

TEACHERS' REFLECTIONS OF THEIR OWN MATHEMATICS TEACHING PROCESSES

Part 2: Examples of an active moderated collegial reflection

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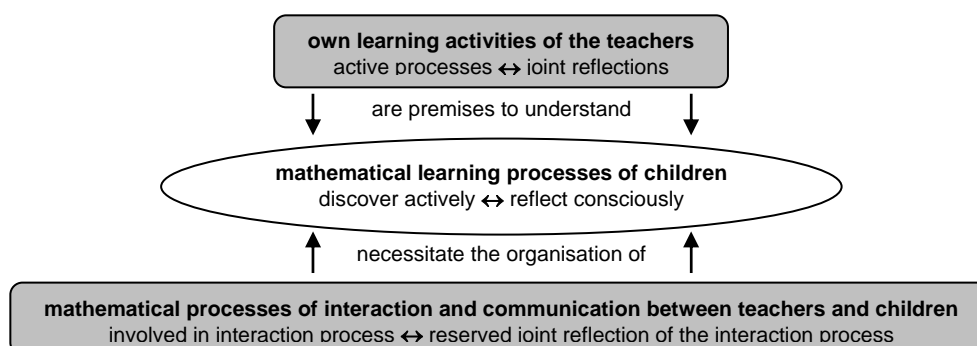
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Abstract. *The research presented in this paper offers a methodological approach to the analysis of teachers' professional development by collegial reflection. Collegial reflections are professional development meetings in which teachers watch and discuss excerpts from talking with their pupils. We'll present an example of collegial reflection based on a diagnostic talk between a teacher and a 2nd grade child. The instruments presented in the first part of this paper will be used for the analysis of the collegial reflection. Investigating the case knowledge participants' construct in professional development can further our understanding of how teachers interact to influence one another's learning. We'll see how participants make inferences about the events they noticed and how they use videos as evidence for their interpretations.*

1. INTRODUCTION: THE RESEARCH PROJECT AND COLLEGIAL REFLECTIONS

The presented research deals with the development of teachers' professional learning by analyzing video episodes. In this article we will concentrate on one example of a collegial reflection process and we will use the analytic tool presented in the first part of this paper for describing the reflection process.

Teacher professional development seems to be short-term, individualized and disconnected from practice (Ball & Cohen, 1999; McLaughlin & Mitra, 2002). An important aspect of teacher learning groups is that they engage in long-term collaboration with their colleagues, focusing on issues that relate to their daily teaching activities (Little, 2002). To promote and support teachers in attending to and interpreting students' mathematical thinking there should be interplay between activity and reflection (figure in: Steinbring, 2003, p. 217/218).



Lesson study provides such a possibility for teachers where they examine systematically their instructional methods, teaching content and also their students' processes of learning and understanding (Yoshida, 2008, p. 85). A small group of teachers plan together a research lesson, implement it and the other teachers observe this lesson. Afterwards they discuss about this research lesson. With the collegial reflection we try to offer the teachers of our projects a possibility to deepen and broaden their understanding of the teaching episode by an unusual view of the situation.

Our interest is to find out what kind of readings the participants use in the collegial reflections and what kind of case knowledge they develop when talking about the video episodes. In the first part of this paper we explained the different kind of readings: *biased – spontaneous* (narrate, evaluate) than *open – reflected* (paraphrase, interpret). The teachers construct knowledge by observation, experience, transfer and interrelation. If the teacher just refers to his own thinking, he will develop knowledge by observation or experience. If he takes account of the other participants' utterances, he will construct knowledge by transfer and interrelation. We also want to find out what impact the moderator has on the readings and the case knowledge the teachers develop in the structured talk. A structured talk is a collegial reflection with a moderator attending the meeting.

Sherin and van Es use a related approach for analysing their video clubs (Sherin & van Es, 2005) which are similar to our collegial reflections. They examine the teachers' role in the video club setting. In contrast to our research they do not identify the case knowledge the teacher construct when talking about the video episode. They analyse speaking turns along the dimension *specificity* (general or specific) and *focus on video* this means that they explore if the comments grounded in the events that occurred in the video or based on events outside of the video episodes.

