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CHAPTER SEVEN

What Do Students Attend to?
Students' Task-Related Attention in Swedish Settings

INTRODUCTION

What aspects of tasks on mathematical relationships do Swedish students attend to when interacting with the teacher? In this chapter three types of mathematics task-related issues that students focus their attention on in Swedish classrooms are analysed. Previously attention and motivational factors such as interest and student engagement have been objects of both theoretical and empirical research. However the main focus of existing studies are attitudes or psychological states, often dichotomised and not related to mathematical content. We are investigating what students attend to in tasks on mathematical relations. The overall purpose is to find out how students direct their attention towards this content matter during student-teacher interaction, and how this knowledge can be useful in mathematics classrooms. Our aim is to provide a student voice, focusing on what students attend to in student-teacher interaction when dealing with tasks on mathematical relations and how it can be linked to the concept of interest. Through our analysis of video recorded lessons from one grade eight class in a Swedish school we discovered three categories of task-related attention: (i) Relevance of a task, (ii) Solving a task and (iii) Validating a task. In this chapter, episodes will serve as empirical evidence of three types of task specific attention in student-teacher interaction.

BACKGROUND

Interest and Learning

The background to this study is ongoing research on the interactive view of motivational factors, such as interest and student engagement in mathematics. On the curriculum level, one of the official aims in Swedish school is to develop interest towards mathematics. Research related to the concept of interest in education has evolved from being a trivial, everyday term for internal/external state of affect, to empirical studies on interest towards content specific situations (Bikner-Ahsbahs, 2003; Dewey, 1913; Mitchell, 1993; Nilsson, 2009). There is empirical evidence to support the importance of interest in relationship to learning mathematics. The relationship between interest and learning was established through multilevel structural equation modelling and resulted in a reciprocal

B. Kaur et al. (eds.), Student Voice in Mathematics Classrooms around the World, 115–131.

relationship between interest and learning (Ma, 1997). This reciprocity can be illustrated, as shown in Figure 1.

Interest ←→ Learning

Figure 1. Reciprocity established by Ma (1997)

In other words, learning affects interest and interest affects learning. The antecedence of interest and learning leads us to the question of how interest is evoked. This we want to approach by starting to analyse what students attend to in a task. It can be done on a classroom level, approached through analysis of mathematics lessons. The intentions of an empirical approach to interest lead us to initiating a study of task related attention. That is, attention directed towards subject matter in mathematics originates from this pedagogical dilemma. Also, it is important to stress that the concept of interest in studies of teaching and learning has certain features that are unique, not shared by motivational research. For one, interest is connected to the content- related area of learning rather than motives or goals (Ma, 1997). Interest is expressed during tasks and activities in classroom practice. On that basis, interest has been studied beyond the dichotomy of inner/outer state or motives and attitudes.

Further on, interest is introduced in relationship to knowledge and the process of learning mathematics in institutional environments. In other words, rather than focusing on the *motive,* the direct involvement in the learning situation is analysed in order to gain insight in the process of interest construction. When it comes to an empirical approach on interest, it can be searched for in the Gaps of Knowledge (GOK). This view originates from the Informational Gap Theory where interest is described as a perceived focus of attention on specific knowledge gaps, which become exposed to an observer during interaction (Silvia, 2006). This perspective is grounded on epistemological assumptions stated in the following way:

- Knowledge the student is aware of having
- Knowledge the student is unaware of having
- Knowledge the student is aware of not having
- Knowledge the student is unaware of not having

The gaps of knowledge are described as the difference between the wanted knowledge and the knowledge one is already aware of. What can be gained from this view? In this study attention is seen as a pathway towards the development of interest, constructed in the gaps of knowledge. GOK serves as a metaphor to conceptualise the bridge between the knowledge the student is aware of and the knowledge that the student desires. This view on knowledge indicates that there are constructions not yet experienced by the student; that the student is aware or unaware of (Marton & Booth, 1997, p. 7). In this study the GOK model is presented in order to relate student interest construction to students' knowledge. This epistemological standpoint is helpful when distinguishing between episodes in which students try to learn or try to receive social recognition. The use of this model will help us to gain insight in interest related to specific tasks that are a part of classroom interaction. It can help to interpret what students attend to, and how to choose sequences relevant as units of analysis.

