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This article aims to try out a framework describing teacher positions based on an analysis of their interactions, and through this, gather ideas for further development of the framework. This article uses shared data from TWG 19, with data from five classrooms. These were analyzed by categorizing interaction from transcripts of the data. The analysis focuses mainly on the interactions related to one position: A teacher that shares and develops student ideas. The findings illustrate how this framework can characterize and contrast these five classrooms.

Keywords: Positioning theory, interactions.

Introduction

In all social settings, including classroom discourse, the participants position themselves and each other based on personal preferences and social interactions. In the classroom context, a teacher typically will position students continually, and this positioning can be seen by the type of questions asked, the types of tasks given, and who the teacher groups together (Harré & Langenhove 1999). This study aims to use the shared data in TWG19 to try out a framework describing five teacher positions: A teacher that knows and tells, a teacher that supports, a teacher that shares and develops student ideas, a teacher that participates, and a teacher that facilitates (Drageset, 2021). The results of this will be used as a base for further developing the framework. We will particularly study the third position with this research question: How can a study of how teachers enacted the third position, *a teacher that shares and develops student ideas*, be used to characterize and contrast different mathematics classrooms?

Theory

It is well established that in a discourse, a turn is thoroughly dependent on previous turns (Linell, 1998). Consequently, it is possible to argue that student interactions are affected by the teacher, and this is particularly true when the teacher speaks every second time as in the Initiation-Response-Evaluation (IRE) pattern. However, there is more to communication than responding to the prior turn. Other factors are in play, such as when a teacher asks a question, students might know what is accepted as an answer and not. This is not only related to the content of the prior turn (the teacher question) but might also be related to established classroom norms. Such norms are described by Yackel and Cobb (1996) as socio-mathematical norms. These are developed over time in all classrooms, whether worked on deliberately or not. Another factor that affects communication is related to positions in the classroom. When joining a social setting, one might have dispositions that guide one's preferences for positions, such as trying to keep silent because of insecurity or a feeling of safety and curiosity in mathematics, making you an active participant. On the social level, such positioning is a reciprocal, sometimes competitive, process where you do not choose a position freely but might be positioned by others' positions or actions, and your positioning affects others (Harré & Langenhove 1999). In the classroom context, a teacher typically will position students continually based on the teacher's beliefs about the competency and personality of the student (Harré &

Langenhove 1999). Also, this positioning of others, being by the teachers or fellow students, might be intentional or not. However, it is not just the teacher that positions students. It is more plausible that positioning is a form of negotiation, such as in socio-mathematic norms. One basic example could be when a teacher presents a rule to be used, and the student wants to know why. This can be seen as the student trying to position the teacher as something other than a teller of methods. Moreover, Drageset (2021), in a study of how explanations are initiated and responded to, has found that teacher interactions are far less dependent on the prior turn than student interactions. This illustrates how teacher typically has other agendas than responding to prior turns, and positioning might be a tool to describe the difference between how teachers and students contribute to classroom talk.