This article is based on two research projects (“Malin” and “MathKiD”), which both deal with collegial reflections, but which differ in the way of support and moderation (see also first part of this paper).

- *Cautious* moderator („Malin-Project“) (Nührenbörger & Steinbring, 2008): The researcher chooses one video episode and provides the teachers with the video episode and the belonging transcript. Furthermore he introduces the methods of collegial reflection and presents a paper with analytic perspectives, which the teachers can use during the reflection process. The researcher moderates the reflection process in a *cautious* way. The teachers can discover and discuss independently the basic structures of their teaching. In the long-term they can adopt the collegial reflection as a school-internally way of professional learning. We hope that this may guide the teachers to understand their school as a place where also teachers can learn.

- *Active* moderator and *no* moderator („MathKiD“): The researcher chooses one video episode of a diagnostic talk, which one participant conducted. In every meeting the

chosen episode will be discussed from a different analytic perspective. The teachers are provided with the video episode and the transcript to the chosen episode. In the structured talk, where the project leader is an *active* moderator, the teachers first get a short introduction about the following meeting. They receive a paper with several stimuli to the specific analytic perspective, which they can use in the interpretation process for their orientation (Scherer, Söbbeke, & Steinbring, 2004). The project leader is an *active* moderator in the structured talk because she analysed the whole transcript sensitively before the meeting and looked for special features to be discussed with the teachers and which they shall notice. The structured talk is like a supervision where the external moderator is the supervisor (Lippmann, 2005, p. 10 ff.). In the informal talks the teachers meet each other without the project leader. You can compare the informal talk with intervision. If people meet each other without a moderator it is called intervision (Lippmann, 2005, p. 12). The structured talks and the informal talks are both audio taped. The informal and structured talks take place in an alternating fashion. In every meeting new transcript will be discussed.

In the following we will look at one structured talk of the project MathKiD. The influence of the informal talk prior to the structured talk will not be discussed in this article.

2. THE COMPOSITION OF THE STRUCTURED TALK

The composition of the structured talk is the following:

1. The teachers' feedback on the informal talk.
2. Analysis of the video episode with the belonging transcript from a specific analytic perspective:
 - a. Understanding of the child (first structured talk)
 - b. Intentions and actions of the teacher (second structured talk)
 - c. Interaction between the teacher and the child (third structured talk)
3. Flashlight to the new insights, which resulted from the analysis of the video episode.

Different stages of the structured talk are:

1. The teachers' feedback on the informal talk.

The moderator listens to the teachers and they report on the contents they discussed in the informal talk.

2. Analysing the video episode with the belonging transcript from a specific analytic perspective (understanding of the child, intentions and actions of the teacher, interaction between the teacher and the child).

First, the moderator asks the teacher who talked to the child in the video, what she expected from the child of her class before the diagnostic talk and what kind of feelings she had at the beginning of the diagnostic talk. Then all the participants watch the video episode and after that the teacher from the video has the possibility to express her first impressions of it. Then the other teachers can also express their

impressions. In the analysing process the moderator structures the discussion, 1) she encourages the others to express what they think about a statement of one teacher, 2) she tries to find out what every participant wants to express, 3) she points to different possibilities to interpret a situation and look deeper on special issues in the transcript, 4) she refers to the given stimuli on the paper the teachers got, 5) she focuses the conversation on mathematical interactions, 6) she reminds the teachers to talk about the transcript and 7) she remarks the teachers to provide an evidence from the transcript for their interpretation. The moderator is not assessing the interpretations of the teachers, is not changing her role into the didactical expert and is not insisting on her stimuli, which she offered to the teachers.

3. Flashlight to the new insights, which resulted from the analysis of the video episode.

At the end of the structured talk the moderator asks every participant to express their own new insights after analysing the video episode and what kind of new information they got about the mathematical abilities of the child and the possibilities to support the child.

