

School data as mediators in professional development

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Abstract International research documents a variety of approaches for fostering the professional development of principals. These studies mainly draw upon survey and interview data. Less attention has been paid to observing professional development processes. This article aims to examine how professional learning is played out empirically in the interactions among members of a school improvement team in a Norwegian context by paying special attention to school data as the departure for professional development of principals. Cultural Historical Activity Theory frames the analysis. The findings suggest that video clips of teaching practices stimulate engagement among team members and, hence, mediate professional learning processes beyond the situations presented in the workshops. These video clips triggered analyses of how to understand and improve teaching practices. In addition, external facilitation seemed crucial for anchoring the analysis theoretically, and for highlighting implications for leadership in the workshops.

Keywords Professional development · Mediation · Principals · Cultural Historical Activity Theory (CHAT)

Introduction

There seems to be agreement that the relationship between leadership and learning outcomes is indirect but nevertheless important (Hallinger and Heck 2010; Leithwood et al. 2010; MacBeath and Townsend 2011; Robinson et al. 2008).

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Professional development of principals is an important issue for enhancing this relationship, and recently rigorous efforts to document the effects of leadership development over time have been made (Crow et al. 2008). However, limited attention has been devoted to observing *how* professional development is played out empirically (Murphy et al. 2009), the focus in this article.

The empirical setting is a local school improvement project (hereafter called *the local project*) where researchers from the Department of Teacher Education and School Research, at the University of Oslo, were invited by a local educational district to promote professional learning among principals. Principals at three pilot schools, two administrators from the local school district, and the researchers decided to form *a school improvement team*. The members of this team met regularly in workshops for 2 years. Different data from the pilot schools, such as notes from observations, video clips from teaching and leadership practices, and evaluation reports (hereafter called *school data*) were discussed and analyzed by the team.

The local project provided an opportunity for researchers to collect data from these discussions and interactions among team members over 2 years. All the meetings were audio- and video-recorded. This paper draws upon data from the larger study and aims to examine how professional learning is played out empirically in the interactions among members of the school improvement team by paying special attention to school data as the departure for the professional development of principals.

The article is structured in five sections. First, relevant research on professional development of principals and learning in teams, as well as school data as the point of departure for professional learning are presented. Second, Cultural Historical Activity Theory (CHAT) as a theoretical framework is presented. Third, the study and its methodology are explained. In the fourth section, the findings are presented and discussed. Section five is the conclusion.

Previous research

Professional development of principals

Many countries have prioritized the professional development of principals in recent years to improve school performance (Crow et al. 2008). Different trends in professional learning research have been identified, focusing on the aims, pedagogy, and curriculum (Rusch 2008), as well as the different forms of supporting structures (Barnett and O'Mahony 2008), content, and methods used (Huber 2008).

Based on survey data, Huber (2008) identified certain new trends in leadership development in 15 countries across Europe, Asia, Australia, and North America. Rather than training the principals to be prepared for certain roles, he argues there is a trend toward focusing on communication, cooperation, and change in personal development. His study indicates a trend toward integrating theory and practice in the learning processes to make professional development relevant. In addition, many studies demonstrate the significant effects of leadership on school conditions and student learning. One source is large-scale quantitative studies (Hallinger and

Heck 2010; Robinson et al. 2008). Case studies add to this growing evidence (Leithwood and Levin 2008). However, researchers inquiring about leadership effects face many methodological challenges in their efforts to demonstrate effects, especially regarding student outcomes, and the evidence concerning what works and what does not is scarce and inconsistent (Leithwood and Levin 2008). Increasingly, many researchers argue longitudinal studies that would permit us to know how leadership programs influence ongoing leadership practices must be designed (Barnett et al. 2009; Taylor et al. 2009; Hallinger and Heck 2010). The present study does not focus on the effects of leadership development in the schools, but explores empirically what is being produced from interactions among team members in terms of learning within and across workshops during 2 years when the team analyzed teaching and leadership practices. More precisely, this article examines how learning processes are played out in the interactions among members of a school improvement team in a Norwegian context by paying special attention to school data as the departure for the professional development of principals.

Professional learning in teams

A sizeable body of research documents professional learning in teams, among teachers in schools and across schools (Jackson and Timperley 2007; Lieberman and Miller 2008; Little 2002; Stoll et al. 2006). Collaborating in teams within and across schools seems to be an element in principals' daily lives in many schools (Johnson et al. 2008), but empirical research on the learning processes in a leadership team is missing.