Task-Related Attention

The first step towards an approach on the conditions for learning mathematics is to look at what students attend to. Attention as an object of study is also process oriented, "not a thing, at least in the sense of some thing to which you can point" (Mason, 2004). Mason gives a view on attention as a dynamic process, an act where a student's focus has a certain direction. When looking at what students attend to, it is, according to Mason (2004) equally important to take into consideration *how* they attend.

In classroom interaction, the manner in which the students attend to a specific task can manifest through students engaging in a certain activity or task. This type of engagement has been investigated in different classroom behaviours (Helme & Clarke, 2001). In videotaped data and interviews Helme and Clarke used cognitive engagement (CE) to analyse how students engage on different levels. The results of their study found that students engaged on an individual level using a variety of forms including: verbalising thinking, resisting interruptions, externalising gestures, and giving feedback when working in pairs. Students who cognitively engaged in subject matter also completed utterances of the teacher or other peer students, exchanged ideas and suggestions and justified their argument and solutions. In other words, engagement was established as a term for student involvement and actions, beneficial for their cognitive development. Further, Helme and Clarke give insights into the quality of the engagement of a student through excerpts of conversation between a student and the teacher and the student and another peer. This type of research is a possible point of departure for investigating conditions for learning. Therefore, in order to research conditions for learning we need to analyse students when interacting in a certain way, focusing their attention on mathematical activity, expressing interest and cognitive engagement. Indicative factors can be used as a tool to pinpoint how the students behave when they attend to mathematics.

In this study we take a stance by linking motivational factors such as interest and student engagement to task-specific attention. We will contribute with insights into the ways the students attend to specific features of a task in their interaction with the teacher with mathematical relations in focus.

AIM AND RESEARCH QUESTIONS

The overall aim of this chapter is to propose a student-oriented view on interest during classroom interaction. It is a study where attention is linked to specific features of different tasks during naturalistic classroom interaction. In our study, we include the concept of task specific attention as a part of student interest development. Students' focus of attention and what this attention is directed towards when dealing with mathematics is investigated. In other words, interest is manifested in a student's way of attending to a certain task. This provides a point of departure for an approach and analysis of empirical data.

The research questions addressed in this study concern students dealing with tasks within a specific topic area in mathematics, namely mathematical relations: *What aspects of a mathematics task do students attend to when interacting with the teacher? And how is interest co-constructed in such situations?* Hence, we aim to outline students' way of attending since attention can be observed.

METHOD

The main focus of this chapter is student voice during classroom interaction. Interaction has on a group level been described as "a collective pattern in how human beings understand and behave" (Emanuelsson, 2001, p. 23). Based on this conclusion we turn to a way of understanding interest as an interactive process inside the classroom. The object of study is the process of interaction, primarily on students' focus of attention relative to subject specific circumstances. In our study this point of departure provides an opportunity to give students a voice without decontextualising learning situations, without neglecting the specific turns that might be of importance in the process: "In focusing on the interaction itself as a unit of study, creating a more active image of the human being and rejects the image of the passive, determined organism" (Cohen, Lawrence, & Morrison, 2007, p. 404). This study highlights the active image of the student in the classroom context, without neglecting the teacher. Student-teacher interaction is chosen as a focus of analysis, because this form of interaction frequently occurs during Swedish lessons. As numerous studies show, the Learner's Perspective Study (LPS) data provides a rare opportunity to analyse development through students' actions in detail, as well as to follow this interactive process in naturalistic settings (Clarke, Emanuelsson, & Jablonka, 2006). An analysis based on a continuous lesson set can lead towards an overview on the theme of interest and provide suggestions for further methodological decisions and possibly further data collection. In this particular study a video analysis involved a sequence of 10 lessons from the LPS data in school SW1. The aim was to investigate if students' interest construction is visible for an observer, what students are interested in and if students' reflections on their actions are compatible. Episodes from one lesson (SW1L10) were selected for further analyses. This lesson was chosen because the theme of the whole lesson was individual work in textbook, especially rich in student-teacher interaction with content matter in focus.

