Teachers' enactment of policy in classrooms: making students accountable through inscriptions from the curriculum in classroom interactions

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Abstract

The purpose of this paper is to examine the complex relationships between educational policy and classroom practice. By employing a sociocultural perspective, we examine formulations inscribed in socio-material artifacts about what students should learn and how they should engage with knowledge. We explore how these formulations are mobilized in instructional work and the implications this activity has for student participation. To address this issue, we analyzed video data of how teachers invoke competence aims from the national curriculum in their instructional work in six classrooms. The analytical procedures were derived from interaction analysis. The analysis focuses on how such formulations explicitly mediate social interaction as it unfolds on a micro level. The findings show that competence aims gain different functions as they are mobilized in classroom practice; in other words, they serve different purposes in teachers' instructional work and anticipate different modes of student participation. In this study, the competence aims were (a) invoked as a source of authority, (b) translated into instructions, and (c) mobilized to obtain social order in the classroom. More rarely, the competence aims were used in meta-level discussions, where they functioned to reach agreements on how to pursue work toward joint goals. We discuss the implications of these ways of invoking competence aims for student participation.

Keywords Policy · Classroom interaction · Epistemological messages · Sociocultural · Inscriptions · Accountability

Introduction

The purpose of this paper is to examine the complex relationships between educational policy and classroom practice. By employing a sociocultural perspective, we examine how teachers mobilize particular formulations inscribed in socio-material artifacts about what students should learn and how they should engage with knowledge through

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their instructional work. By analyzing how such formulations (e.g., competence aims) are invoked through teachers' instructions and how they function as explicit mediational means (Wertsch, 1998a) as classroom interactions unfold, we aim to explore the implications of such explicit forms of mediation for student participation.

From a sociocultural perspective, learning contexts in schools are configured by material, social, and institutional conditions that shape students' and teachers' trajectories of participation in activities (Furberg & Silseth, 2022; Kozulin, 2004; Newman et al., 1989; Säljö, 2010). Studies of classrooms and instructional work have shown the significance of student–teacher interactions for student participation and engagement (Engle & Conant, 2002; Kozulin, 2004; Mehan, 1979b; van de Sande & Greeno, 2012; Wortham, 2004). However, less research has detailed how teachers' explicit orientations to policy mediate student participation in student–teacher interactions. In such interactions, teachers invoke formulations of what students are supposed to learn and what competences they are supposed to develop (Berland et al., 2016; Russ, 2018). Examining how teachers make policy documents relevant by orienting students to explicit formulations is important and valuable because such cultural tools are intended to frame and shape activities in the classroom. However, just *how* they are invoked, in what situations and to what pragmatic end, is an empirical question yet to be scrutinized.

To address this issue, we employ the concepts of *inscription* (Forman & Ansell, 2002; Roth & McGinn, 1998) and *accountability* (Mäkitalo, 2003; Gresalfi et al., 2009) to analyze how educational policy is mobilized as socio-material artifacts in classroom activities. We draw on video data of instructional work carried out over one academic year in three secondary schools. When analyzing the data, we focused on how teachers explicitly invoked *competence aims* (i.e., formulations of what students should learn found in the national curriculum) in their interactions with students during lessons. We aim to shed light on the following research questions:

- How do teachers and students make sense of competence aims when they are invoked in instructional work?
- What are the implications of the invocation of competence aims for student participation?

The present article is structured in the following way. First, we present existing research on the relationship between student–teacher interactions and student participation. Second, we present our analytical framework, discussing the concepts of accountability, inscriptions and competence aims, which will guide the analytical work. Then, we outline the methods and describe the research setting and data. In the results section, we provide a detailed analysis of the interactional work carried out when teachers invoked competence aims during lessons. Finally, we discuss our findings in relation to existing research and provide some concluding remarks.

Student participation and epistemological messages

Educational research has shown that the characteristics of student–teacher interactions are consequential for student participation and how students engage with subject matter in school (Baucal et al., 2013; Howe et al., 2019; Kovalainen & Kumpulainen, 2007; Mehan, 1979a). Of importance is how teachers frame talk and interactions as well as how such framings shape students' contributions and participation during lessons (Berland et al., 2020; Engle, 2006;

Furberg, 2016). Researchers have demonstrated that the way teachers introduce a topic, follow up on students' responses, formulate questions, and invite further discussion are consequential for student participation and how they are positioned as learners in the classroom setting (Clarke et al., 2016; Enyedy & Goldberg, 2004; Rajala et al., 2016; Wortham, 2004). Teachers can support student participation through elicitation, contextualization, and revoicing (Silseth, 2018; Forman & Ansell, 2002; Mercer, 1995) and elevate engagement by acknowledging students' contributions, enabling them to share and build on each other's ideas and perspectives (Clarà, 2019; Jaber et al., 2021; Michaels et al., 2008; Rødnes et al., 2021).

This line of research has generated important insights into the dynamics of student–teacher interactions and how they shape student participation during lessons. However, less research has investigated at a fine-grained level how teachers and students make meaning of policy tools in student–teacher interactions. Gaining more detailed knowledge about this phenomenon will contribute to our insights into how such cultural tools contribute to framing and shaping activities in the classroom, with consequences for student participation. The curriculum, either nationally or locally produced, informs teachers' planning and execution of instructional work, which shapes the daily life of students in classrooms (César & Oliveira, 2005; Duncan & Hmelo-Silver, 2009). For instance, Rajala et al. (2016) showed that teachers might orient students to policy tools, curricular demands, and curriculum designers during student–teacher interactions, and that such orientations might hinder active and supportive participation from students. Although the curriculum provides teachers with directions and orientations for planning and carrying out instructional work, teachers and students also negotiate and make sense of the curriculum in situ in classrooms and during lessons (Enyedy & Goldberg, 2004), which means that lessons also unfold in ways that are not scripted by curriculum designers.

