in the Icelandic sample who did not speak Icelandic at home, the result must be interpreted with caution. The coefficient for 'born in test country' was significant in Finland, indicating that students not born in Finland perceived more directive feedback than students born in the country. In Denmark, Finland, Iceland and Sweden the coefficients for student performance showed a significant and almost linear relationship between the amount of perceived directive feedback and student performance in the sense that the better the student was performing in mathematics the smaller the amount of directive feedback the student perceived. This result had some intuitive logic attached, as one could easily imagine a teacher giving more directive feedback in terms of direct guidance to students struggling with the curriculum rather than to the high-performing students for whom it was easier to complete the tasks at hand. The reality for the teacher was, after all, that there was only a certain amount of time available for giving feedback and so many students.

The coefficient for school SES was significant in Denmark, indicating that the higher the level of average SES of the students the less directive feedback the students perceived. The next analysis will indicate whether this might have been due to teachers in high SES schools in Denmark prioritizing giving facilitative feedback rather than directive feedback. The analysis also showed there was no difference in the perception of feedback between students attending public schools and students attending private schools.

--|| Table 2 about here ||--

Table 3 shows the results of the *facilitative feedback model*. The hypothesis for this model was that high-SES students perceive more facilitative feedback than low-SES students. The results are mostly in line with this hypothesis. In Denmark, Finland, Iceland and Sweden, high-SES students perceived a statistically significantly larger amount of facilitative feedback than low-SES students. Across Denmark, Finland, Iceland and Sweden, the trend was

that high-SES students perceived more facilitative feedback than the other SES groups, but the relationship was only statistically significant in some of the cases. Only in Norway was there no difference in perceived facilitative feedback in relation to student SES. The size of the coefficient estimates that reached statistical significance (ranging from $-.10$ in Finland to $-.20$ in Iceland) must be considered as being relatively small. A coefficient of $-.10$ can be interpreted as if the low-SES students perceived one-tenth of a standard deviation less facilitative feedback than the high-SES students. A nested F-test indicated that the three SES coefficients in the model are jointly significant in Denmark, Iceland and Sweden. In Norway and Finland, the F-test revealed a non-significant result even though the threshold for statistical significance was only marginally missed in the latter case ($p=.07$). Nevertheless, the results support the second hypothesis and indicate that high-SES students perceived more facilitative feedback in Denmark, Finland, Iceland and Sweden than low-SES students did, whereas there was no difference between high- and low-SES students in Norway.

Also in this model, boys perceived significantly more feedback than girls, although the estimates were somewhat smaller than in Table 2. In Finland, Iceland and Sweden, students not speaking the test language at home perceived the most facilitative feedback. Whether or not the student was born in the test country was not related to perceived facilitative feedback in any of the countries. The coefficients for the relationship between perceived facilitative feedback and math performance tended to be opposite to the ones in the first model, indicating that better-performing students perceived the largest amount of facilitative feedback, except in Iceland. This relationship was most pronounced in Denmark and Norway. It therefore seems that low-performing students perceived the most directive feedback, whereas high-performing students perceived the most facilitative feedback. There is again an intuitive logic behind this finding, as low-performing students in the classroom might need very precise instructions from the teacher to complete a task, whereas high-performing students only need some hints and implicit instructions to complete a similar task.

Students in high-SES schools in Sweden perceived more facilitative feedback than students in low-SES schools. There was no relationship in the other Nordic countries, and the results do not support the idea that high-SES schools in Denmark prioritized giving facilitative feedback. The coefficient for 'public' was significant in Denmark, Norway and Sweden, indicating that students attending public schools in these countries on average perceived less facilitative feedback than students attending privately funded schools. However, as there were only 39 students attending privately funded schools in Norway this result must be interpreted with caution. In both models, the coefficients of determination for the level 1 variables indicated that only a small part (around 6 %) of the between-student variation in perceived feedback was accounted for by these models.

--|| Table 3 about here ||--

Regarding the relationship between students' SES and perceived feedback for both models, it seems that when using explicit communication (as is the case with directive feedback) there was no difference between high- and low-SES students in terms of the amount of feedback perceived. However, when using implicit pedagogical communication (as is the case with facilitative feedback) high-SES students perceived the most feedback in all countries but Norway.