The analysis was done in several steps: First individually, by choosing episodes from different parts of the lesson, illustrating students attending to a task. In step two we coded suggestions for categories in order to describe what students attend to. In the third step of the analysis a team of experienced researchers validated episodes and discussed the strengths and weaknesses of suggested categories. Revisions of the categories and coding of sequences were made. In the final step, the chosen episodes were organised into excerpts by the writers. Categories that were generated from this material can be recognised as a result of a qualitative approach that serves to "penetrate the situations in ways that are not always susceptible to numerical analysis" (Cohen et al., 2007, p. 407). Visual resources made it possible to go back and forth in the data, scrutinising it in collaboration with different researcher groups' various insights and perspectives.

This data is a unique high quality data set where ethical aspects are taken in consideration at all the stages of data gathering. In this secondary data analysis attempt we spent time reducing extensive amounts of recordings and transcripts to a manageable number of sequences. Therefore we chose to take specific precautions when handling and analysing recorded material. For one, the avoidance of material downloads to unprotected computer sources and the risk of spreading confidential material. Analysing recordings from the original source, in this case a server, highly protected by individual passwords, was a suitable solution to this ethical issue. As a part of the analysis and validation process, sequences were presented in working groups, courses and conference participants. In such cases of scrutiny the permission from students who participated in those sequences needs to be thoroughly controlled; there was permission to use the material. In some cases, permission was given for research but not for conference presentations and discussions. Those students were eliminated from the analysis. Only students who agreed to be full participants are included and referred to anonymously in the transcripts. One important precaution had to do with the teacher's role. When analysing a teacher's actions it is important to keep a sensitive, honouring way of expressing oneself in the analysis. It is important not to become normative in a sense that values the teacher's performance, but instead interpret what actions mean. These considerations correspond well with the legal requirements of confidentiality and utility according to Swedish recommendation, that individuals are protected from identification and not exploited for non-scientific purposes. Since this study is of an explorative character, not all ethical aspects are expected to be obvious from the beginning. By following general guidelines research participants', teachers' and students', personal integrity is not neglected.

RESULTS

In the following section we present three episodes, illustrating categories of what student's attended to during student-teacher interaction. The episodes are:

(i) Relevance of a task
(ii) Solving a task
(iii) Validation of a task

A common feature of all the episodes is that the student is initiating the interaction by approaching the teacher with a question or a comment. Hereby the results are presented in form of episodes, each supported by a set of excerpts, where students' attention is visible in student-teacher interaction. In order to interpret the presented data, we have revised lesson transcripts and impose the following key symbols:

, or . pause;
… unfinished sentence;
(…) speech impossible to detect;
[…] events or behaviour outside speech;
// simultaneous speech

(i) Relevance of a task: "What do you need this for?" In the first episode, the student who is instructed to work individually tries to understand the relevance of the tasks on mathematical relationships.

Excerpt L10:1

04:54:16	Student	Where's everything? [Leafs through the maths book] What's it called?
04:57:24	Teacher	Yes yes. What do you mean?
04:58:19	Student	(...)
04:59:09	Teacher	Yes //yes, you draw a line, yes you do. [Nods]
05:00:20	Student	//Yes but ... It's so ... It's like no one ... It ... I don't know how to explain ... Well ... It's so ... It's like ... Yes, am I going to have any use for being able to draw lines ... I mean I
05:19:25	Student	I understand ... well I sort of understand stuff like this ... I(...)But why should I? And I can show where this point is (...) compared to that one.
05:20:07	Teacher	Yes well yes//But that's really good ... But that's good, yes but that's really good then
05:29:24	Student	//But I don't want to, to keep on doing this for like 20 pages and stuff and carry on there and then there's even ... more (here)
05:34:11	Teacher	Yes but can you, can you, like, do it?
05:36:17	Student	Yes I think so?
05:37:19	Teacher	Yes well I think that you should do move on and stuff because in the red section ...
05:40:28	Student	Yes. [Nods]
05:42:18	Teacher	(...) then there'll definitely be things you can't do. It'll ... It'll be a bit more there (...) so it'll be a bit different.

The student in Excerpt L10:1 is upset and involves the teacher in a conversation about the tasks suggested by the teacher. The student starts by approaching the teacher, who is standing next to her, and questions the relevance of the tasks. In this episode the teacher listens actively, responding by nodding and confirming the student's concern (04:59:09, 05:40:28). He tries to direct the student's attention to the purpose of dealing with the tasks, by bringing up hierarchical structure of mathematics as a subject, where prior knowledge is important in order to deal with coming tasks. The student requires information about the long-term relevance of the topic and at the same time seeks justification for mathematics as a school subject.