Several conceptions are used in the research literature, such as *networking*, to capture interaction when "at least two organizations are working together for a common purpose for at least some time" (Muijs et al. 2010, p. 6); *teamed learning*, to capture learning across and within schools (Jackson and Timperley 2007); and *professional learning community*, to capture the learning as well as the community aspect (Stoll et al. 2006). In addition, Engeström has introduced *knotworking* as a concept, to capture a more elusive and improvised phenomenon in workplace learning (Engeström 2006, p. 1786).

Researchers draw attention to different aspects of professional learning in teams, highlighting the importance of studying professional learning communities as fluid rather than fixed (Stoll et al. 2006) and being aware of the limitations of professional learning within schools (Jackson and Timperley 2007). The literature on professional learning communities (Stoll et al. 2006) is more concerned with developing shared visions and a common understanding than documenting how tensions might mediate learning, a central aspect when researching developmental work within a CHAT framework. In this paper, we take, as a starting point, that collaboration in teams is not necessarily productive. Therefore, exploring how and why tensions in collaboration might enhance learning is an empirical issue.

School data as a point of departure for professional development

Principals in many countries are expected to lead the process of data analysis in their schools for accountability and school improvement. Although schools seem to

have access to considerable amounts of data about student performance and student characteristics, there are variations when it comes to the use of data in identifying, understanding, and responding to the students' needs (Anderson et al. 2010; Halverson et al. 2007; Leithwood et al. 2010).

School data refer to more than test results (Anderson et al. 2010; Leithwood et al. 2010). In the present study, school data refer to observation notes, video clips, and evaluation reports. Earl and Fullan (2003) differentiate between data for accountability and data for improvement. Data for accountability refers to how leaders in states, districts, and schools are required to report publicly about their efforts toward improvement, as well as reporting on their successes. Data for improvement are seen in the light of the knowledge the society possesses and rapid changes, and focus on the importance of taking charge of change to “control” the future. In this article, we focus on data for improvement. Based on large-scale reforms research in Canada and England, Earl and Fullan (2003) discuss the public use of data and argue that data have to be interpreted to produce new knowledge. Data become valuable when shared, debated, and applied in a social context. In other professions, data from practice have been used as the point of departure, combined with theoretical models, for critical examinations in so-called *Change Laboratories*, which are organized by researchers as workplace learning to produce change in different types of organizations (Engeström and Sannino 2010). However, we know less about *school data* as a departure for professional development of principals, the focus in this article.

Analytic framework for studying mediation

Cultural Historical Activity Theory (CHAT), rooted in Vygotsky's (1978) work, is chosen as an analytical lens to examine mediation as a phenomenon in learning processes when researching the professional development of principals. CHAT offers an opportunity to study learning processes over time in a team, to relate the activity in the team to the object of activity, to look at the dialectic relationship between individual actions and collective activity, and to study how tools may mediate learning. Figure 1 is a visual representation of an activity system. The

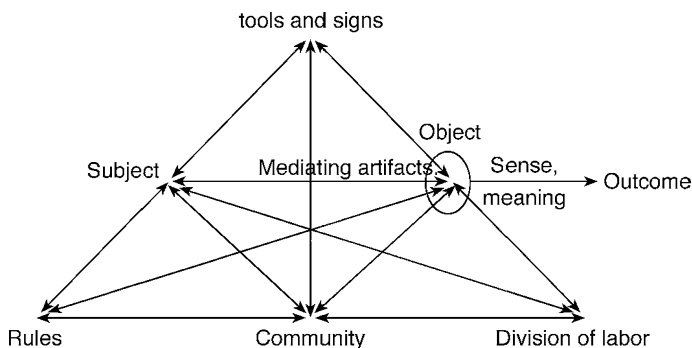


Fig. 1 A model of an activity system (Engeström 1987, p. 78)

figure shows the constituting components (subjects, objects, etc.) as well as the relationship between the components. This article is mostly concerned with subjects, tools, objects, and outcomes in analyzing the data.

Within a CHAT framework, the relationship between individual actions and collective activity is dialectic (Roth and Lee 2007). The term *subject* refers to “the individual or subgroup whose position and perspective are chosen as the perspective of the analysis” (Engeström and Sannino 2010, p. 6), which in this case is the team. Lektorsky (2010, p. 79) argues that without the actions of individuals a collective activity is impossible and that a collective activity cannot exist without individuals. What is considered a collective subject might be an institution, an organization, or, in our case, a team of people. Tensions might emerge between people in collective activity when constructing and reconstructing objects, producing collapses in the activity as well as development (Engeström and Sannino 2010).