Recent research within the learning sciences has emphasized that teachers communicate what they believe are preferable ways of participating and engaging with knowledge to students (Berland et al., 2016; Manz, 2015; Russ, 2018; Stroupe, 2014). According to Russ (2018), it is important to examine the "messages teachers send students about the nature of learning in the classroom" (p. 95) to understand student participation. During instructional work in classrooms, teachers sometimes orient students to *epistemological messages*, which are "messages about what constitutes knowledge or learning in the immediate moment" (p. 99). Through different interactional moves, teachers convey messages to students about what types of participation are favorable and what types of knowledge they should engage with and construct in different assignments. An important aspect of such epistemological messages is that students can appropriate them in future participation. Hence, these messages may shape student learning; however, how students respond to and make sense of such messages is an empirical question. Taking Russ's (2018) argument into account, it is important to examine what happens as epistemological messages from the curricula are enacted and used to attune students to favorable ways of participating.

Accountability, inscriptions, and competence aims

From a sociocultural perspective, participants' construction of meaning is viewed as an interactional accomplishment (Säljö, 2010; Wertsch, 1998b). By conceptualizing people's actions as inherently social and mediated by material-semiotic cultural artifacts, such as inscriptions, the sociocultural perspective shifts the locus of investigation away from individual and cognitive achievements to view learning as situated in activities and social practices (Mäkitalo, 2016; Greeno & Gresalfi, 2008; Zittoun, 2017). As such, how students and teachers make

sense of inscriptions that are introduced in the setting cannot be understood or analyzed outside the social context where they are enacted.

Furthermore, particular settings and practices, such as classrooms, feature certain expectations of how to participate. People are made *accountable* for their actions in particular ways (Mäkitalo, 2003; Shotter, 1984). In the context of classrooms, Gresalfi et al. (2009) distinguished between "being accountable for" and "being accountable to." These two layers of student accountability in school are interrelated, but refer to somewhat different orientations in the teacher's instructional work. "Being accountable for" refers to what competences students are expected to develop and display. For example, science involves methods and concepts that students are supposed to know and use competently. "Being accountable to" highlights to whom the students are accountable. For example, science activities might be *designed* in ways in which students are expected to produce claims and evidence in line with relevant criteria in the subject domain (epistemic accountability), while students in situ may display an orientation geared more toward socially accountable forms of participation (such as gendered participation in school science activities). In this paper, we employ the notion of accountability to examine how teachers make students accountable for participating in certain ways during classroom activities by explicitly orienting them to policy formulations during student–teacher interactions.

The concept of *inscription* enables us to clarify how knowledge, values, and interests materialize in artifacts through formulations that can travel across time and local settings and be mobilized to accomplish a variety of things in particular situations (Silseth & Arnseth, 2011; Forman & Ansell, 2002). Many of the existing studies of inscriptions in classrooms have occurred within the context of science and mathematics education (Cobb, 2002; Forman & Ansell, 2002; Medina & Suthers, 2013; White, 2019). In these studies, the inscriptions are typically graphs, tables, equations, diagrams, and images, which are analyzed as tools for supporting inquiry and argumentation. In this article, we introduce a slightly different use of the concept for analyzing the relationship between policy and practice in the classroom. We conceptualize *competence aims* in the national curriculum as inscriptions that can accordingly be viewed as vehicles of epistemological messages. Competence aims are formulated standards for what students should learn according to in the national curriculum, which teachers must follow in their planning and execution of teaching (Prøitz & Nordin, 2020). Teachers' introduction of competence aims during class is, for this reason, an explicit example of how policy formulations travel to the classroom; as a result, it is relevant to study practices in the classroom where these formulations are enacted.

As material artifacts, inscriptions can travel between people, contexts, and situations and do not change during transport. In our case, they are also public and directly available. Roth and McGinn (1998) emphasized that "an inscription does not have meaning in and of itself; rather, its meaning arises in the context of other inscriptions and sign forms (e.g., language)" (p. 38).

We argue that competence aims are inscribed with ideas and perspectives on knowledge and the student role—what students should learn about in different disciplinary domains. However, these formulations and the epistemological messages that teachers orient students to are situated in the context of classroom practice. We will now turn to such contexts in terms of how our empirical study was conducted and the methodology adopted.

Methodology

This study is part of the project *Tracing Learning Outcomes Across Policy and Practice*. From the outset of this project, we aimed to shed light on how educational policy was enacted in school practice in naturalistic settings. We have employed interaction analysis as

a broad methodological framework for investigating how students and teachers interacted with each other and objects in their environment (Jordan & Henderson, 1995). A founding idea for interaction analysis is that learning environments are co-constructed and socially activated in situ through the use of physical, social, and cognitive artifacts. As such, a key interest is how artifacts support or constrain particular forms of participation. This broad methodological framework guided the way we approached the enactment of policy and defined our unit of analysis.

We recruited three lower secondary schools in different parts of Norway to participate in the project. For the first 6-month period, we conducted participatory observation at these three schools in a range of settings, such as teacher team meetings, classroom lessons, and parent meetings, before identifying two subjects and six classes to follow more closely through video observation. In the following academic year, we observed specific teachers and classes in parts of their daily work in the subjects of science and Norwegian. A focal point of our investigation was the joint meaning making between students and their teachers when establishing goals and direction for their learning activities. Using video data allowed us to study meaning making, instruction, and learning reliably as they unfolded during classroom activities (Derry et al., 2010; Erickson, 2011). Thus, video data enabled us to examine how competence aims were oriented and responded to by teachers and students in situ. In contrast to data generated by different versions of self-reporting, such as questionnaires and interviews, video data enables us to study how meanings are negotiated and jointly created moment-by-moment through social interaction (Peräkylä, 2004; Sacks, 1984). We argue that zooming in on meaning making and orientation toward policy matters in students' and teachers' everyday lives in classrooms enables us a finer-grained perspective on how policy plays out in the local practice of classroom instruction in educational institutions.

Research setting

All three participating institutions were public schools that recruited students from the local community. The teachers were experienced in their subject domain, and the students were in grades 9 and 10 (13–16 years old). In Norway, both public and private schools are obligated to implement the national curriculum. The curriculum contains specific competence aims that students are expected to reach at certain levels of their education. Such competence aims have been part of the curriculum for the last 15 years, and teachers are encouraged to be in dialogue with students to determine how to reach these aims. As such, showing and orienting students explicitly to competence aims can be recognized as a state strategy involving students in reaching institutional aims. Nonetheless, we know little about how students and teachers interact and make sense of such competence aims in situ.