Excerpt L10:2

05:49:28	Student	What do you *need* this for?
05:51:15	Teacher	What you need this for? Yes, well the thing, the thing, the thing, the thing is ... that it is good for ... It's that you will be able to read graphs and understand what they mean ...
05:58:06	Student	Hmm
05:58:29	Teacher	... and it's not always so very simple. If you can do it and read and understand the difference between the pear and apple tree right here, or pears and apples, that's good.

The teacher hesitates when it comes to explaining the practical implications of the task (05:51:15). The student expresses that she will attend to the tasks that are relevant. The teacher now tries to provide a meaningful explanation. He does so by suggesting procedural purpose of mathematics (05:58:29). His first explanation of these tasks' relevance to the student is to be able to interpret graphs in different situations and to become skilful when dealing with future tasks.

Excerpt L10:3

06:09:12	Student	Hmm
06:09:25	Teacher	But it's a really ... It's a really simple diagram (this one)... But I ... I ... It's ... it's good if you're practicing this because it's ... It's I think important for everyone to be able to do. If you've got a graph in a newspaper you need be able to understand what the graph is. And later we're going to talk a bit about
06:25:10	Student	Hmm but that's what I'm doing. It's about (...)

The student argues with the teacher; she thinks that she is already able to work with the graphs (06:25:10). The teacher instructs her to provide an area of application from everyday life for the student to relate to (06:09.25). Also, at this point of the interaction the teacher signals that the conversation is over, by making an attempt to leave. The student resists this action and continues to express her frustration over plotting graphs.

Excerpt L10:4

06:29:03	Teacher	Yes but that's good. [Nods]
06:29:04	Student	Yes [tries to leave]
06:29:17	Student	[to T] Hey, you!
06:29:22	Teacher	[turns to the student]Then I think you should carry on with it a bit longer.
06:32:16	Student	[sigh]
06:33:02	Teacher	Yes.
06:33:19	Student	But there are millions of pages!
06:35:10	Teacher	No, there aren't millions of pages.
06:36:16	Student	Yes there are (...)
06:39:27	Teacher	Yes.
06:40:24	Student	And then it keeps going, there, it's just that there are millions of pages. I mean, how can one even think up so like many lines? [laughter] I don't get it.

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06:46:19   Teacher  [laughter, looks down at the student, repeats
                    with a comforting voice] Mmm. How can one ...
                    How can one think up so many lines.
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Here we see the student expressing unwillingness to carry out the tasks on mathematical relationships. Unsatisfied with the given answer, she carries on arguing. She does not let the teacher leave and move on to the next student (06:29:17). She is still attending to finding out the relevance of similar tasks.

Excerpt L10:4 ends on a positive note with laughter and smiles. In order to focus her attention on mathematical relationships, this student seeks confirmation of relevance within the tasks. Although she shows her understanding of the topic as she interprets it, about drawing lines and comparing points plotted in a graph (05:00:20) it is the procedure and not the concepts she is determined to avoid (05:29:24). In the exchange we see how the teacher justifies this topic (06:09:25). The student returns to that issue later in the interview, stating that she can proceed with any task as long as she knows the purpose: What do we need this knowledge for? When is it applicable? To summarise these excerpts, it can be said that interaction involving the clarification of the relevance structure, both practical but also considering abstract sides of mathematics, can be a part of the process. The selected episode (L10:1-4) illustrates the student's repeated questioning of tasks that involve plotting graphs indicate that interest can be co-constructed with the aspect of relevance in focus. The teacher tries to convince the student with examples of practical implication in everyday life, such as "to read and understand curves in newspapers." In the beginning the student is upset, questioning the relevance of dealing with this content matter. The student reveals her way of understanding mathematical relations while reflecting on her own knowledge. When she claims to already be capable of understanding representations in diagrams and graphs, it becomes visible that she doubts her own ability to "draw lines." She says that she does not want to attend to a procedure on a topic she claims to master. At the same time, in her interaction with the teacher she shows insecurity, indicating there might be gaps of knowledge (05:36).