Studying activity within a CHAT framework means exploring the *object* at which the activity is directed, by which the activity is energized and motivated, rather than the activity itself (Foot 2002). Object refers to two different, but interrelated, aspects: the historical and generalized object of the activity system and the situational and constructed objects that give direction to the (inter)action (Jahreie and Ottesen 2010). Historically generated objects of activity systems might be motivated by institutional needs, for example, of educating highly competent principals. Situational objects refer to what is being worked on. Principals and educators may work on situational objects, motivated by situations arising in leadership practices. Rather than being fixed once and for all, objects of activity may be constructed and reconstructed over an extended period.

Since the team members in the present study operate only outside their workplaces and intend to exist as a team only for delimited time, the team is not an activity system in itself. *Engagement* is suggested as an intermediate and analytic concept when analyzing units between activity and individual actions (Engeström 2008). Asking and answering questions and looking at video clips are examples of team actions that were studied. Some actions might be parallel and driven by the same outcome, for example, to understand a teacher’s practice.

Mediation as an analytic concept was introduced by Vygotsky (1978). Humans use physical tools to master different situations. Instead of visiting a specific classroom before the workshops, the researchers introduce video clips as a physical tool as a departure for analysis in the team. When analyzing the video clips, the participants use a common language as a psychological tool (sign) to master thinking and communication (Vygotsky 1978). A claim within CHAT is that activity exists only as mediated, but the same tool might have different meanings, and mediate different processes when used in various types of activities. In addition, CHAT makes it possible to study the mediating role of tensions in professional development.

The study and its methodology

The present study was designed as a qualitative study stretched over time with a developmental approach. It rests partly on ethnographic fieldwork, with a focus on

the work in the team, and partly on interaction analyses of specific episodes in the workshops organized by the team.

The opportunity to collect data for this study came when researchers from the Department of Teacher Education and School Research were invited to contribute to the local school improvement project and the principals and researchers decided to form a team. Thus, there are pragmatic reasons for choosing this particular school district, as well as the team as the site of the research. However, the average size of the school district may make the study relevant in other contexts as well.

The developmental approach aimed at contributing to the professional development of principals by intervening with different resources, such as school data. Producing development and change is central within action research studies and in many different modes of workplace learning. Rather than following a specific method, the study's developmental approach was designed during the 2 years of collaboration as an evolving process where the researchers participated in the setting being studied. This was a way of getting first-hand information about the collective learning processes.

A researcher's involvement in the unit being researched may challenge the analytic perspective of the research. Because close relations between researchers and participants may result in a reluctance to discover the critical issues in the project, the researcher's involvement may privilege some stories to be told, and silence others. This limitation is widely discussed in research literature, and dilemmas related to the publications of findings, the goals of the research, and the role as an external facilitator have been highlighted (Barab and Kirshner 2001; Goodson 1993; Møller 1998). The researchers' role in the team was to facilitate critical analysis of teaching and leadership practice. To review the research process post hoc, and thus undertake in-depth analysis, the workshops were recorded with video and audio. The time lag between collecting and analyzing the data might create the distance needed to produce critical analysis of the interactions.

With a particular focus on school data as the departure for professional development, *interactions data* were collected from the workshops in video- and audio-recordings as well as the artifacts (physical tools) introduced. The data were explored through *interaction analysis*, which has been characterized as an

empirical investigation of the interaction of human beings with each other and with objects in their environment. It investigates human activities such as talk, non-verbal interaction, and the use of artifacts and technologies, identifying routine practices and problems and resources for their solution. (Jordan and Henderson 1995, p. 39)

The present study focuses in particular on the interactions between the participants and the participants and the physical tools and the analysis of the issues being worked on.

Each of the 10 team workshops lasted for about 2–3 h, including breaks. In this paper, we use transcripts covering a period of 8 h, from a total body of 25 h of interactions data collected from the workshops from October 2008 to June 2010. By reading the transcripts of the total data corpus, we identified situational objects that give direction to the interactions. Actions directed toward situational objects form an

episode in this article. We identified 34 episodes. Episodes are the analytic units of analysis. However, since this article is concerned with how school data mediate object-oriented engagement, we have criteria for what makes an *action-relevant episode* in relation to the research questions, which might be a more extensive unit than what Barab et al. (2001) describe. In this article, an action relevant episode must

- (a) be long enough to identify object-oriented engagement as the unit of analysis related to situational objects, not just individual actions,
- (b) include an artifact in the form of school data, and
- (c) indicate what is being produced in terms of an outcome of mediated engagement.