3. THE FIRST STRUCTURED TALK ABOUT AJDIN AND MRS. WHITE

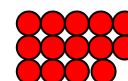
The MathKiD project started in August 2007 and five teachers from two different primary schools are participating. One group consists of three teachers, the other of two teachers. Each of the three teachers conducted one to three diagnostic talks with grade 1 or 2 pupils before the first structured talk in November 2007. The first informal talk was in October 2007 and is not audio taped.


The structured talk is the first meeting of the three teachers with the project leader to analyse a video episode and the belonging transcript under the analytic perspective “understanding of the child in the observed situation”.

Content of the video episode Ajdin and Mrs. White

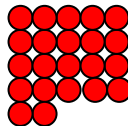
The content of the chosen video episode is the talk between Ajdin (grade 2) and Mrs. White about a pattern of coins at the beginning of the second grade. On one side the coins are red and on the other side they are blue. They are playing the game “Collecting coins” (Hengartner, Hirt, Wälti, & Lupsingen, 2006, pp. 27-30). In this game you throw your dice and move forward the shown number on the playing field. On special fields, where you see a structured or unstructured amount of coins, you can win coins. The goal of the game is to structure the won coins in a way that you always find out very easily and quickly how many coins you already won and to be able to compare your coins with the amount of coins your partner won.

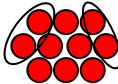
Ajdin and Mrs. White play the game “Collecting coins” the second time. At the beginning Mrs. White told Ajdin that he should display his coins so that they would not have to count a lot to find out who has already won more coins. They have already talked about 13 minutes. Mrs. White won 14 coins and she structured them in $5+5+4$.



Ajdin is winning his first 6 coins and he structures them like that: 

Mrs. White wins 5 more coins. Ajdin tells her that she now has 19 coins and she structures it like $5+5+5+4$. She first asks him how he saw this and then how he calculated it. He tells her that $14+5=19$, because $4+5=9$. After that Mrs. White wins 3 coins and structures them like that $5+5+5+5+2$:



Ajdin wins four coins and structures the coins like that:  Mrs. White says that it is a “strange” pattern and asks what he thinks about it. He first tells her $3+4=7$ and $7+3=10$ and later he says $3+3=6$ and $6+4=10$ while pointing on the lines of his pattern.

Epistemological analysis of the video episode Ajdin and Mrs. White

For the interpretation it is important to notice that “Collecting coins” is on the one hand a game and on the other it is dealing with mathematical contents. The arrangement of the coins is different for Mrs. White and Ajdin. She refers to five and ten as the base of our counting system when arranging her coins. She is not changing her pattern after winning some more coins. She continues her pattern (Nührenbörger & Steinbring, 2008).

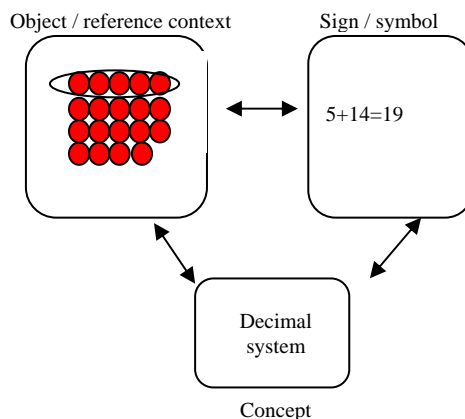


Fig. 1: Epistemological Triangle Mrs. W

Ajdin’s first pattern would be called triangle number. He is “continuing” his pattern to the second pattern. There is no (geometric) label for this pattern like square or triangle or something else. It is not clear in which way he would continue his second pattern. The second pattern seems so complex for Ajdin that he gives two different calculations as interpretations: first $3+4=7$ and $7+3=10$ and later $3+3=6$ and $6+4=10$. With the calculations Ajdin does not explain his actions when arranging the coins to the first pattern. The second calculation explains the pattern in a symmetric way, but Mrs. White is not dealing with it.