Arguments that the teacher suggests for letting the student continue doing something she already claims to know is that it is necessary; that solving simpler tasks constitutes basic knowledge and is a condition for solving more complex tasks. There will be, according to the teacher, new challenges later in the chapter, in the red section. However, we see that the student is interested to pursue repetition only if she can see a relevance of the tasks. In other words, the student pays attention to the relevance of content matter, and she does so in a passionate way. By questioning the relevance she begins to construct interest through the interaction with the teacher.

(ii) Solving a task: "The bigger the x-value, the steeper the graph" Next scenario aims to capture a type of unit where the student communicates a wish to clarify mathematics strategies within a specific task. In the text, the task (see Figure 2) is marked with an asterisk (*), which means it is on a higher level than ordinary tasks.

Which of the following relationships in the diagram to the right
a) are parallel lines
b) start in origin.

K=100x
K=6x
K=20+6x
K=20+2x

Figure 2. Representation of the task the student is working on

Excerpt L10:5

47:55:05	Student	... are parallel [reads the task]
47:55:26	Teacher	Yes
48:17:15	Student	Yes ... They can’t be parallel because they
48:20:24	Teacher	Why is ... Why can’t they be parallel?
48:22:17	Student	Well because it’s ... It changes ... yeah.
48:22:23	Student#2	(...) A lot higher up
48:26:15	Teacher	Good, you’ve come a long way. What is this? What sort is this? Who ... What determines how much it is changed or how, how much it slopes?
48:33:13	Student#2	That!
48:34:27	Teacher	Yes, exactly, the one next to x there.
48:36:21	Student#2	Yes.
48:37:18	Teacher	The bigger x you have, what happens then with a graph?
48:41:01	Student#2	//Mhm
48:41:07	Student	//Mmm
48:42:12	Teacher	It goes up more quickly, doesn’t it ... Hmm ... How quickly does that one go up?
48:47:26	Student	Quite quickly?
48:48:23	Teacher	Yes because for one step on the X-axis it rises ... six steps on the Y-axis ... and on that one then ... so for one step on the X-axis it also rises ... six ... steps on the Y-axis
49:06:15	Student	(maybe) [says it in English]
49:06:27	Teacher	Yes but look here.
49:07:14	Student#2	(maybe) [says it in in English]

The first student in excerpt L10:5 initiates a teacher-student conversation by raising her hand to seek help determining which lines are parallel and pair those together. At the same time, a peer student becomes involved by joining the conversation. In order to solve the task, the students focus their attention on the teacher’s questions. As the progress of the conversation becomes more teacher-driven, the student’s attention is directed towards answering the teacher’s questions. The teacher explains how the shape of the line changes depending on the value of x. At first the student seems to be insecure and guessing how the student can find a satisfactory solution to the task (48:47:26). There is doubt in the students’ comments, indicating that the students have not understood and are possibly trying to guess the answer or say what is expected of them in the conversation (48:47:26; 49:06:15; 49:07:14).

Excerpt L10:6

49:08:12	Student	But what are you doing now, do I have to *look?*
49:24:17	Teacher	One two three ... Eeer, here ... That's zero ... It goes from the origin
49:31:11	Student	Hmm
49:31:17	Student#2	Hmm
49:32:05	Teacher	Does this one go from the origin?
49:32:27	Student#2	Yeah
49:33:14	Student	Mmm (nodding)
49:33:22	Teacher	Does this one go from the origin?
49:34:06	Student#2	No
49:34:15	Student	Nah
49:34:26	Teacher	Does this one go from the origin?
49:35:17	Student#2	//no
49:35:21	Student	//no

In excerpt L10:6 we observed the rapid flow of teacher's questions followed by students' answering more and more simultaneously. Directly after every explanation, the students' attention is caught again. Here attention becomes visible in the data when the speech overlaps – the two students start to form a unity in answering question (48:41:07; 49:35:21). As the episode continues, the co-construction of interest in the form of overlapping speech becomes frequent, in fact every time the teacher receives an answer.