Eight of the 34 episodes in the total data material met these criteria. From the analysis of the eight episodes, we sought characteristics of how school data act as a mediator for professional development. We present excerpts from an 80-min episode in the fifth workshop. This episode is chosen and must be seen as an empirical carrier of the analysis of school data as mediators, not merely an example of video clips as mediators for learning processes. Five excerpts from this episode have been chosen as instantiations of the object-oriented engagement mediated by school data. Although they are not statistically generalizable, we argue they are analytically generalizable by showing typical aspects of how school data act as mediators in professional development in the other seven episodes. To be more precise, we comment on the ways the excerpts are similar and different from the other seven episodes defined as action relevant for answering the research question in this article. In general, the participants' utterances are long. To show progress in the discussion, some utterances are reduced.

Findings

In this section, episode 13 from the fifth workshop is presented as short narratives and excerpts. Before the fifth workshop, the researchers visited a first-grade class in a pilot school to produce a teaching practice video. A lesson in mathematics, the group-work afterward, and an interview with two students were video-recorded. In addition, the researchers photographed the activities, the teaching plan, and what was written on the blackboard. The video clips and the pictures were reduced to a film (20 min long), which was sequenced and shown to the team for critical analysis. The teachers in the three pilot schools had recently attended a seminar where pictures as factual texts had been introduced and discussed, and the teachers were expected to implement some of these ideas in their teaching practices. The researcher presented two main questions to the team as a starting point for the session: How do we understand the sequences? What are the implications for principalship? The questions might be seen as an intended object of the workshop. How the tool mediates engagement in teaching will be analyzed in more detail in the next section.

All participants are anonymous in the excerpt. Eileen is a leader from the administration in the municipality, Tony is a school leader from a lower secondary school, Annie is a school leader from a small rural school, and Billy is a school

leader from a medium-sized school. All participants have teaching experience. The researcher was a teacher, a principal, and a supervisor in a municipality.

How video clips mediate collective engagement in teaching

Excerpt 1 shows how the principals sought to understand what could be regarded as “factual texts.”

The excerpt shows how the talk is directed toward exploring how to understand a situation in teaching practice as a situational object in interactions with the video sequence as a physical tool. Asking questions, bringing in new perspectives, drawing attention to the tool, suggesting definitions, etc., reflects what Engeström (2008) calls strings of actions, directed against the situational object of the *engagement*. In this excerpt, strings of actions seem to be directed toward against the same object (here: understanding a teaching practice in the first grade), which is not always the case. People may have personal goals. The *engagement* consists of strings of action aimed at collectively grasping what happens in a teaching practice in the local project.

When interpreting what is seen in the video clips, the participants use language, as a psychological tool, to communicate. To credit one person for giving the concept meaning might be unfair. Collectively the team members are unpacking the object of the engagement to better understand the teaching practice as a situational object. This is typical for object-oriented engagement in the other seven episodes as well.

Excerpt 1

Who	Utterance
1. ^a The researcher	Can you take it to be a factual text, do you think? The picture?
2. Annie	Yes, I think we could probably say that. The students at least think so. We might think that—might easily think that only written texts should be seen as factual, but for the students in this grade it is definitely a factual text
3. The researcher	Yes
4. Tony	You have everything, I mean, all the concepts, and I guess this is what makes it a factual text, that you have many difficult concepts, or new concepts
5. The researcher	...Yes ... I am not sure if this went too fast, did you get what kind of image it was?
6. Eileen	There was an ocean
7. The researcher	Yes, there was an ocean, and then there was a lot happening there [in the picture] ^b (...). ^c Then there were some seagulls that flew away. How many seagulls are there all together? And how many seagulls flew away? How many are left? And then they make stories about this
8. Eileen	Yes, it obviously is a factual text (Annie: Yes, when you think about the level they're at) ^d , these students, it is [a factual text] for them

^a The utterances are numbered to show the progress in the talk

^b [...] Indicates comments by the authors

^c (...) Indicates parts of or whole utterances are left out

^d Indicates overlaps

A factual text is a central concept in the school improvement project on reading, in which the teachers are participating. Thus, the collective process of clarifying this particular concept might be important when leading the local project as a principal. However, the leadership aspect connected to being a principal has not been brought into the discussion.