We chose three schools with rather different characteristics to participate in the project. Situated in a relatively large city, School North was less than 10 years old and could be characterized as an innovative school in terms of physical and pedagogical organization. For example, they did not have traditional classes but "work teams" of 15 students that were more flexible. School East was situated in a small suburban town with more traditional architecture and class organization. School West was also located in a middle-sized town. It promoted a progressive pedagogy that focused on formative assessment and placed less emphasis on testing and grading than did many other Norwegian schools. The process of selecting these three schools was not guided by a goal of reaching representativeness, but by an aim to explore a variety of local practices in-depth.

Participants and data

We followed two classes at each of the three schools in the project. Thus, six different classes are represented in the material. Classes varied in size, from 15 to 25 students. While several teachers and teacher assistants appeared in the material, each school had two to four teachers bearing the main responsibility for teaching science and Norwegian who were followed over time. In all lessons, a researcher was present to monitor the video camera. To obtain high-quality data, we used a video camera with two microphones. One table microphone was placed at the back of the classroom, and one wireless microphone was placed on the teacher. This strategy enabled us to capture both whole-class interactions and teacher–student interactions when the teachers were making rounds among students. The overall video corpus comprised 107 h of classroom activity. Rather than filming all lessons in the two subjects, we sought to capture trajectories in which students worked on the same topic over time. The material includes a range of activities, such as traditional lectures, whole-class discussions, and group work.

Analytical procedures

The analytical procedures were derived from methods of analyzing social interaction turn-by-turn (Enyedy & Stevens, 2014; Knoblauch & Schnettler, 2012; Linell, 2009). The process of coding and analyzing the video data was twofold. First, all video data were thematically coded using NVivo software. This step provided an overview and allowed us to organize the video material. Four researchers created the codes in collaboration and shared the coding between them. The coding allowed us to map subjects, schools, activities, and content in the data corpus.

During the analysis of video data, we coded instances in which teachers explicitly oriented toward competence aims in their encounters with their students during lessons. The selection criterion was that the teacher would verbally mention the competence aims during instructional work when the students were present in the classroom. We identified 27 sequences in which the teachers explicitly referred to competence aims in their encounters with students. Second, after coding all of these instances of teachers' referring to competence aims, we transcribed all interactional sequences in which they appeared. When transcribing the excerpts, we used a modified version of Jefferson's (2004) transcription conventions (see Appendix). We then analyzed these sequences according to analytical principles from interaction analysis (Hall & Stevens, 2015; Jordan & Henderson, 1995). For this approach, the analytical interest is to carefully examine how interlocutors are sensitive and attuned to each other's utterances and, together, co-construct meaning and knowledge in the activities in which they are engaged. Furthermore, we looked for patterns in how the teachers interactionally oriented to the competence aims during instructional work. This procedure enabled us to undertake a moment-by-moment analysis of what characterized teachers' and students' joint meaning making when competence aims were invoked as part of instructional sequences. Some of these sequences were quite short, such as when the teachers referred to competence aims only during teacher monologues. Other sequences were lengthier, in which competence aims became part of meaning making activities that extended to several minutes. The following analysis displays five excerpts of interactions between teachers and students. Through this

analysis, we aim to show the complexity and diversity in the use of competence aims. We do not provide an empirical account that emphasizes regularity or frequency, and we cannot make claims about what usually happens in classrooms. However, we shed light on teachers' practices of involving students in curriculum competence aims, as well as on how this practice might serve several purposes. In the following analysis, we show selected episodes that display a variety of ways in which competence aims were invoked in instructional work.

Results: teachers' enactment of policy in classrooms

In the following, we elaborate on five examples that emerged through a detailed analysis of the teachers' instructional work, demonstrating how they made students accountable by orienting them to particular competence aims. These orientations had implications for how students were positioned as learners. The objective for this close analysis of student–teacher interaction is to explore the complexity and variety of ways in which the teachers mobilized the competence aims. First, in some instances, the competence aims were established as a main source of authority. In these instances, the students were made accountable for developing certain competences without any uptake by the students. Second, in other instances, competence aims were translated into instructions, where students were made accountable for solving assignments in certain ways. Third, we also observed instances in which the teacher mobilized competence aims to obtain social order among students during instructional work. Fourth, students were sometimes made accountable for articulating their understanding of competence aims. In these instances, the teacher invited the students to engage in meta-level discussions regarding what the competence aims mean and how they should interpret them and make them relevant to their own work. Finally, we identified a few instances in which teachers positioned the students and themselves as accountable for reaching an agreement for how to pursue work toward a joint goal. In the following, we provide examples from our analysis of interactions between teachers and students that demonstrate these ways of making students accountable through mobilizing inscriptions from the curriculum.