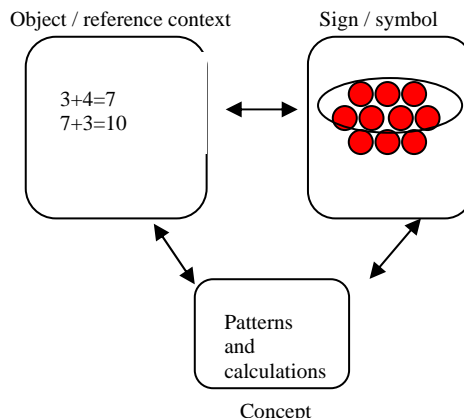


Fig. 2: Epistemological Triangle Ajdin task 1

Mrs. White uses the term “strange pattern” for his second pattern. Perhaps she uses it, because in her thinking her pattern is mathematically correct and not comparable with the pattern of Ajdin. For Mrs. White it is probably important to be able to “see” the amount of coins quickly and for Ajdin it is important to find an easy calculation for the pattern.

The moderator wants to discuss with the teachers about the different patterns of Ajdin and about the term “strange pattern”, which Mrs. White used.

Content of the structured talk about the video episode Ajdin and Mrs. White

The whole structured talk lasted 2 h and 15 min. Two different episodes were selected dealing with the first and the second pattern of Ajdin.

Content of the first episode of the structured talk

In the first episode the moderator tells the teachers that the first pattern of Ajdin is still a pattern even if it is not structured in rows of five or ten coins. This is meant as a stimulus for the others to discuss this statement. The participants are not discussing the first pattern. Through a statement of Mrs. White all the participants discuss the continuation from the first to the second pattern of Ajdin. The teachers discuss their own different interpretations of continuing the first pattern if they had won four additional coins.

Analysis of the first episode of the structured talk

The first episode deals with the continuation from the first to the second pattern of Ajdin. The teachers talk about patterns as a mathematical content and the working process of Ajdin. They do not differentiate between these two topics.

Each teacher talks about the cases in different readings, as specified below.

Mrs. White talks more than half of the time and dominates the discussion. She explains her understanding of patterns and what she believes how Ajdin is thinking. Probably Mrs. White has the feeling that she has to justify and to defend her actions in the diagnostic talk. On the one hand she is telling about her own thinking (“I would have” / “I put” / “for example I would” / “I would do”) and on the other hand it is presumable that she tries to get a sense of Ajdin’s statements (“I don’t know what he” / “I think” / “I believe” / “I find this unexpected” / “I can imagine”) (line 65 ff.). She describes her working process when she builds patterns, which is mainly based on her experiences. In this episode Mrs. White **narrates** and **evaluates** the continuation from the first to the second pattern of Ajdin (l. 69).

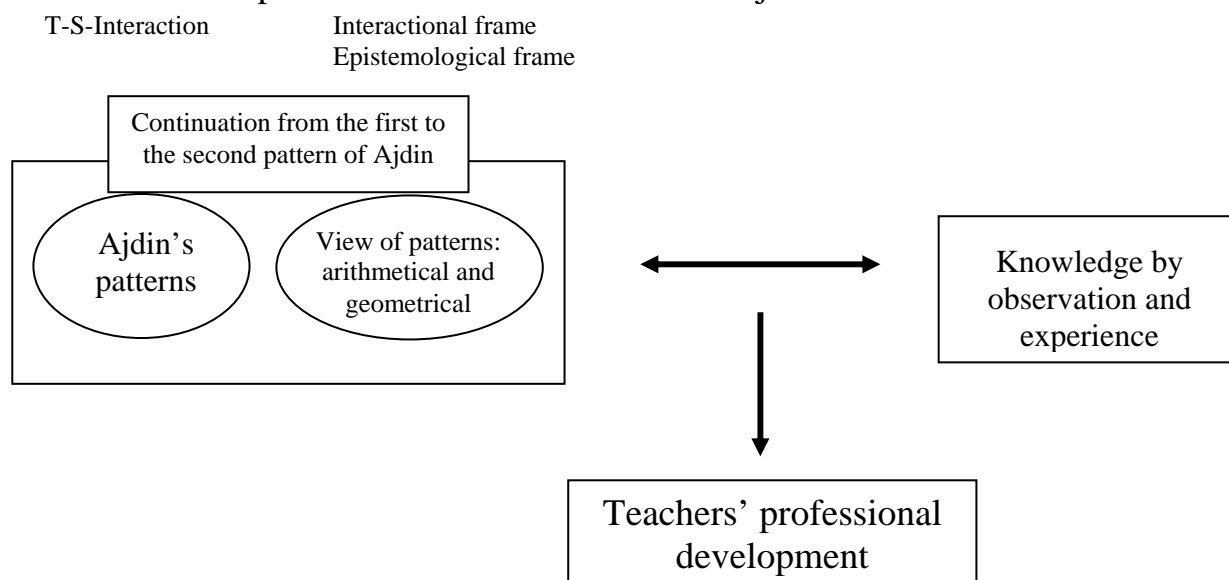
Mr. Peter talks about the structure of Ajdin’s first pattern, which Ajdin loses in the eyes of Mr. Peter when he creates the second pattern. Mr. Peter assumes that Ajdin followed the sequence of natural numbers in his first pattern (l. 71, 73, 75). Mr. Peter **evaluates** the situation in this episode.