The excerpt shows that the video sequence mediates a collective engagement in exploring the use of pictures in a teaching practice as part of a learning process. Video clips, as physical tools, trigger the analysis of the teaching practice, but the strings of action indicate how talk, as actions, also plays an important role in shaping the situational object of the engagement. The interactions among the team members' talk and the tools construct the object. The team members are interacting with the tools, and the tools and the talk as actions mediate engagement in a teacher's practice. The result of the engagement might indicate some collective awareness emerging in the process, as the team searches to give meaning to a central concept in the local project. By not linking the teaching practice to principalship, the team is, at this stage, constructing only a part of the intended object related, to make sense of the teaching practice and the implication of leadership. The analysis of the other seven episodes indicates similar findings. Leadership implications are not necessarily brought on the agenda by the participants themselves if the researcher does not ask for implications of the analysis and which strategies the team members would choose to improve practice.

How video clips expand learning beyond a teacher's practice

Excerpt 2 is related to the same video sequence as Excerpt 1. However, the task has changed. The starting point is when the researcher asks the team to reflect on what is happening in their own schools. Excerpt 2 shows how the team discusses the relationship between what happens in first grade and in the seminars for teachers in the pilot schools.

Although the video sequence as a physical tool is the same in Excerpts 1 and 2, the tool is guided by the researcher's question. The tool mediates different processes. Excerpt 2 shows how the video clips from the first-grade class mediate analysis beyond the teaching practice in the first grade. Strings of actions indicate how the team members contribute by bringing in examples from their own contexts while exploring the first-grade teaching practice. The interactions between the members indicate there is a job to do in relation to the use of images in school practice in terms of underlining the importance of using pictures, valuing the use of pictures in teaching, using pictures in adapted teaching, and using pictures more strategically. Excerpt 2 indicates that video clips also serve as mediators in this situation when the team is exploring teaching practice.

In addition to mediating analysis of the use of pictures in first grade (shown in Excerpt 1), the same video clip mediates a discussion of other contexts and what happens in one arena (the classroom) in addition to what happens in another arena (in courses for teachers). Similar phenomena are identified in the other seven episodes. School data and the talk trigger analysis beyond the practices being

Excerpt 2

	Who	Utterance
1.	Researcher	What happens [in your school], do you know?
2.	Annie	[The teachers] are very conscious about using images, they are in all the grades, absolutely! (Researcher: Yes, they are?) But when it comes to mathematics, I'm not, I'm not entirely sure how it's used there (...)
3.	Tony	We have just distributed the mathematics tasks to those [students] who will be examined in math in tenth grade, and so, one task is about you, it's about getting a driver's license, and driving a car. Then there are some pictures of a driver's license (...)
4.	Billy	I feel the teachers are using images quite a lot (...) at least in the lower grades (...)
5.	Annie	I think so, too, in most subjects. I answered about mathematics so I'm not sure in which degree it is an element there...
6.	Eileen	... and then it is important to value the use of images, maybe as a substitute for parts of the text. (...)
7.	The researcher	But do you think there is more use of [images] this year as a result of [the local project], or is this just a continuation of common practice?
8.	Eileen	I think it's "yes, please, both," because I think there is more deliberate use of it now (...), at least in primary school. I'm not sure if it might be different when it comes to exams, I would be a bit impressed if they manage to include [images] in tenth grade?
9.	Tony	What strikes me is that I've have been doing this for years
10.	Eileen	Yes, you have?
11.	Tony	(...) I think it first happened because [the teachers] learned picture editing on the computer (...) but I think we have some work to do when it comes to raising awareness about the importance of this, and to increase its status. (...) To see the value of it, especially in adapted education (...) The teacher has to (...) use [images] strategically (...)

studied. Excerpt 2 indicates the team is in the process of constructing another dimension of the situational object, which includes a leadership aspect.

The result for Excerpt 2 indicates a collective awareness of exploring possible connections between what happens in one arena (here: staff development) in relation to another arena (here: classroom practice), and the actions to be taken, as leaders, to promote the critical use of pictures in teaching.

How video clips mediate analysis of students' learning

After the researchers observed classroom activities, one researcher talked alone with two students to find out more about what they were learning. In the video clip presented, the team could see how the researcher used subtraction in some stories, and then challenged the students to do the same by offering them Lego bricks. Excerpt 3 shows how the team examines the video clip.