Establishing competence aims as a main source of authority

The teachers sometimes referred to the competence aims without any verbal uptake by the students. This was observed in instances where the teachers explicitly invoked the competence aims to explain what was expected of the students in an assignment. In Excerpt 1, the class is preparing to begin working on a new assignment in which the students will produce in-depth studies of different authors of literature. The students have just received a sheet with an explanation of the assignment, and the teacher orients them to the relevant inscriptions formulated in the national curriculum called the Knowledge Promotion.

```
1   Teacher: if you look at the top of this sheet (1.2) it says (0.2) um:
2            it is um: taken from the Knowledge Promotion (1.0) um: (2.5)
3            and in the Knowledge Promotion it says something about
4            what is expected of you and or what competence that is
5            expected that you develop (1.5) during the:: (0.5) when you
6            finish tenth grade (1.0) and there it says "the student is
7            supposed to present the result of in-depth studies of two
8            (0.8) self-chosen topics (0.4) one authorship (0.5) and one
9            literary topic or linguistic topic (0.4) and account for the
10           choice (0.7) um: of texts and topic" (0.7) and now it is a
11           literary topic (0.9) that we will immerse ourselves in (0.7)
12           not authorship (1.5) but a literary topic (2.8) and then um um
13           it says that the assignment is (0.7) "find a literary topic
14           that you wish to immersive yourself in (0.8) it may be
15           Norwegian literature (0.6) but that is not a requirement (0.6)
16           it may be literature that is um: known (0.5) so that it
17           might be easier to find some material (1.0) below a list of
18           names of authors and literary topics that might be relevant is
19           displayed"
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Excerpt 1. Establishing competence aims as a main source of authority

In this excerpt, the teacher first orients the students to the formulation printed on the sheets that were passed out in class and establishes a normative context for the activity by specifying a direct relation to the national curriculum (Knowledge Promotion). In lines 3–6, the teacher emphasizes that the aims describe the competences that the students are expected to gain when they have completed lower secondary school (grade 10). The teacher then reads a particular aim that the students will be working with in this assignment, thereby signaling that this competence aim is important (lines 6–10). Accordingly, the curricular context is first "read into" and then made explicitly relevant to the "here and now." After explaining the competence aim, the teacher reads aloud the concrete task that the students are given. Here, the competence aims are woven together with the upcoming assignment (lines 13–19).

Through this way of introducing and anchoring aims and tasks to the curriculum, the teacher invoked the competence aims as non-negotiable and formulated by voices of authority. This may be why none of the students questioned or commented on the teacher's presentation of this competence aim. "The student" was introduced as a category talked about and displayed as responsible for achieving the competences formulated. Although the teacher's use of competence aims can be viewed as a transfer of authority from the teacher to the curriculum, the analysis also showed how the teacher maintained authority by selecting and interpreting the aims. In this sequence, only the teacher referred to competence aims, and they did not become part of negotiations with his students. By mobilizing this inscription and voicing formulations of authority, the students were positioned as accountable for politically formulated aims.

Translating competence aims into instructions

In other sequences, the competence aims became part of conversations with students about the activities in which they were engaged. In some sequences, the students were made accountable for participating in and solving assignments in certain ways. In the next

excerpt, we zoom in on a science class, where the students are engaged in project work consisting of making an online newspaper for which they are expected to work on different tasks. The students received a sheet describing the assignment. The teacher holds this sheet in her hand during the conversation, and it becomes clear that some of the students have been working on tasks that are not aligned with the teacher's expectations.

```
1    Teacher:   regarding the assignment about statistics (0.5) we discovered
2               that there had been some misunderstandings yesterday (0.8)
3               um: because here (0.5) in all the other assignments
4               you have been told that this is a bank of ideas ((holds the
5               sheet up in the air)) (0.6) and you can find other more (0.6)
6               tempting assignments yourselves (0.6) but when it comes to
7               the assignment about statistics (0.9) you have to choose one
8               of these topics ((points to a specific part in the sheet))
9               (0.6) I know that some groups already have done something
10              else (0.6) and that is not wrong (0.5) but then you have to
11              do that in addition (1.4) okay (0.4) ((Hugo raises his
12              hand)) so choose one of the four that are listed here (1.5)
13              and the reason for that (0.5) is that it's directly linked to
14              some of the competence aims in school science ((Hugo puts
15              down his arm)) (0.5) so if you do not answer this (0.3) then
16              you haven't been working with that specific competence aim
17              Hugo (1.0) and then you have to do it another day (1.3) so we
18              try to squeeze in um: as much as possible into (0.4) this
19              webpage (1.1) so then you choose one of them.
20   Liam:      but why can't we just (0.2) take one or choose one ourselves
21              (0.2) one that you find yourself?
22   Teacher:   no because if you choose to do an inquiry about (0.8) peer
23              pressure to wear the right clothes (0.7) for example (0.6)
24              then it doesn't have anything to do with competence aims in
25              school science,
26   Liam:      what does safety belts in a bus have to do with Science?
27   Teacher:   um one of the comp I can show you the competence aims
28              afterwards if you like (0.6) but it is about what we work on
29              now it is about forces and physics in science (0.9) and um::
30              one of the competences are about being aware of what (0.5)
31              um: safety equipment do that can moderate (0.6) um::: (0.5)
32              um::: injuries (0.6) for example in the head (0.9) if you are
33              in an accident (0.6) because that has to do with physics
34              (0.9) with external influences forces and the like (0.8) ok
35              (2.0) so this is like an alternative to read something in
36              Tellus ((a textbook in science)) and that we spend time on
37              this (0.8) this is what we think (0.5) that you need to focus
38              on that in this assignment.
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Excerpt 2. Competence aims translated into instructions

The excerpt begins with the teacher explaining that some of the students have misunderstood the assignment (lines 1–2). In previous assignments, the students were given the opportunity to choose which topic to work on (lines 3–6), but in this particular assignment, they have to select one of the topics described in the worksheet, which the teacher has designed for them (lines 6–8). This requirement clearly raises some questions for the students, as evidenced by Hugo raising his hand in line 11. Instead of

allowing questions, the teacher accounts for this way of designing the assignment by explaining that "it's directly linked to some of the competence aims in science" (lines 13–14). The teacher emphasizes that completing this specific task is essential to achieving these specific competence aims (lines 15–16). Although Hugo has already lowered his hand, she directs this clarification to him in particular. In response to the teacher's account, Liam interjects, without raising his hand, and questions this particular task in the assignment. In her response, the teacher defends the assignment's design by again invoking the competence aims in the subject of school science (lines 22–25). Here, she introduces the example of peer pressure as an imaginary case that has little to do with school science. By introducing this example, she tries to show that not all cases are relevant for addressing the competence aims in school science and that the cases that the teacher has created are designed to target these aims. When Liam then questions the science relevance of working with safety belts, which is a possible topic described on the sheet, the teacher gives an account of why this is relevant for this particular subject. She also defends the relevance of the task by referring to competence aims other than the ones printed on the sheets. In lines 35–38, she states that this assignment is an alternative to reading the textbook before saying that "this is what we think you need to focus on."

In this sequence, the teacher used competence aims to position students as accountable for participating in the assignments in certain ways; however, the students questioned the teacher's instructions, leading to tensions between student agency and the competence aims in the curriculum. The teacher acknowledged the work that the students had done, but because it was not directly linked to the competence aim that the project work was meant to cover, she explained that they needed to re-orient and redo their work. The episode demonstrates that competence aims are inscribed with epistemological messages that teachers can mobilize in flexible ways to argue that students need to develop certain skills and work in certain ways.