Check for robustness

The results above could reflect a more general picture of how high-SES students tend to evaluate aspects of the classroom more positively than low-SES students. Therefore, to

check the robustness of the results I employed the model used above only with other classroom measures (classroom disciplinary climate and teacher classroom management) as the dependent variable. The questions used for these two measures are more general and ‘objective’ in their wording (e.g. ‘My teacher starts lessons on time’) than the questions used for the two feedback measures and were therefore less prone to generating differences in students’ answers due to students’ understanding of the pedagogical language used in class.

Using the *classroom disciplinary climate* as perceived by the students as the dependent variable revealed no relationship with student SES. However, using the *teacher classroom management* as perceived by the students revealed a trend very similar to the one found in Table 3 where perceived facilitative feedback was used as the dependent variable, even though the coefficient estimates did not reach statistical significance in any country but Sweden.

--|| Table 4 ||--

There were similarities in the framing of the questions in the questionnaire between the questions relating to classroom disciplinary climate and directive feedback. Here, the question ‘*How often do these things happen in your mathematics lessons?*’ was used. There were also similarities between the questions relating teacher classroom management and facilitative feedback. Here, the question: ‘*Thinking about the mathematics teacher that taught your last mathematics class, [and then a question]*’ was used. In that sense, the framing of the former was more ‘objective’ because it did not call for an explicit evaluation of the teacher, whereas the latter had an explicit reference to the mathematics teacher.

These results might therefore be an indication of a more general difference between students from different social backgrounds in terms of their experience of teacher communication and instruction. High-SES students tend to perceive teachers more positively than low-SES students, whereas there is no difference between high- and low-SES students in the perception of what happens in the classroom if the evaluation is not explicitly related to the teacher.

If there are general between-student differences in teacher quality evaluations that are related to the social origin of the students, it has important implications for policy, research and practice. First, it is easier for teachers in high-SES schools to receive positive student evaluations than it is for teachers in low-SES schools. This has important implications, particularly in settings with high-stakes teacher evaluations. Second, this difference in perception between social classes must be considered when using various measures of teacher quality in educational research.

Nevertheless, even though the difference in perceived facilitative feedback between high- and low-SES students in Denmark, Finland, Iceland and Sweden was partly due to a more general difference in the perception of teacher matters, it still has important implications for policy and practice, which I will return to in the next paragraph. Furthermore, although the difference in the perception of facilitative feedback was due to a more general difference in the perception of teaching quality between high- and low-SES students, it helps us understand the mechanism behind this difference. As stated earlier, the difference in the perception of facilitative feedback could either have been due to a difference in the distribution of the feedback or a difference in the perception of feedback or a combination. However, as the difference between high- and low-SES students was similar when it comes to the perception of *classroom management*, a much more ‘objective’ measure, I tentatively interpret that the difference in the perception of facilitative feedback to a large extent was due to

a difference in perception and not in the distribution. The distribution of *classroom management* could not have been differentiated within-class, and high-SES students still reported to have perceived a higher quality of teacher classroom management.

Conclusion

I used two types of teacher–student feedback as the dependent variables in two multi-level regression models to determine whether there are any between-student differences in the amount of perceived feedback in mathematics classes in the Nordic countries and whether these differences are related to students' SES. Using the student perspective to measure perceived *directive feedback*, I found no difference between high- and low-SES students in Finland, Iceland, Norway and Sweden, whereas high-SES students in Denmark perceived more feedback than did below-average-SES students. These results were not as expected, as this kind of teacher–student communication has been found to be used mostly in teacher interactions with low-SES students. However, as Bernstein argues, this type of explicit pedagogical language is based on a very explicit vocabulary and should be equally accessible to all students in terms of understanding and decoding.

In contrast, facilitative feedback uses a more implicit pedagogical language that I hypothesized was more available to high-SES students than to low-SES. The results basically confirm this hypothesis. Using facilitative feedback as the dependent variable revealed that high-SES students reported having perceived more of this type of feedback than low-SES students in Denmark, Finland, Iceland and Sweden. There were no differences in Norway.