In this excerpt, Annie (3) and Billy (4) comment that it seems as if the students are not committed to the task. After having observed the sequence, the researcher (7) suggests that the girl manages subtraction, which Annie (8) agrees with. Then the researcher shows what happens when the girl faces the arithmetic challenge of

subtracting 2 from 1. This task is visualized, and mediated, by using Lego blocks. The boy thinks $1 - 2 = 0$, while the girl thinks the answer must be 1. The researcher freezes the video clip to show the girl's face before the girl concludes that $1 - 2 = 1$. We now look closer at how the participants interpret this situation.

After seeing the first part, Annie (8), in Excerpt 3, thinks the girl understands subtraction. However, after seeing the second part of the video clip, Eileen (2) thinks the girl does not completely understand subtraction. The way the tool is used, by sequencing the video, mediates attention to a central pedagogic aspect: the risk of organizing activities in a way that leads to an instrumental rather than a reflective understanding, and so the talk focuses on the role of tools in teaching. The participants are interacting with the video clips, and the video clips, which mediate engagement in students' learning. In this sense, the tool also acts as a mediator in the situation reported in Excerpts 3 and 4.

Collectively, the team is now in the process of negotiating an expanded version of the situational object including a learning aspect. Learning theory, as a basis of knowledge, does not seem to be an active resource in the leaders' interpretation of the learning situation, which is a similar phenomenon in the other seven episodes as well. The result of the engagement might be increased collective awareness of pedagogical questions related to instrumental learning, and of the role of tools in learning processes.

How tensions mediate reflections on the use of professional concepts

The point of departure for episode 4 is an analysis written by one of the researchers, using concepts from Vygotsky's theory, based on the video situation shown before Excerpts 3 and 4. In Excerpt 5, the researcher gives an example of how the situation might be analyzed theoretically, and the team discusses how using professional language might trigger an attempt to improve educational practice. The analysis

Excerpt 3

Who	Utterance
1. The researcher	What do we see here? What happens in this sequence?
2. Annie	(...)
3. Eileen	(...) Those questions make them talk in general about calculating, and not necessarily about subtraction (...)
4. Billy	A bit bored with subtraction now
5. Tony	In a way, they are using what they have learned. It is the application
6. Annie	(...) There was that dialogue, and then there was the girl, but then there was "can you answer?", then the girl raised her hand, and she got to answer. But when they were actively working, they were together. Then it's two heads are like one (...)
7. The researcher	(...) Have they learned something, do they know [subtraction], from what you see now?
8. Annie	Yes, I think they know it

Excerpt 4

	Who	Utterance
1.	Researcher	What do we see here? If we describe first and interpret a bit, can we describe what happened first?
2.	Eileen	Initially we could see that the girl (Researcher: Yes) knew how to do the operational, the operations and automatize it. These are rather challenging cognitive processes when it comes to the abstraction (<i>support from others</i>). And it's not completely understood (...) because the girl does what she has learned (<i>support from others</i>), mechanically
3.	Tony	Mathematics is very instrumental (...) It is such a challenge to hold them back, so they think mathematics and not instrumental
4.	Eileen	Strategies here (...)
5.	Annie	Yes, use concrete, I think that would create greater understanding, our strategies
6.	Eileen	Actually transforming this into a text, into a mental text
7.	Tony	Then they would have understood that this wouldn't work (...)
8.	The researcher	It has something to do with our level of abstraction (...)
9.	Eileen	I think it's wonderful (...) When he says, "I'm confident it's zero!" (<i>Support from others and laughter</i>) That's so wonderful. And they're both sitting there and thinking so hard, then those pictures, are so wonderful. Look at them thinking (.....)
10.	Billy	But she sticks to her own explanation
11.	The researcher	Yes, she does. What makes her stick to her explanation?
12.	Billy	It could be that she's only looking at the blocks. How she has organized them
13.	Eileen	And that "the order in front of and behind the minus, does it make any difference? It might as well be organized this way"
14.	The researcher	What has she done? What has she done in order for it to become one?
15.	Eileen	She has actually subtracted one from two, even though (Annie: I also think so) the two is the last number (Annie: She put [the numbers] in the wrong order) (...) because her ability to abstract cannot understand this yet

focuses on exploring how tensions mediate analysis of teaching practice in professional development.