Mobilizing competence aims to obtain social order

Sometimes, the teachers oriented to competence aims to obtain attention and focus during lessons with formulated norms and regulations that the students had to follow to succeed as competent students. In Excerpt 3, a class is engaged in a whole-class conversation inquiring about the topic of genetic variation, and the teacher has put up a slide on the whiteboard with a model that illustrates genetic variation and heritage. The students are becoming restless, and their concentration is decreasing. The students are engaged in off-topic talk and cut off the teacher—something that causes frustration.

```
1   Teacher:   what you need to know (0.4) is (0.5) in the genetic material
2              all the chromosomes are copying themselves John ((John and
3              his peers are engaged in off-topic talk)) (2.3) for heaven's
4              sake (4.9) you will get this on the test next time (0.1) we
5              move on (1.0) ((the teacher puts up the competence aims on
6              the whiteboard)) ok (1.2) we look at the aim first then
7              maybe we can obtain some focus (0.5) this is the aim that I
8              will test you on okay we look at that first (0.8) "give an
9              account of cell division and of genetic variation and
10             heritage" ((reads from the screen)) (0.9) what does it mean
11             to give an account of?
12  Anders:    be able to explain,
13             (3.1)
14  Teacher:   "m[ention",
15  Henry:       ["it implies mentioning defining and description of
16               knowledge with own words that display that the students
17               have an understanding of the matter", ((reads from the
18               screen))
18             ((laughter among the students))
19  Teacher:   yes that was the formal (0.3) that was the formal (0.4) tell
20             about something in a thorough way (0.4) you must-
21  Per:       -express the facts, ((chuckles))
22  Teacher:   express the facts (0.4) use scientific terms (0.3) use
23             examples (0.2) display that you know it that you understand
24             it (0.7) so (0.3) if we return to this ((the teacher goes
25             back to the prior slide about cell division)) (1.9) then you
26             must (0.7) be able to (2.9) give an account of (0.7) cell
27             division (1.1) and if you are going to be able to give an
28             account of cell division (0.4) it is not enough to say (0.3)
29             that it is called mitosis (0.4) and it happens because of
30             growth (0.5) you must be able to (0.6) use scientific
31             terms and elaborate on what happens (0.3) use the word (0.3)
32             chromosome (1.6) tell that it's (1.1) copying itself
33             ((Anne raises her hand)) (2.2) and then they are extracted
34             (0.5) to two (0.7) totally identical and then two new totally
35             identical cells are formed (1.1) this is daughter cell the
36             first one is called mother cell (1.1) Anne,
37  Anne:      um:: are we going to have a test about this,
38  Teacher:   yes (0.4) the week after the autumn holiday.
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Excerpt 3. Using competence aims to obtain order

As illustrated in lines 1–2, the teacher orients the students to some of the relevant content knowledge that they need to know about genetics. When John and some of his peers engage in off-topic talk, the teacher displays discontent with the situation (line 3). After a lengthy pause (4.9 s), she mentions an upcoming test and explains that the topics they are addressing will be relevant. As she introduces the competence aims, she displays them on the whiteboard, emphasizing that the students will be evaluated according to these aims (lines 7–8). In line 10, the teacher requests that the students provide an explanation of what it means to "give an account of," which she argues is an important starting point in their work on genetics. Anders responds with a short account, which the teacher acknowledges by moving on to the next part of the competence aim: "mention" (line 14). In his response, Henry begins to read the explanation that is already provided by the national guidelines displayed on the

whiteboard. We can sense the humoristic undertones of this utterance, which might reveal how some students interpret it as an activity with obvious expectations and outcomes. In her response, the teacher tries to reframe the activity by elaborating on what the students must be able to do to achieve the competence and to do well on the upcoming test: "express the facts," "use scientific terms," and "use examples." During the teacher's explanation, Anne raises her hand (line 33) and asks if they are going to have a test about this topic (line 37), which the teacher confirms with emphasis.

In this sequence, the teacher used the competence aims to reestablish order in the class and to maintain the students' attention. We may assume that the teacher found the situation in which the students were unfocused and engaged in off-task activities to be challenging. She addressed this challenge by mobilizing the competence aims and an upcoming test. As part of this strategy, the teacher made students accountable for explaining the competence aims and what was expected of them. As such, the goal of the activity was not to engage students in a discussion about what the competence aims meant; rather, it was an activity that enabled the teacher to work toward joint attention. The students' ironic stances toward the teacher's strategy were not explicitly sanctioned. Instead, the teacher continued to elaborate on what was expected of the students and what roles they should assume as learners. Hence, the formulations inscribed in the curriculum were elaborated as epistemological messages, such as what it means to know something and how one displays this knowledge and competence in the domain of genetics. The competence aims were used to orient the students to proper ways of participating during the lesson.

Making students accountable for articulating their understanding of competence aims

We also observed sequences in which the teachers more explicitly engaged their students in discussions about the competence aims. In some sequences, the students were made accountable for articulating their understanding of particular formulations. Excerpt 4 is from an episode in which the teacher orchestrates a conversation about the competence aims in chemistry during the semester. The teacher displays the competence aims, which were retrieved from the national authority's webpages, on the whiteboard in front of the class and engages students in a conversation about the different verbs found in the aims.