Excerpt L10:7

49:35:27	Teacher	No. That's good. Now we'll get an incline on this one and how much it inclines, it's, if I know that this is x six, then I know that for one step it inclines six
49:45:00	Student	//hmm
49:45:05	Student#2	//hmm
49:45:09	Teacher	Two steps then, it's going to rise, 12.
49:47:29	Student	//hmm
49:48:04	Student#2	//hmm
49:51:09	Teacher	*This* one on the other hand ... It actually starts on 20 ... And for each x it's only going to rise two
50:02:21	Student#3	[Approaches T by patting him on the back, tries to get his attention]
50:04:05	Student	Yes but that one also starts on 20
50:05:23	Teacher	That also starts on 20
50:06:13	Student	You've drawn that
50:07:23	Teacher	But was it that ... aha
50:09:26	Student	But was it that ... aha
50:12:06	Teacher	So that starts there as well but it's going to have ... the same ... So those two are going to be parallel ... Because they have the same "incline coefficient" - is what it's called
50:26:05	Student	//yeeees?
50:26:11	Student#2	//yeeees?
50:29:19	Teacher	The one with the x is called ... It says *how* much
50:32:06	Student	Hmm
50:32:17	Teacher	Each step of x is called because it says ... How much is step of x. How much y is going to rise and if they rise the same then they

		are always going to be parallel.
50:38:26	Student	Yes exactly.

In particular, in L10:7 the teacher is active; he tries to shift the attention towards the main question. The structure of the conversation is presenting the procedure to the student in chronological order, emphasising the important knowledge. In contrast to the first example, here the focus of attention is not on finding relevance; the teacher does not define or try to specify the meaning or application of parallel lines. Rather, he aims to communicate the key message: the larger the x-value, the steeper the graph. Also, in the beginning the student gets acknowledgement for her pre-knowledge and at the end support for her understanding of the concept. Up to this stage both students confirm that they understand what the teacher was trying to say (50:26:05; 50:26:11). It seems as if the student has understood how to determine if two lines are parallel (50:38:26).

Excerpt L10:8

50:40:14	Teacher	Do you understand?
50:41:05	Student	Yep.
50:42:25	Teacher	So those two are parallel.
50:44:01	Student	Okay.
50:44:21	Student#2	Okay.
50:46:01	Teacher	Are those two parallel?
50:48:29	Student	Can never be.
50:50:28	Teacher	Exactly, they can never be, right, this one here only increases by two for every step that one slopes a hundred.
50:54:08	Student	Then it should be two.
50:54:15	Teacher	[Nods]

In L10:8, the teacher is trying to test if the student can apply what they have learned about the parallel lines. During this conversation, both students confirm that they have learned what the teacher was trying to explain about parallel lines (50:40:14-50:44:21). However it is possible that students confirm or give a positive reply because it is expected of them as a part of interaction. In the next step the teacher choses to let the students show that they can apply their knowledge in a new example on the same theme. The teacher poses a question to see if the student can determine if two other lines are parallel (50:46:01). When the student gives a correct answer and also provides details on the new task, the teacher accepts the answers (50:54:08, 50.50.28) and it can be concluded that learning has been taking place. Rephrasing the answer and adding to the earlier explanation is a strategy this teacher uses to find out if the students learned (50:50:28).

The two students are engaged in the same task. Student number one is interacting with the teacher and the other student, initially passive in the conversation, is engaged as an active listener (observed to be concentrating and taking notes). The teacher is looking at her as well, including her in the conversation. Gradually, the dialog develops into a group interaction and both students are simultaneously engaged in the conversation. That aspect becomes visible in the teacher's gestures, initially directed to one student, but later turning to the other student, having eye contact and in that sense making a verbal and physical attempt to include the second student in the interaction (50:44:10, 50:44,11).

(iii) Validation of a task: "Can you work it out using this unit anyway?" The student sits at the back of the classroom and solves a task and validates the solution by comparing it to the suggested answer from the back of the book. The task involves a journey plotted on distance time graph (see Figure 3).

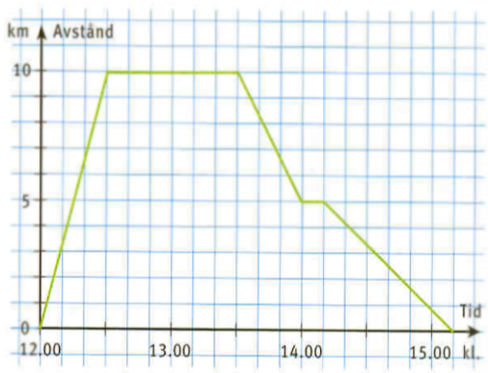

Figure 3. Graph of the journey in the task

The question reads: Which speed does the traveller have when she a) bikes to the beach, b) bikes home, and c) walks home. Next to the task there is a framed formula in red, describing the relationship between speed, distance and time.