According to both Harré and Langenhove (1999) and Wagner and Herbel-Eisenmann (2010), positioning can be observed through a study of interactions. This means that one way to explore and describe different positions in a classroom is to study what each participant says. A framework that is being developed from a review of literature on classroom discourse in mathematics suggests five broad teacher positions (Drageset, 2021). The first position is a teacher that knows and tells. A teacher that knows and tells takes a position as somebody who knows something and has the authority to decide and evaluate. This position can be further detailed into three ways of telling: telling as initiation (such as teacher as initiator by Lobato et al., 2005), telling what or how to do (such as teacher explanation by Henning et al., 2012), and telling about connections (such as connections by Rowland et al., 2005). The second position is a teacher that supports. A teacher that supports helps students in their work to reach answers and develop their mathematical understanding. Also, this position can be further detailed into three ways of supporting: supporting by reducing the complexity (such as simplification by Drageset, 2014), supporting by assessing (such as confirmation by Henning et al., 2012), and supporting by progressing student thinking (such as probing guidance by Warshauer, 2014). The third position is a teacher that shares and develops student ideas. Such a teacher position focuses on student thinking as the source for discussions and learning. This position is based on a large number of concepts from the literature and can be further detailed into three parts. First, the position is based on the teacher accessing and sharing student thinking (such as eliciting student thinking by Fraivillig et al., 1999). When ideas are accessed and shared, the teacher might point out what is important in different ways (such as clarifying statements by Conner, 2014) or using student thinking as the core of the discourse (such as by encouraging reflection by Cengiz et al., 2011). Such use of student thinking has been described as uptake by Correnti et al. (2015). The fourth position is a teacher that participates. When a teacher participates, the teacher works together with students to find solutions or understand new concepts. This might be done in two ways, either by being a real collaborator in an inquiry where the teacher does not know the answer (such as in a landscape of investigation by Skovsmose, 2001) or by playing a role (such as in teacher in role, by Drageset et al. 2021). The fifth position is a teacher that facilitates. When taking this position, the teacher facilitates the discourse and mathematical work without engaging in the content. This can be further detailed into three ways of teacher facilitating: facilitating by orchestrating the discourse (such as guiding participation and norms by Drageset, 2019), facilitating the development of ideas (such as turn-and-

talk by Kazemi et al., 2014), facilitating a focus on peer thinking (such as requesting evaluation by Conner et al., 2014).

Table 1: Five positions and further detailing (first row) and characterization of each (second row)

A teacher that knows and tells…	A teacher that supports…	A teacher that shares and develops student ideas…	A teacher that participates…	A teacher that facilitates…
… as initiation … what to do … about connections	… by reducing complexity … by assessing … by progressing student thinking	… by accessing and sharing … by pointing out … by using student thinking (uptake)	… as a real collaboration … as a teacher in role	… by orchestrating the discourse … by developing ideas … focus on peer thinking

Some teachers may maintain one position most of the time, while other teachers might change position frequently, deliberately or not. It is also probable that the students sometimes are willing to take positions aligned to the teacher positions, and at other times not. If the teacher takes the position as *a teacher that knows and tells*, this only works if the students align themselves by taking a position of *listeners*. Accordingly, a teacher can only facilitate the discourse without engaging in the content if the students are willing to take positions as active participants by asking questions, explain, evaluate, and argue. This negotiation can also be seen as part of developing classroom norms, where different teacher positions are accepted and aligned student positions are accepted.

Method

This article reports from a study of shared data within TWG19 for the CERME12 conference. Different participants of the thematic working group shared five videos from different classrooms. This is done so that the participants can achieve a deeper understanding of each other's analysis and frameworks when not only the results but also the data is shared. The article is also connected to the SUM project that aims to develop teachers' capacity to teach through inquiry-based learning.

We use a framework describing five teacher positions (Drageset, 2021) to explore characteristics and contrasts between the five classrooms, aiming at trying out and further develop the framework. The analysis is based on a turn-by-turn analysis, categorizing all teacher interactions related to the five positions and their further detailing (see table 1). Then we chose to explore the most frequently used position further (a teacher that shares and develops student ideas). We then used the characterizations from table 1 as categories (access and share, pointing out, using student thinking) and categorized all teacher interactions in this position. We discovered a need for a new category through the data analysis, which we named *requesting mere answers*.

The data from each classroom is too limited to say much about the classrooms. However, this type of data from different classrooms is valuable because one can try out how a framework might be useful to characterize different practices and use this for further development of the framework. This result

also illustrates different ways teacher positions themselves during mathematical classroom discourse, which may be a foundation for conducting larger studies.