```
 1  Teacher: so d:: the chemistry topic will be quite large this spring
 2           (0.9) um:: and if we look at what verbs (0.8) that are
 3           listed in these competence aims (2.1) are someone able to
 4           find out what verbs that are listed (1.3) provide examples
 5           (1.2) Tone,
 6  Tone:    explore?
 7  Teacher: explore (1.0) is that something we do in the notebook,
 8  Tone:    no.
 9  Teacher: no (0.6) where do we explore (1.6) Kim.
10  Kim      huh,
11  Teacher: where do we explore.
12  Kim:     in the lab for [example,
13  Teacher:               [we can explore in the lab (0.2) can we explore
14                          other places,
15  Kim:     yes on the Internet and in books and explore [(    )
16  Teacher:                                       [good (0.5) super
17                                                  (0.9) Tone did
18                                                   you have more,
19  Tone:    um assess,
20  Teacher: asses yes.
21  Tone:    you can both do that written and orally,
22  Teacher: you can both do that written and orally (.) super (0.5) yes,
23  Anders:  °classify.°
24  Teacher: <classify> what is to classify (3.3) that was trickier
25           (0.8) what does it mean that you are supposed to be able to
26           classify (7.1) I believe that was a new word for many of you
27           (1.1) Tone,
28  Tone:    (  ) a little like:: (0.2) sort them into different classes or
29           (0.4) levels ["for example"
30  Teacher:           [yes that was a very god description (0.3)
31                      sort something in different class or group
32                       (0.3) that is just like you here at the school.
33  Kim:     yes students,
34  Teacher: you are sorted into class 9A (1.4) um:: (0.3) but (0.5) it is
35           (0.2) yes it is one reason for you being sorted into this
36           group (1.8) and what is that (5.6) there is one reason for why
37           you don't attend 8A.
38  Kim:     because we are smarter than the ones in 8A,
39           ((soft laughter among a couple of students))
40           ((makes a sound))
41  Helga:   we are older,
42  Tone:    we are sorted by age.
43  Teacher: what did you say,
44  Helga:   we are older,
45  Teacher: you are older right,
46  Helga:   [(  ) older,
47  Teacher: [so (0.3) so we ha we have managed to find out what year
48           you are born,
49  US:      °myeah°,
50  Teacher: and then we have sorted you in group nine.
51  Kim:     was that difficult to find out,
52  Teacher: yes it was not easy (0.6) it was a lot of analytical work
53           (1.1) um:: (0.6) and that we can do with substances to (0.4)
54           we can find characteristics of substances (0.6) and then we
55           can sort them in different groups (0.7) this is what
56           classifying is about.
```

Excerpt 4. Making students accountable for articulating their understanding of competence aims

In the beginning of the excerpt, the teacher introduces competence aims on a whiteboard, orients the students to the verbs used, and requires them to provide examples (lines 1–5). In her response, Tone suggests the verb "explore." The teacher acknowledges Tone's answer

and continues with a cued question about whether exploring is something one does in a notebook (line 7). When Tone replies that this is not the case, the teacher moves on and asks where the class can engage in the activity of exploring. Upon being addressed by the teacher, Kim provides the example of lab work and searching the Internet and books. When the teacher acknowledges these examples, Tone suggests "assess" and Anders "classify." The example of classifying sparks a lengthier conversation in which the teacher reveals his uncertainty about the students' familiarity with the concept; however, Tone provides a brief yet precise definition of the term (lines 28–29). In his response, the teacher acknowledges Tone's contribution and elaborates by orienting to how students are classified in certain ways at the school they attend. Thus, the teacher introduces the comparison between classifying substances in science and classifying students in school. This discussion evolves further into an explanation of age as the key characteristic for classifying students in school classes, where Kim makes fun of the idea of this being scientific work by asking if age was "difficult to find out" (line 51). The teacher acknowledges this joke before re-orienting the class to identifying characteristics of substances and classifying them, which are important activities in chemistry that the class will engage in during the semester.

In this sequence, the teacher invited different students to contribute by providing explanations of the different aims. The students identified "explore," "assess," and "classify," and the teacher made the students elaborate on how and where they could engage in such activities. The students were being made accountable as students with certain expectations and roles—which skills and knowledge they were supposed to learn in this subject—by invoking specific verbs as inscriptions that were made available to the class. By focusing on verbs, the teacher indicated that the competence aims are about doing and trying out specific methods in school science. As such, the competence aims are not only inscribed with formulations about what students are supposed to learn but also display perspectives on what kind of activities are "scientific." In this sequence, epistemological messages played out quite differently compared to the sequences displayed in Excerpts 1 and 2. By making students engage with the competence aims more actively, they were more coupled with the kinds of activities and outcomes that are expected.

Positioning students and teachers as accountable for reaching an agreement regarding how to pursue work toward a joint goal

When examining the data, we also found some instances in which competence aims and activities associated with these aims triggered lengthier dialogues. These conversations concerned what type of participation is required by the students as well as the concepts and academic discourses related to these competence aims. In Excerpt 5, we zoom in on an event in which a teacher engages in reconfiguring his instructional work related to a specific competence aim. The competence aim that guides their work reads as follows: "The students should be able to use the concepts electricity, current, resistance, effect and induction to explain results from experiments." Prior to this lesson, the students have been engaged in lab work, where they have experimented with different circuits and written down explanations about what happened in their trials. The teacher has reviewed the students' explanations, and he is not satisfied with the students' accounts. In the current lesson, the teacher has asked the students to read each other's explanations and to discuss their perspectives on the explanations in groups. After the group work, the teacher facilitates the following whole-class conversation.