To check the robustness of the results, I used measures of perceived classroom disciplinary climate and perceived classroom management as the dependent variable in two similar models. The results of these analyses indicated a more general difference between high- and low-SES students in the perception of classroom matters. I argue that the difference in perception between high- and low-SES students was mostly due to a difference in the perception of facilitative feedback and not due to a difference in the distribution of the facilitative feedback.

This study adds to the literature on inequality in education by pointing at a specific mechanism that might cause high-SES students to benefit more from school than low-SES students. Facilitative feedback is described as promoting learning strategies and self-regulated learning, skills that are highly rated in lower secondary education, higher education and outside of school. If high-SES students perceive more facilitative feedback than low-SES students, this might give rise to inequalities in the education system.

Whether the difference in the amount of perceived facilitative feedback is due to a difference in distribution or a difference in perception, it must be considered a major concern in terms of policy and practice. Knowing that feedback is important for student learning makes it essential to take account of the student perspective to ensure that the feedback is equally distributed and perceived by all students no matter their SES. This goes for both practice and research. Implementing small changes in how teachers communicate with students and how students understand teachers might have a powerful impact in reducing inequalities in the classroom.

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Table 1. Descriptive statistics

Variable	Denmark		Finland		Iceland		Norway		Sweden	
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
Dependent variables										
Directive feedback	0	1	0	1	0	1	0	1	0	1
Facilitative feedback	0	1	0	1	0	1	0	1	0	1
Independent variables										
Student level										
Female	.51	.50	.50	.50	.50	.50	.51	.50	.51	.50
SES (mean)	0	1	0	1	0	1	0	1	0	1
Speaks test language	.88	.32	.84	.37	.97	.18	.93	.26	.91	.29
Born in test country	.93	.26	.90	.30	.92	.28	.93	.25	.93	.26
Math performance (mean)	499	80	514	84	499	87	495	85	490	84
Level 1 (low) 25 %	395	37	406	41	389	40	387	38	383	38
Level 2 25 %	474	17	487	16	471	17	464	17	462	17
Level 3 25 %	529	16	542	17	527	17	523	18	518	18
Level 4 (high) 25 %	609	34	621	36	611	38	604	40	598	39
School level										
School SES	0	1	0	1	0	1	0	1	0	1
Public	.75	.43	.93	.25	.99	.11	.95	.23	.83	.37
Number of students	4,163		5,427		2,191		2,813		2,689	
Number of schools	337		300		132		195		205	

Table 2. Multilevel regression models on perceived **directive feedback** in mathematics

	Denmark	Finland	Iceland	Norway	Sweden
	Model 1	Model 1	Model 1	Model 1	Model 1
Student level					
SES					
Level 1	-.08	.07	-.08	-.01	-.01
Level 2	-.12*	.06	-.06	-.02	-.04
Level 3	-.06	.07	-.01	-.03	-.02
Level 4 – reference					
Female	-.20***	-.42***	-.29***	-.34***	-.43***
Speaks test language	.11†	.02	-.33*	-.11	-.13†
Born in test country	.00	-.13†	.10	-.05	-.02
Math performance					
Level 1	.44***	.52***	.56***	.21**	.53***
Level 2	.24***	.24***	.35***	.09†	.13*
Level 3	.14**	.11**	.14*	.04	.07
Level 4 – reference					
School level					
School SES	-.07*	-.01	-.03	.01	-.02
Public	-.04	.01	-.19	.08	-.07
Intercept	-.13	.06	.35	.17	.24*
Number of students	5,020	5,863	2,345	3,116	3,138
Number of schools	341	309	132	195	206

Note: Models estimated by maximum likelihood. † p<0.10; * p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Table 3. Multilevel regression models on perceived **facilitative feedback** in mathematics