Findings

Table 2: Overview of the frequency of positions taken in each classroom (empty means zero)

	Classroom 1 Drageset 1 (King's birthday)	Classroom 2 Drageset 2 (whiteboards)	Classroom 3 Hoover	Classroom 4 Sakonidis	Classroom 5 Santos
A teacher that knows and tells	7 (16%)	27 (31%)		11 (34%)	21 (22%)
A teacher that supports	10 (22%)	9 (10%)			
A teacher that shares and develops student ideas	17 (38%)	42 (47%)	2 (15%)	18 (56%)	62 (67%)
A teacher that participates					
A teacher that facilitates	11 (24%)	11 (13%)	11 (85%)	3 (9%)	10 (11%)

When looking at table 2, we can see a considerable difference between the classrooms. However, the data from the classrooms vary in length and type of interaction to such a degree that it is not possible to use table 2 as a basis for comparison. But as Table 2 illustrates, the most frequent teacher position in these five classrooms is to *share and develop student ideas*. Since this position is most frequent in total and in four of the five classrooms, we will look more into how the interactions of this position look like and what these can tell us about classroom characteristics.

According to Drageset (2021), the teacher position of *share and develop student ideas* can be characterized by three types of teacher interactions: access and share, pointing out, and using student thinking (uptake). During the analysis, we discovered that these could not characterize all teacher interactions, and therefore, we added a new type: requesting mere answers. With these four types, we were able to categorize all teacher interactions related to this position.

Table 3: Frequency of each type of interaction within the teacher position of *sharing and developing student ideas* (empty means zero)

	Classroom 1 Drageset 1 (King's birthday)	Classroom 2 Drageset 2 (whiteboards)	Classroom 3 Hoover	Classroom 4 Sakonidis	Classroom 5 Santos
Access and share	7 (16%)	28 (31%)	2 (15%)	3 (9%)	12 (13%)
Pointing out	7 (16%)	8 (9%)			1 (11%)

Requesting mere answers		5 (6%)		14 (44%)	40 (43%)
Using student thinking (uptake)	3 (6%)	1 (1%)		1 (3%)	

As seen in Table 3, the first type of interaction, *access and share*, is the only interaction found in all the classrooms. Drageset's second classroom (whiteboards) is the classroom that uses this interaction most frequently, while the data from Hoover's classroom only have two interactions related to this position. Otherwise, we see a common pattern in these classrooms. To access student ideas, they all ask how, what, and why. Examples include "*How did you think?*", *"What do you mean?"* or simply "*why?"*. Typically, when asking what and how the teachers request a chronological explanation of how an answer was reached or what to do to reach an answer. When asking why, they request a reason or argument for why one should use this method or why an answer should be seen as correct. These three types of questions (how, what, why) are about what Fraivillig (1999) labels eliciting student thinking. When doing this in plenary talk, it is also about sharing student ideas with their peers. This can be seen as the foundation of the position of sharing and developing student ideas, as accessing is about sharing, and sharing is needed to develop the student ideas further, particularly to include other students in the development of the ideas.

The second type, *pointing out*, was found in three of the five classrooms. There was little difference in the frequency of the use between the classrooms, but we found two quite different ways of pointing out. Most frequently, the teachers used this position to revoice parts or all of what the students had said. There were two different applications of revoicing, either simply revoicing the student's point or revoicing while adding additional information. One example of simply revoicing is, "*Okay. So you used the fact that you know twenty present is one-fifth.".* The other way of pointing out was when the teachers summarized students' explanations. We saw this most frequently in Drageset's first classroom (King's birthday), where the teacher frequently gave a thorough summary of how a student had solved a given task, based on the student's explanation. One of these summaries is this one:

> Teacher: First, she wanted to go to the year 2000 first, and then go from 2000 to the year the King was born. Right? So you started with 80 minus 17, and got 63. She removed 17 from 80. Then you got 63. Then she wanted to find what 2000, from here, and jumping 63 years backward from the year 2000. That's how she thought. So you tried to do 2000 minus 63, but this is a really difficult equation, to do it like this. Because... You haven't really learned this, with such large numbers. Did you manage to finish it, too?

This way of pointing out still focuses on the student's ideas, but the teacher takes an active role in repeating and emphasizing the student's solution, possibly also modeling how to explain.