Mrs. Dieter reacts to the stimulus of the moderator (l. 77, 79) by creating a pattern different from Ajdin’s second pattern. She neither refers to the transcript nor the

episode. She connects the pattern with geometrical shapes like a square (l. 83, 85, 87, 91, 96, 98). Her statement seems like an insertion. Mrs. White rejects Mrs. Dieter's statement and therefore Mrs. Dieter tries to justify her thinking (l. 101, 112). At the end she refers to the transcript when she talks about Ajdin seeing six coins at once (l. 114). Mrs. Dieter briefly **narrates** the situation at the end. The other time she does not refer to the episode.

In this episode Mrs. Otto shortly **paraphrases** that Ajdin counted the six coins when he won them (l. 115, 117). She refers to the transcript.

The moderator gives a stimulus to think about Ajdin's first pattern if it is a pattern (l. 64) and how each of the participants would put the four coins Ajdin won to his first pattern (l. 77). Then she tries to understand the statements of the teachers and demands further information. In line 104 she refers to the rule of the game that says that you have to structure your won coins, but not in a specific or given way. The moderator tries to initiate that the teachers develop different interpretations of continuing the first pattern to the second pattern of Ajdin.



Discussion of the first episode of the structured talk

If we look at the readings of the teachers we can see that they react more *biased – spontaneous* (narrate, evaluate) than *open – reflected* (paraphrase, interpret).

If we look at the generation of case knowledge we can see that the teachers use their knowledge by observation and experience they have developed. For example Mrs. White refers to her remedial teaching (l. 74) as knowledge by experience. The teachers are not interpreting the given material in detail, the video episode and the belonging transcript. They do not refer to the statements of the other participants and therefore they do not generate knowledge by transfer and interrelation.

Content of the second episode of the structured talk

In the second episode the participants discuss from where Ajdin got the first pattern. Was it his own idea or did he see this pattern on the playing field? One teacher says

that Mrs. White could have asked him why he structured the pattern like this. Mrs. White says that she could ask him but his answer would not help her to know from where he got his first pattern. Then they talk about the change from the first to the second pattern. The teachers tell their own different interpretations of the second pattern. They think about how to foster the mathematical abilities of Ajdin. They believe that you only have to support children with low-level competencies. They are convinced that they do not have to support him, but to foster over the usual level. In line 320 the moderator refers to the diagnostic-talk-transcript and says that Ajdin interprets his second pattern in a second way and one teacher states that Ajdin re-interprets his second pattern when he gives another calculation.

Analysis of the second episode of the structured talk

The second episode deals with the development of several cases. They talk about the origin of the first pattern of Ajdin and again about the continuation from the first to the second pattern of Ajdin. They discuss about patterns as a mathematical content and the working process of Ajdin. Furthermore they think if they have to support Ajdin even if he is not a low achiever.

First we will look at each teacher. Each of them talks about the cases in different readings again.