Speed = Distance/Time

Figure 4. A representation of the illustration in the textbook

Excerpt L10:9

15:35:15	Student	That's not right at all? [laughter]
15:36:12	Teacher	All right what is it that is not right?
15:37:00	Student	It's wrong in the answers [in the book].
15:38:13	Teacher	Is it wrong in the answers [in the book]?
15:39:11	Student	Yes [laughter]
15:41:13	Teacher	(...) have cycled ... to the beach. What is ... it is? It, that one [points on the task]
15:45:09	Student	(...) yes
15:47:14	Teacher	Or there?
15:47:29	Student	Hmm, ten kilometres.
15:49:12	Teacher	Yes they cycled ten kilometres in distance in

		the time.
15:52:23	Student	30 minutes.
15:56:00	Teacher	30 minutes.
15:57:27	Student	And then, then it says that it should be 20.
16:00:08	Teacher	Yes it says that yes, that's what I think as well.
16:00:17	Student	(...) ... yes but what is it that's wrong then?
16:03:09	Teacher	What have you worked out then?
16:04:21	Student	Yeah, kind of that.
16:05:27	Teacher	Yes, what? What sort of unit is it then?
16:07:14	Student	[sniggers]

When the student discovers that the answers do not match, she displays doubts and consequently approaches the teacher. The teacher is walking towards her and there is a student sitting next to her. This student is laughing and asks the teacher to resolve the matter. Here the student wants to point out what she believes is a mistake in the answer at the back of the book. The student notices that the teacher initially supports the answer to the task in Figure 4 suggested in the book (16:00:08). When the reason for the mistake is pointed out to the student a reaction is provoked (16:07:14).

Excerpt L10:10

16:07:26	Teacher	What ... What is this?
16:09:19	Student	Kilometres.
16:10:19	Teacher	Right. And that?
16:12:15	Student	Minutes.
16:13:08	Teacher	You've calculated a speed for how ... This many kilometres per minute.
16:17:20	Student	Yees ... Then it has to be ...
16:19:12	Teacher	... how many hours is that?
16:21:15	Student	A half.
16:27:18	Teacher	What's ... Ten?
16:28:01	Student	Oh, right.
16:30:28	Teacher	Kilometres per hour ... and you've calculated kilometres per minute.
16:32:26	Student	Yeah. Yeah
16:35:13	Teacher	But the most common is usually kilometres per hour.
16:36:25	Student	Mmm hmm
16:38:07	Teacher	So. But *that* is right.
16:39:12	Student	Yes.
16:39:29	Teacher	...*that*, the speed is right, except that kilometres per minute is an uncommon unit.
16:44:22	Student	What ... But can you ... work it out in this [using this unit] anyway?
16:45:29	Teacher	Yes you can work it out in this [using this unit] as well.

Attention in excerpt L10:10 is directed towards the correctness of the answer produced by the student and the one printed in the answer section in the book. To the student, those answers appear not to correspond, and surprisingly the answer the student truly believes is correct is her own (16:38:07). This is a case of validation and reflection, arguing not only about the validity of the answer but also questioning the correctness of the suggested answer in the book. The student directs her attention towards the numerical answer. This indicates student's strong confidence in herself and her own mathematics ability (15.37.00; 15.38.13; 15.39.11). In other words, the student is confident enough to think the suggested answer at the back of the book is wrong. The teacher interacts with the student having the answer in focus but at the same time clarifying why the answer in the book differs from the answer of the student. He tries to help her in the evaluation of the units in her answer (16:35:13). That is, the teacher helps her to shift attention towards the units. Despite the student's strong conviction of the correctness of her answer, she takes an accepting role throughout the conversation, but opposes at the end of the interaction sequence (16:38:07). She expresses the wish to make the teacher accept the correct part of her answer instead of adjusting it to the given answer at the back of the book (16:44:22). This student shows interest in attempts to validate the correctness of her answer in relation to mathematical correctness rather than expectations or the importance of having suitable units (16:45:29).