```
1   Teacher:    okay (1.6) the::n we turn the focus this way (1.9) um::
2               (1.2) do you see how important it is to read the question
3               properly?
4   Benjamin:   yes.
5   Teacher:    imagine if this was a: (0.2) written test that we will have
6               in:: (0.6) three weeks.
7   Fiona:      shall we have that?
8   Teacher:    no um:: (0.5) I don't know when but I guess we are going to
9               have a written test (0.9) because this competence aim is
10              well-suited for (0.5) doing an experiment (0.2) and write an
11              explanation (1.0) um: (2.0) if you were a teacher (0.6) and
12              saw these answers (0.3) to this question ((the question is
13              why is it called a series circuit)) (1.3) what would you
14              think (2.4) yes?
15  Sondre:     what are they doing?
16  Teacher:    you know what (0.2) I:: really think the opposite (1.0) what
17              am I doing (1.1) that haven't been able to teach you (0.8) or
18              made you think properly (0.6) but alright (0.2) sometimes
19              Sondre I also think what are they doing (0.8) but (0.3) right
20              after I think (0.5) what should we have done differently
21              (1.6) and I believe that what we do now (1.0) is what (0.4)
22              we do differently (0.7) to (0.7) sharpen our senses (1.3)
23              Frank (0.8) do you have an explanation for why (0.3) it's
24              called a series circuit?
25  Frank:      it's like several (0.7) bulbs,
26  Teacher:    yes,
27  Frank:      that are coupled on one cord,
28  Teacher:    yes,
29  Frank:      like Christmas tree lights.
30  Teacher:    li[ke Christmas tree lights.
31  Frank:        [it's (0.2) one cord and then it's several several-
32  Teacher:    -but where does the word series come from?
33  William:    it's like one series, ((gesticulates with his hands))
34  Teacher:    it's like one series,
35  William:    yes,
36  Teacher:    does anyone have a suggestion (0.5) where we like can use the
37              word or explain the word series Liz or yes?
38  Miriam:     m:: several:: bulbs like connected together,
39              ((lines omitted from the excerpt))
40  Teacher:    does anyone have (0.5) an example of a totally different
41              place where we use the word series?
42  Lucas:      Netflix,
43  Teacher:    Netflix.
44  Lucas:      that's several several,
45  Teacher:    what's a series in that context?
46  Benjamin:   it's li::ke.
47  Lucas:      several things after each other,
48  Benjamin:   yes (0.2) or it's-
49  Frank:      a film consisting of several episodes,
50  Benjamin:   yes.
51  Teacher:    can you jump like [random,
52                                [a movie that is divided into.
53  Benjamin:   yes.
54  Karen:      rather not,
55  Teacher:    rather not right you should see them in the right order or it
56              won't give much meaning.
```

Excerpt 5. Positioning students and teachers as accountable for reaching an agreement regarding how to pursue work toward a joint goal

The teacher first orients the students to the importance of reading thoroughly the questions that students are supposed to address in assignments (lines 2–3). By asking the students to imagine if the assignments they just have worked on were a written test in the near future, the teacher signals that something is at stake. Fiona then asks if they in fact will have such a test (line 7). The teacher hesitates but invokes the competence aim they are working on and states that it is well-suited for an experiment and written report, activities which they have been engaged in. In lines 11–13, he continues by asking how the students would assess the explanations that the students have produced in their prior assignments if they were in his situation. Through this move, he shifts the students' perspectives and makes another position available to them in the participatory framework: the teacher position. Sondre accepts this change of perspective by suggesting that he would be wondering "what are they doing," meaning the students. In doing so, he indicates that he would not be satisfied with their efforts (line 15).

The teacher builds on Sondre's contribution but proposes a different approach and even questions himself (lines 16–17). In this utterance, the teacher also argues for the need to do things differently (lines 20–22) and then begins to facilitate a more exploratory and inquiry-oriented dialogue, where he focuses on producing explanations of high quality and invites students to contribute several ideas for engaging with the science matter. When Frank is prompted to explain the reason for calling something a series circuit, he both provides an explanation and puts forward an example of a Christmas tree (line 29). The teacher acknowledges Frank's contribution, but he also digs deeper into the word "series." He then continues by inviting the students to provide ideas about the usage and explanations of the word.

When Miriam also invokes the example of bulbs, the teacher tries to move the students out of this frame (lines 40–41). In the lab, the students have been working on making series couplings using bulbs, and we can assume that the teacher would like the students to come up with other examples and explanations to relate their talk to other relevant instances. When the teacher emphasizes a "totally different place," another student, Lucas, invokes the example of Netflix (line 42), a large distributor of TV series that the students are quite familiar with. The teacher acknowledges this example but asks for elaboration (line 45). After several students have provided different explanations of the concept of series in the context of Netflix, he sums up by arguing that episodes should be viewed "in the right order," and we assume that he tries to link this to the basic principle of series couplings.

In the final sequence, both the students and the teacher were being made accountable for the students' achievement of the competences in the subject domain. When he mobilized the competence aim, the teacher provided the students with an imaginary role as teachers, reflecting upon their own work. Likewise, he entered a more collaborative mode by asking what "we" should have done differently. In this way, he aligned himself with the students and displayed that his success as a teacher was related to the students' level of understanding and engagement. Through this strategy, the teacher positioned himself as accountable for the students' success—a strategy that worked as a starting point for orchestrating a dialogue about series circuits and explanations of the concept. When the students only provided quite similar examples and explanations associated with their previous lab work, he oriented the students to other contexts where the word "series" is used. By using a strategy where students could invoke ideas and examples of their own, such as Netflix, the students became active contributors in the ongoing co-construction of insights into why these electrical couplings are called series circuits. The epistemological messages displayed and acted upon made relevant the co-construction of knowledge. By aligning himself with

the students and inviting them to contribute multiple ideas and perspectives, the teacher offered students alternative ways of engaging with the competence aim. As a result, they participated more actively in the ongoing co-construction of what competence in this subject domain means. This approach enabled students to reason about science concepts and explore what it means to participate competently in science-related activities. This example differs from the other sequences that we have analyzed, and it shows an interesting aspect of making students accountable for developing certain competences through the use of inscriptions from the curriculum.

Discussion and concluding remarks

In this study, we have provided empirical accounts of how policy tools contribute to framing and shaping classroom activities and student participation. Norwegian teachers' practice of explicitly introducing competence aims when teaching represents a unique opportunity for observing and exploring the complex relationship between policy and classroom practices. The concept of inscriptions has been helpful for understanding this relationship because it brings attention to whether and through what capacities such artifacts can stabilize meanings and directions for use as they traverse "untouched" between policy documents and classroom activities. Two research questions have guided our analytical efforts: (1) How do teachers and students make sense of competence aims when they are invoked in instructional work? and (2) What are the implications of the invocation of competence aims for student participation? In the following, we highlight and discuss some of the findings from the analysis.