Mrs. White talks more than one third of the time and like in the first episode she tells what she thinks about the patterns and what she believes how Ajdin is thinking. Probably Mrs. White has the feeling that she has to justify and to defend her actions in the diagnostic talk. It seems like that because she dominates these two episodes. She uses “I” very often differently. We already described this in the analysis of the first episode. It seems that she thinks she knows what Ajdin wanted to do. She express that she can demand explanations of Ajdin, but they will not help her understanding what Ajdin thought (l. 254, 256). Most of the time in this episode Mrs. White **evaluates** the working process of Ajdin when he builds his patterns (l. 238, 240, 242). She decides that Ajdin needs no supporting, so she also evaluates the process (l. 313) and tries to finish the discussion in this episode.

Mr. Peter talks again about the first pattern of Ajdin. He seems to be convinced that he knows how Ajdin saw his pattern. For him the only view is following the sequence of natural numbers (l. 235, 290 ff.). He refers to the transcript when he evaluates the working process of Ajdin. At the end he describes that Ajdin finds two different calculations for the second pattern. Mr. Peter **evaluates** and **narrates** in this episode.

After the moderator repeats the statement of Mrs. Dieter (l. 279) she is the only one who reacts and she explains her statement (l. 280 ff.) how she looks on the second pattern of Ajdin. Her statement seems like an insertion because nobody refers to her. It seems that only Mrs. Dieter tries to answer to the stimulus of the moderator. Mrs. Dieter **narrates** in this episode.

In this episode Mrs. Otto reacts to the statement of Mrs. White and suggests her to ask Ajdin what he thinks about his patterns. She refers to the transcript when Mrs. White says “pattern”. She reflects about the term “pattern” and the interpretation of it (l. 257 ff.). Later she points out that one can also support children who show a good performance (l. 316, 318). Mrs. Otto **paraphrases** and **interprets** in this episode.

The moderator gives feedback to the statements of the teachers with “mhm”. In line 279 she points to the continuation from the first to the second pattern and takes up the statement from Mrs. Dieter (l. 273). Later she refers to the transcript and explains that Ajdin has two different interpretations of his second pattern (l. 320 ff.). Most of the time she listens to the conversation.

Discussion of the second episode of the structured talk

If we look at the readings of the teachers we can see that all the four teachers stick to their roles. They react more *biased – spontaneous* (narrate, evaluate) than *open – reflected* (paraphrase, interpret) apart from Mrs. Otto. In this second episode Mrs. White and Mr. Peter discuss a lot, but the others are also active, but not talking that much.

If we look at the generation of case knowledge we can see that the teachers use their knowledge by observation. The teachers refer more to the transcript than in the first episode, but they rarely use knowledge by transfer and interrelation.

Comparison between the first and the second episode of the structured talk

We can see that in both episodes the teachers use almost the same readings and generate almost the same case knowledge. Only the moderator reacts more restrained in the second episode. It seems that the moderator helps the teachers to refer again to the transcript. But sometimes it seems that the teachers give the moderator the role of an inspector whom they have to answer to, especially Mrs. Dieter.

4. CONCLUSIONS AND OUTLOOK

We found out that in this first structured talk the teachers react more *biased – spontaneous* (narrate, evaluate) than *open – reflected* (paraphrase, interpret) and use mainly knowledge by observation and experience and rarely knowledge by transfer and interrelation. Probably the teachers develop a more *open – reflected* view over the course of three structured talks in one year. And perhaps they get used to this kind of discussion and interpretation as a result they refer more to the statements of their colleagues to generate knowledge by transfer and interrelation.

The influence of the moderator seems to remind the teachers to focus their attention on the transcript and to initiate reflection processes about the statements of the other participants. We have to look for more evidence what impact the moderator has on the course of the structured talks and the case knowledge the teachers develop. We also can compare the influence of the cautious moderator (“Malin”, first part of this paper) and the active moderator (“MathKiD”) on the course of the structured talks.

After one structured talk we can draw no consequences and we cannot describe lasting changes in the readings and case knowledge the teachers develop. We will investigate and describe the development over the three structured talks. At the end we will look at video graphed lessons from the beginning and the end of the project MathKiD and will investigate if the structured talks had an impact on the teaching of each participant and on their professional development. Furthermore we will reflect if the participants want to continue the collegial reflections in their school without a moderator intended of the cautious moderator (first part of this paper).

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Transcripts can be ordered from the authors.