Excerpt 5 indicates that strings of action are coordinated against understanding a dimension of teaching practice as the situational object of the engagement. However, the participants, arguing from different perspectives, seem to have different goals. *Tensions* among the participants emerge in the talk (Engeström 1987). Some (Eileen, Tony, and Billy) argue for the use of professional language by staff, and one (Annie) is skeptical about using professional concepts because of the distance this may create from parents and other stakeholders. Tensions are more explicit in the fifth excerpt, compared to the other excerpts. The disagreement invokes further explanations, and should therefore not be seen as a negative thing in meaning making, but rather as a source of development.

The tensions in episode 5 seem to *mediate* nuances, extensions, and clarifications by drawing attention to the situation in which professional language is used, to the

Excerpt 5

	Who	Utterance
1.	The researcher	Up to now, we have been interpreting this from an everyday perspective. What I'm not sure about, whether there really is any qualitative difference between [an everyday perspective and a scientific perspective], or if it doesn't matter? Will we get as far with the everyday perspective? What do you think?
2.	Eileen	(...) But I actually believe that we can simplify our language, I talk about professionalizing it
3.	Tony	It is not a part of our everyday language... far from it
4.	Eileen	No, it's not, but I think it will simplify [professional talk] if not, it will be like we talk about, we talk about what we see without being able to relate it to increased awareness in relation to what more we can do about it
5.	Annie	Do we really need this kind of language to increase awareness, really? I'm not quite...
6.	Eileen	Maybe not necessary. We use more words, and we can have a different understanding of the words we put in it
7.	Billy	But for the teacher it might also, I think it might make the teachers more aware, in their, on their level, in relation to their profession (...)
8.	Annie	Yes, because that's where I think almost the opposite, because I think in relation to both expert reports and individual subject syllabus and such, we work for the opposite, to have a language that parents understand and to the extent that the students also get involved. So, then it at least has to be clear in which arenas this [language] is used
9.	Eileen	I think, between us, to make each other accountable for the quality
10.	Annie	I am in doubt about this, why the quality would be better by using the language, this language. I have difficulties seeing that. I have to be persuaded about that (...)
11.	Tony	(...). We need one language when we reflect together. You need some kind of terminology. But then we have like the cultural, (...) it's not accepted to speak about too advanced terminology (...) teachers need to become more professional (...)
12.	Annie	(...) And I think that there are many teachers who are very professional in their subject. Science concepts when dealing with scientific experiments, for example (...)
13.	The researcher	This is very interesting. So you're saying that the teachers have a professional language in the subject, but [they do not have] a professional language about the subject? (...)
14.	Eileen	Yes, you might say that

relationship between theory and practice, and to different forms of language when discussing subjects and pedagogical aspects. The engagement reflects how the team is in a process of learning about the use of language in a professional context. The result of the engagement is an increased collective awareness of the use of professional language in the principals' own contexts, although the principals discuss it very generally.

Discussion

The findings raise several issues connected to the knowledge base of leadership development and the role of tools in professional development. In addition, the

findings show the potential of applying CHAT as an analytical framework in studying the role of tools in the professional development of school leaders.

The knowledge base of professional development among principals

Principals are responsible for qualifying the conditions for students' learning as well as for their result. Since there is no single recipe for producing good results, the learning situation has to be analyzed to qualify teaching and make sure the school offers good conditions for learning. The local project, on which the analysis in this article is built, is an example of leadership development, which intends to enhance the principals' capabilities as educational leaders. The underlying assumption is that a focus on the school's core activities is crucial to fulfill the principals' educational leadership function and to supervise and support teachers (cf. Robinson et al. 2008).

The present project may be characterized as practice-oriented leadership development, where video clips of classroom practice serve as common ground and as an important tool for promoting collective reflections. In this way, the school data serve as a source of improvement. The findings show how principals are actively involved in exploring their own understanding of the recorded teaching practices, and the learning is actively supported by questions from the researcher and peers. Data become valuable when shared and interpreted among the team members but only to a small degree do the principals activate theories of learning when interpreting teaching situations. When the researcher uses theoretical concepts in his analysis, tensions among the participants emerge. Tensions mediate further explorations.

Practice-oriented leadership development is significant and vital. Practical tasks performed by principals may be learned by observing how other principals accomplish similar tasks, from sharing experiences with colleagues or, as in the local project, by collectively discussing and analyzing video clips of teaching practices. This argument is in line with Mintzberg, who argues that "managing is neither a science nor a profession; it is a practice, learned primarily through experience, and rooted in context" (Mintzberg 2009, p. 9). Learning from each other, emphasizing "best practice" as a basic principle, is also promoted in Norwegian leadership programs.