Existing research within the learning sciences has emphasized that teachers communicate what they perceive as preferable ways of participating during lessons to students, as well as signaling how students should engage with and construct knowledge (Berland et al., 2016; Manz, 2015; Russ, 2018). Our study adds to this body of knowledge. We have examined how teachers mobilized and made sense of inscribed formulations in the form of competence aims and how they displayed and enacted a variety of epistemological messages following these instances. The analysis showed that teachers' explicit introduction of competence aims creates social situations in which some actions become possible, some likely, and others unlikely. Specifically, the competence aims were sometimes invoked as a source of authority, sometimes translated into instructions, and sometimes mobilized by the teacher to obtain social order in the classroom. Our analysis has shown that even if students are not often involved in discussions about competence aims, such tools can contribute to clarifying ideas, building useful analogies, and creating links between learning activities and formulations of learning outcomes. The variation in how competence aims were treated interactionally throughout the analysis supports Enyedy and Goldberg's (2004) assertion that the implementation of a curriculum is not an all-or-nothing affair, but a matter of degree. Through close analysis of social interaction, we can investigate how curriculums were entwined with local practices and artifacts and enacted in situ by students and teachers.

Studies within the sociocultural field have shown that reaching institutionally set goals involves introductions to certain ways of acting or being as students (Silseth & Gilje, 2019; Elwood & Murphy, 2015; Lund, 2008). The current study builds on these insights and contributes by specifically examining teachers' mobilization of competence aims, which can be viewed as a particular type of cultural tool with the potential to shape both student and teacher participation. The students in our study were exposed to different applications of competence aims with implications for how their own participation in school activities will

be assessed. This experience allows for a kind of reflexivity that is important for students because to succeed as knowledgeable students, they need to be able to incorporate the institutional perspective in their own contributions to school practice, learning, and development.

Furthermore, research on student participation in classrooms has emphasized the importance of how teachers frame talk and interactions (Baucal et al., 2013; Howe et al., 2019; Kovalainen & Kumpulainen, 2007; Mehan, 1979a). For instance, prior research has shown that teachers can elevate engagement and participation among students by being sensitive to students' orientations and contributions when talking about subject matter during lessons (Clarà, 2019; Jaber et al., 2021; Michaels et al., 2008). Teachers can use different strategies to engage students in educational dialogues that support participation and learning (Clarke et al., 2016; Enyedy & Goldberg, 2004; Rajala et al., 2016; Wortham, 2004). The current study adds to this understanding of student participation by generating knowledge about how teachers and students make meaning of policy tools in student–teacher interactions. Looking at how students were made accountable when teachers invoked competence aims enabled us to study the relationship between policy tools and student participation. When discussing our findings, Gresalfi et al.'s (2009) distinction between "being accountable for" and "being accountable to" is useful. The analysis showed that the different ways that the teachers invoked the competence aims had different implications for student participation. For instance, in Excerpt 2, the students were positioned as *accountable for* following certain ways of solving assignments in a science project, but they were also made *accountable to* the competence aims, which were positioned as more important and authoritative than prior tasks that were developed on a local level. Thus, in line with Rajala et al. (2016), our analysis shows that the teachers sometimes position the curriculum as a source of authority in classroom dialogues, which might hinder active participation among students.

However, when the teacher invited the students to engage in meta-level discussions, the resulting discussion displayed the potential of competence aims as tools for engaging both students and teachers in educational dialogues and collaborative efforts of reflecting upon what competence means, what it means to participate competently, and how to work toward joint goals. In Excerpt 4, the teacher invoked the competence aims in ways that enabled the students to provide their explanations of their understanding of what was expected of them in a science unit. The students were *accountable for* interpreting and analyzing the verbs used within competence aims. Competence aims are not primarily written for students, and the formulations are often quite dense and difficult to grasp. Hence, the interpretation work of the teacher in Excerpt 4 provided opportunities for students to participate and engage with them. As such, in terms of student participation, the students were more actively engaged in discovering the meaning and status of the competence aims. In Excerpt 5, the teacher positioned both himself and the students as *accountable for* student learning and provided explanations of science concepts and principles. They were also *accountable to* each other and the classroom community in this enterprise. Regarding student participation, the students were involved as partners and contributors in a dialogue about competence and how one should work toward building such competence. The teacher enabled them to mobilize rich resources in these collaborative efforts in a community of learners. This way of invoking competence aims also enabled students to reason about science concepts and reflect collaboratively about what it means to participate competently in science activities. The competence aim was used as a catalyst for this conversation, thereby displaying how such cultural tools can become important ingredients in educational dialogues that support student participation in interesting ways.

Norwegian teachers' explicit use of competence aims in teaching can be seen as a manifestation of the increasingly strong goal orientation on all levels of the educational system,

observable through government reforms and detailed descriptions of learning outcomes (Prøitz & Nordin, 2020). Some of the excerpts in the analysis illustrated how the teachers pointed at the competence aim as something outside the teacher's control but offered the students a plan for reaching these goals. However, we also found instances where these competence aims became interesting tools for engaging students in dialogues about competence and what was expected of the students as learners. In this study, we have focused on variation and complexity of invoking policy tools in student–teacher interactions. Future studies could pursue these findings by investigating regularities and frequencies in larger samples over time. In addition, future studies could also examine the relationship between how teachers plan teaching activities by means of using competence aims and how they are enacted in actual instructional work.

In conclusion, competence aims and other policy tools should not be conceived as coherent representations of one overarching pedagogical and epistemological position. Rather, competence aims should be viewed as results of political negotiation and influence at the state and school level, and that negotiation about the meaning of such aims continues between teachers and students in classrooms. Our analysis showed how competence aims can be realized as epistemological messages and how they can be set in motion as vehicles for action and reflection in the classroom. Such messages should not be understood as information capsules submitted from a policy level but as situated resources for meaning making and social action. As such, teachers and educators should critically scrutinize how they invoke such policy tools and reflect upon how they involve students in the interpretation work of such artifacts when designing and enacting teaching in their classrooms.

Appendix. Transcription conventions

Sign	Explanation
(2.5)	Time (in seconds) between end of a word and beginning of next
>word<	Right/left carats indicate increased speaking rate (speeding up)
<word>	Left/right carats indicate decreased speaking rate (slowing down)
word	Underlining indicates emphasis on words and expressions
[	Brackets indicate where overlapping talk begins
:::	Colons indicate a prolonged, stretched sound
. , ?	Punctuation markers indicate intonation. The period indicates falling intonation. The comma indicate slight rising intonation and question-mark sharp rising intonation
()	Empty parentheses indicate difficulties in hearing what was said
°word°	Degree sign indicates words distinctly quieter than surrounding speech
((looks up))	Double parentheses contain analyst comments or descriptions
"word"	Indicate when participants cite a text (read aloud).

Declarations

Conflict of interest The authors declare no competing interests.

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Current themes of research:
Well situated in the sociocultural tradition, the authors have in their recent research been focusing on meaning making, learning and teaching as an interactional phenomenon, and published on a wide range of topics relevant for the field of Psychology of Education, such as contextualizing instruction, technology-enhanced learning, learning and simulations, assessment practices, accountability, socio-scientific controversies and learning identity.

Most relevant publications:
Furberg, A. & Silseth, K. (2021): Invoking student resources in whole-class conversations in science education: A sociocultural perspective. *Journal of the Learning Sciences*.

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