The third type, *requesting mere answers*, is the most used interaction in this position, but we only found it in three of the five classrooms. There are mainly three ways the teachers requested mere answers. One way whereby asking yes and no questions, such as *"Did you agree that this was the best way?"*. Often we recognized these types by how the students answered the given question. As we mentioned earlier, the student's response to the teacher's questions seems to be based on what their experience tells them is an acceptable answer for that type of question, in what looks to be an

example of socio-mathematical norms (Yackel & Cobb, 1996). An interesting variant of these yes and no questions were questions that, in reality, were yes-questions (the correct answer was obviously yes) and no-questions (the correct answer was obviously no). A second way of requesting mere answers was by requesting answers to tasks, where the answers typically were a number, such as *"and here, how many do I need for a whole pizza?".* A third way of requesting mere answers was to ask for the meaning, such as *"What did percentage mean then Ole?",* which we only saw in Drageset's second classroom (whiteboard). Since we only saw this at the beginning of the lesson, it seemed that the teacher wanted to get the students thinking about the subject they were going to focus on in that lesson.

The fourth type, *using student thinking (uptake)*, was not observed in these classrooms. However, in Hoover's classroom, the teacher did use student thinking in a comparable way but without interfering in the mathematical content. Consequently, these interactions were seen as part of the position called *a teacher that facilitates* and the code *focus on peer thinking*.

Discussion and conclusion

This part will discuss what the findings related to the position of *sharing and developing student ideas* mean for each classroom and use this to characterize and contrast the classrooms. According to Harré and Langenhove (1999), teachers position students continually, so we will also comment on how the teachers' choice of positions might position the students.

Classroom 1: Drageset 1 (King's birthday)

In this classroom, we see that 38% of the teacher's interactions belong to the position of *sharing and developing student ideas*, primarily by *accessing and sharing*, and *pointing out*. This teacher was the one with the most thorough summaries of student's solutions when pointing out. This shows a teacher focused on getting access to and sharing the students' ideas and then gathering any loose ends into a coherent whole. This can position the students as owners of ideas while the teacher maintains the authority to define and model the solutions.

Classroom 2: Drageset 2 (Whiteboard)

In this classroom, 47% of the teacher's interactions belong to the position of *sharing and developing student ideas*, primarily be *accessing and sharing*, where the teacher's goal seems to be to share several different student ideas and methods. This teacher rarely summarizes the student's ideas but instead lets the students' answers stand on their own. This means that the students also here are positioned as owners of ideas, but without the teacher using the authority to point out a more precise or correct solution.

Classroom 3: Hoover

In this classroom, the teacher mainly takes the position of *facilitating*, but only twice the position of *sharing and developing* (see table 2), which is not enough to analyze related to the latter position.

Classroom 4: Sakonidis

56% of this teacher's interactions belong to the position of *sharing and developing student ideas*, primarily by *requesting mere answers* and occasionally *accessing and sharing*. This means that the

teacher focuses on sharing answers and quite rarely on sharing solutions. This teacher positions students as task solvers and the teacher continually uses the authority to confirm or reject the answers.

Classroom 5: Santos

In this classroom, 67% of the teacher's interactions belong to the position of *sharing and developing student ideas*, primarily by *requesting mere answers*. However, this teacher also uses *access and share* as well as *pointing out* to a certain extent. This means that the teacher positions the students as task solvers and occasionally as the owner of ideas. At the same time, the teacher continually uses the authority to confirm and reject answers.

Conclusion

As illustrated above, the teacher position of *sharing and developing student ideas* is the most frequent one in this data set. However, while four of the five teaches use this position frequently, there are clear differences. One is most focused on sharing student solution methods and let them be the end product. Another is also focused on sharing solution methods but also refine them through long summaries. Furthermore, two others seem most focused on sharing answers and using their authority to confirm or reject them. This work illustrated how a study of the position of a teac*her that shares and develops student ideas* can be used to characterize and contrast different classroom practices, which indicates that this framework might be used for studies of larger datasets. This work has also revealed that the three original types of teacher interactions suggested by Drageset (2021) were not sufficient to characterize all teacher interactions related to the position of a teac*her that shares and develops student ideas*. By adding one new type, requesting mere answers, we were able to categorize all teacher interactions related to this position.

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