However, many situations in teaching and leadership require analytical expertise to solve problems and manage dilemmas. Systematic knowledge about teaching, learning and leadership, and knowledge about theoretical concepts may then be crucial for the participants to come to grips with their everyday practices. Even though learning from practice has shown great potential, it may preserve or mask the preservation of the status quo. Alternatively, learning from practice may encourage an embrace of the latest trends without equipping principals to analyze the models more critically. Observation is more than merely "seeing what is" because observation includes the perspectives and frameworks through which school leaders interpret what they see (Møller and Schratz 2008).

Therefore, the importance of theoretical concepts as a tool for analyzing what happens in everyday practice should not be underestimated. Although theoretical knowledge can never tell exactly what to do in a specific situation, we argue theory

might enrich our interpretation of everyday practice and thus expand the basis of leadership.

As demonstrated in our analysis, the questions raised by the researcher to some extent directed the talk about the video clips.

The role of tools in professional development

The analysis shows that school data serve as mediators for the team when examining a teacher's practice. The participants interact with each other and with the tools, and the tool mediates engagement in teaching and learning. Although the study does not document the effect of tool mediation in terms of individual achievement, the analysis indicates an increased awareness, on a collective level, when it comes to the use of concepts, the relationship between what happens in the classroom and what happens in courses for teachers, and implications for leadership.

Rather than preparing principals for certain tasks, this form of professional development aspires to qualify principals for educational leadership when working on situations in teaching practice. As the work of teachers is considered important for student learning (Hattie 2003), it follows that a principal's involvement in a teacher's work might also be important (Robinson et al. 2008). Video clips as a form of school data give the participants an opportunity to get involved in teaching and leadership teaching practices without being present in the situations. Based on the analysis, we argue that video clips, as school data for teaching practices, have potential in mediating professional learning among principals. In addition, using school data in leadership education may foster inquiry habits of mind.

Methodological reflections: CHAT as analytical framework

The analysis shows how tensions create progress in the team discussions, for example, by drawing attention to nuances in relation to the use of professional terminology in everyday practice in schools. The results are in line with many CHAT studies (cf. Engeström and Sannino 2010) that document how tensions trigger different forms of expansive learning. However, tensions might also be a hindrance for expansive processes, and even result in breakdowns. Applying CHAT as an analytical framework provides the potential for demonstrating how tensions might mediate learning.

The present study shows how individual actions and collective engagement constitute the learning processes. The findings suggest that principals and researchers develop a collective awareness of teaching practice in interactions with each other, and with video clips as physical tools. To credit an individual for grasping teaching practice would be insufficient, since the participants contribute by asking questions, bringing in different perspectives, etc. Instead of extending the list of competencies the principals may have as individuals, we argue that further research on leadership preparation and development should be aware of the potential to widen the unit of analysis from the individual to activities in which principals are engaged collectively as well as widening the site of research. In this way, it might be possible to produce knowledge in authentic situations that mediate

professional learning among principals, and hence, make principals better prepared in leadership for learning. We argue that CHAT holds the potential for grasping the dialectic relationship between individual actions and collective engagement.

Conclusions

The present study shows how school data may be used for improvement. The data mediate learning processes in teaching and leadership issues beyond a specific practice. The findings suggest the video sequences mediate engagement in pedagogical issues related to reading, teaching, student learning, the professional development of teachers, and the quality of learning and teaching. Tensions seem to mediate nuances, extensions, and clarifications. However, leadership issues are not automatically put on the agenda. The principals mostly bring in their own experiences as former teachers when interpreting the video clips. Theory and research do not necessarily seem to be activated when principals analyze core activities in schools. Still, it seems fair to assume that the result of the engagement is that the principals develop an increased collective awareness of questions related to pedagogical questions. Such processes rely on introducing and interpreting school data as artifacts. Documenting what really happens after this kind of workshop would require longitudinal observation in the local schools, which is beyond the scope of this study. Since the research literature documents the importance of principals supporting teachers in their work and learning processes (Robinson 2010; Robinson et al. 2008), how principals learn to support teachers must be explored further. CHAT provides a promising framework for this type of research by including artifacts as well as capturing the role of tensions in learning processes documented with empirical analysis.

An implication of the study is to pay attention to the role of tools used in professional development among principals and teachers. In addition, external facilitation seemed crucial for structuring the talk, anchoring the analysis of the school's core activities theoretically, and for highlighting practical implications for leadership.

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