	Denmark	Finland	Iceland	Norway	Sweden
	Model 2	Model 2	Model 2	Model 2	Model 2
Student level					
SES					
Level 1	-.12*	-.10*	-.20**	.00	-.14*
Level 2	-.15**	-.07	-.06	-.04	-.12*
Level 3	-.10*	-.04	-.06	.01	-.16**
Level 4 – reference					
Female	-.18***	-.11**	-.24***	-.19***	-.29***
Speaks test language	-.08	-.18**	-.24*	-.11	-.08
Born in test country	-.09	-.13†	.06	-.01	-.06
Math performance					
Level 1	-.19**	-.12*	-.01	-.26***	-.13*
Level 2	-.22***	-.14**	-.01	-.28***	-.15**
Level 3	.08†	-.06†	-.00	-.14**	-.18***
Level 4 – reference					
School level					
School SES	-.04	.01	.00	-.00	.05*
Public	-.22**	-.15	.07	-.57***	-.16*
Intercept	.59***	.58***	.31	.94***	.63***
Number of students	5,020	5,863	2,345	3,116	2,689
Number of schools	341	309	132	195	205

Note: Models estimated by maximum likelihood. Standard error in parentheses. † p<0.10; * p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Table 4. Robustness check

	Denmark		Finland		Iceland		Norway		Sweden	
	Perceived disciplinary climate	Perceived teacher classroom management	Perceived disciplinary climate	Perceived teacher classroom management	Perceived disciplinary climate	Perceived teacher classroom management	Perceived disciplinary climate	Perceived teacher classroom management	Perceived disciplinary climate	Perceived teacher classroom management
Student level										
SES										
Level 1	-.02	-.21	.00	-.12	.05	-.18	.04	.11	.01	-.31*
Level 2	-.01	-.19	-.01	-.03	-.03	-.20	.01	.11	.00	-.28*
Level 3	-.02	-.00	.03	.02	.02	.04	.01	.06	.02	-.06
Level 4 - reference										

Note: Models estimated by maximum likelihood. The variables female, speak test-language, born test-country, mathematics performance, school SES and public are included in all models as controls but are not reported here. † p<0.10; * p<0.05; ** p<0.01; *** p<0.001 (two-tailed tests).

Table A1. Scales test - directive feedback

	Denmark	Finland	Iceland	Norway	Sweden
Cronbach's Alpha	.75	.76	.78	.81	.80
Standardized factor loadings					
("How often do these things happen in your mathematics lessons?")					
D1 <i>The teacher tells me about how well I am doing in my mathematics class.</i>	.70	.79	.77	.79	.75
D2 <i>The teacher asks questions to check whether we have understood what was taught.</i>	.45	.42	.53	.52	.57
D3 <i>The teacher gives me feedback on my strengths and weaknesses in mathematics.</i>	.77	.79	.72	.81	.77
D4 <i>The teacher tells me what I need to do to become better in mathematics.</i>	.73	.72	.74	.76	.75
Model fit indices					
Chi ² (2)	17.23	39.82	72.06	64.56	57.08
RMSEA	.04	.06	.13	.10	.10
CFI	.99	.99	.97	.99	.99
TLI	.99	.98	.92	.95	.96
SRMR	.01	.01	.03	.02	.02

Table A2. Scales test - facilitative feedback

	Denmark	Finland	Iceland	Norway	Sweden
Cronbach's Alpha	.72	.77	.81	.83	.81
Standardized factor loadings					
<i>("Thinking about the mathematics teacher that taught your last mathematics class: How often does each of the following happen?")</i>					
F1 <i>The teacher asks questions that make us reflect on the problem.</i>	.64	.68	.71	.68	.72
F2 <i>The teacher asks us to decide on our own procedures for solving complex problems.</i>	.45	.58	.57	.73	.63
F3 <i>The teacher presents problems in different contexts so that students know whether they have understood the concepts.</i>	.64	.68	.72	.74	.74
F4 <i>The teacher helps us to learn from mistakes we have made.</i>	.69	.69	.73	.75	.70
F5 <i>The teacher asks us to explain how we have solved a problem.</i>	.52	.55	.68	.59	.63
Model fit indices					
Chi ² (5)	28.53	45.58	99.64	52.44	47.06
RMSEA	.03	.04	.09	.06	.05
CFI	.99	.99	.97	.99	.99
TLI	.99	.99	.95	.98	.98
SRMR	.01	.01	.03	.02	.02