DISCUSSION

"Human behaviour is too complex to permit accurate predictions of what a given person will do in a specific situation, but by looking across people and situations we can see patterns of regularity" (Kilpatrick, 1993, p. 27). Looking across the interaction during video sequences in SW1, it can be argued that the interaction that takes place is *authentic* and recognisable from the perspective of researching teachers. Communicative validity is an important consideration when it comes to the episodes on classroom level (Booth et al., 1999).

The results show an alignment between task-related attention and student interest in content matter, based on the three types of task-related attention that emerge in student-teacher interaction. In the first one, attention can be seen in the process of a student questioning the relevance of assigned tasks. Specifically, the student questions the purpose of plotting a graph or points on a graph when she already feels she can understand the concept of mathematical relations. From this case, we argue that interest constructed during a discussion on the relevance of the task is a possible segue for the student to both solving the task and seeing the meaning of it. Importantly, this type of attention can seem unfamiliar in an international comparison, since the student is resisting and questioning the instruction of the teacher. However, as Clarke et al. (2006) points out, it is a part of Swedish classroom discourse for the student to question the relevance of the task and the teacher to engage in the matter.

In the episodes analysed in this chapter, examples from an every-day context but also the hierarchic nature of mathematics as a subject served as justifications for the student to study mathematical relationships. This shows that if the teacher attempts to clarify the relevance structure of a task, the student will have a specific reason for dealing with content matter and have an opportunity to become interested. The second type of task-specific attention examined focused on the students' own reasoning. In this case, the teacher had a clear idea of what he wanted to convey about the parallel lines. We argued that the teacher co-constructed interest by taking the initiative and leading the conversation, while the students joined in, supporting each other's answers to the questions that followed the teacher's reasoning. The third category of task-specific attention was illustrated by an episode where the student validated her answer. This episode shows how it is possible for the student in Swedish settings to express interest by reflecting over an answer. In this case, the student evaluated the answer in relation to the content of the task. The student looked at the problem as a whole and determined the value of her answer and the reason for it being incorrect through interaction with the teacher. This category, in contrast to the first one, emphasises the student's acknowledgement of the teacher as an authority, superior to both herself and the book.

What do our results imply? The results of this video analysis suggest the possibility to evolve a theoretical framework of motivational processes such as interest, beyond the psychological state of an individual, with support from empirical data in different forms of naturalistic classroom interaction. In all three categories the attention is expressed by the students, but the role of the interaction with the teacher on details in content matter stands out. This study could signify the importance of task-related attention of the students during a mathematics lesson and evolve into a study where interest construction is a condition for learning. In future research it would be fruitful to make comparative studies on students' interest construction in relation to different types of classrooms interaction, that is keeping the subject specific areas in mathematics constant and varying the type of interaction observed.

CONCLUSION

All mathematics classrooms have certain features in common and yet each classroom is unique in its own way. Student voice during classroom interaction in SW1 is familiar, but at the same time contributes with new insights. For example, questioning the relevance of a specific task or the topic of mathematical relationships is important to consider when teaching mathematics. Also, a student confident enough to rely on the teacher's answer rather than the one suggested in the book, points towards the importance of the teacher's role.

It can be concluded that task-related attention approached as a pathway to student interest, supports previous studies where interest is a condition for learning. In order to learn, students need to attend to the mathematics in the task. In this chapter we showed episodes of students' attention being directed towards different aspects of a task in the interaction between the teacher and student(s).

We showed what aspects of a task students attend to and the ways the interactive co-construction of meaning demands both student and teacher participation. In that sense, conditions for learning mathematical content matter can be approached by observations in coming research. For example, it can be investigated how interest or student engagement as constructs will become visible in student participation.

Most important gains from this study are different aspects of task-related attention that are crucial during classroom interaction. By giving examples of student voice during common Swedish classroom interaction we acknowledge students' perspective and at the same time capture the importance of the teacher's actions. According to the results of our study, interest can be approached at a classroom level, starting with determining the focus of attention constructed in the gaps of knowledge between what is known to the student and the knowledge desired. Hopefully, in future research this classroom-oriented approach can be set in relation to students' knowledge and have potential in inquiry and instructional practice.

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