

## Contextual perspective in analysing collaborative knowledge construction of two small groups in web-based discussion

4  
5  
6

Maarit Arvaja

7

Received: 21 September 2006 / Accepted: 10 July 2007

8

© International Society of the Learning Sciences, Inc.; Springer Science + Business Media, LLC 2007

9

**Abstract** This paper presents a methodology designed to explore the role of context in collaborative knowledge construction activity in asynchronous web-based discussion. The discussions of two student groups participating in a web-based teacher education course were compared. The comparison aimed to highlight the differences and similarities between the groups' knowledge construction activity through studying the thematic structure, communicative functions and contextual resources used in their discussions. The results indicated that the different backgrounds of the two student groups influenced the way context was created and interpreted, and how meanings were negotiated. The differences and similarities between the groups' activity illuminated the situated and mediated nature of learning. The possibilities of the methodology used in this study for evaluating collaborative knowledge construction in context are also discussed.

12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22

**Keywords** Computer-supported collaborative learning · Context · Higher education · Collaborative knowledge construction · Socio-cultural learning theory

23  
24

### Introduction

26

The socio-cultural approach to learning, building on the Vygotskian framework (1978), emphasises the role of social interaction and activity in the process of knowledge construction, as well as the mediative role of tools and the historical and cultural settings in which the knowledge construction occurs. According to Wertsch (1991), it is not possible to study thinking and cognition independently of the social, interpersonal, cultural, and historical settings in which they occur. Cognition is a public, social process embedded within a historically shaped material world (Goodwin 2000), in the sense that it relies on conceptual and material resources and tools that originate in our culture (Bliss and Säljö 1999). To understand collaborative learning, we have to study how people appropriate and master the tools for thinking and acting that exist in a given culture or society (Wertsch 1991).

27  
28  
29  
30  
31  
32  
33  
34  
35  
36

M. Arvaja (✉)

Institute for Educational Research, University of Jyväskylä, P.O. Box 35, 40014 Jyväskylä, Finland  
e-mail: maarit.arvaja@ktl.jyu.fi

Collaborative learning in computer-mediated discussion has typically been evaluated by analyzing and assessing the cognitive quality of discussion (e.g., Guzdial and Turns 2000; Lipponen et al. 2003; Schrire 2006) and its relation to (individual) learning outcomes (Fischer et al. 2002). However, interaction that obtains high ratings in terms of the number of high-order speech acts reveals little about the process of collaboration, as this kind of analysis discards the content and nature of knowledge construction that takes place in interaction (Stahl 2002; Crook 1999). Furthermore, the weakness of this cognitively oriented learning research is that it reflects more broadly a view where language is isolated from its environment and a dichotomy exists between text and context (Goodwin 2000). In the study of collaboration, this has meant the separation of collaborative talk from the social, material and cultural circumstances in which it is embedded. The research of learning has concentrated more on participants' mental structures than on learning as a situated activity (Crook 1999; Stahl 2002; Säljö 1999).

Therefore, a more detailed, micro-level analysis of the collaborative knowledge construction process itself is needed to capture the situational dynamics of collaborative activity and its relation to context (Arvaja et al. 2007; Stahl 2006). This article presents a methodology designed to explore the contextual nature of collaborative knowledge construction in computer-mediated settings. This was done through comparison of the web-based discussions conducted by two student groups. Combination of the analysis of the thematic structure, communicative functions and contextual resources of the groups' discussions was performed to explore the process of collaborative knowledge construction, i.e., the nature and content of the discussion produced by the participants and the role of context in this activity. The possibilities of the present methodology for evaluating collaborative knowledge construction are also discussed.

## Contextual resources as tools of thinking and acting

Two different types of tools mediate human activity: psychological and physical (Vygotsky 1986). Psychological tools refer to mental tools: resources for thinking and acting that are stored in language or discourse (Säljö 1999). The most prominent medium for communicating everyday experiences is ordinary talk. However, there are also specialized forms of discursive practices for specific settings. For example, in school students learn to master psychological tools such as concepts, definitions, and procedures relative to different areas like mathematics, history, language etc. (Säljö 1999). Physical tools refer to 'material' tools—computers, telephones, paper and pencil, for example—that people use to accomplish different activities. However, physical tools are not entirely distinct from psychological tools, because concepts are embodied in physical tools and they make physical tools meaningful for people (Bliss and Säljö 1999). In a sense, people store their knowledge and experiences in physical (and psychological) tools (Bliss and Säljö 1999). According to Vygotsky (1978), the use and meaning of tools are first learned in interaction with others at the interpersonal level (externalization), after which they are internalized as tools at the intra-level. These internalized tools are used as a resource in all kinds of activities. For example, certain concepts are re-externalized in the new act of sense-making, as in the case of collaborative knowledge construction, through which new concepts or understandings are built (Stahl 2004).

Understanding collaborative learning requires making sense of the conversation that students engage in and the tools that mediate their learning instead of studying the mental content of individual minds (Hmelo-Silver 2003). Stahl (2004) describes collaborative

knowledge construction as a cyclical process where individual's tacit understandings— related to the phenomena, concepts or material tools available and relevant to understanding the topic under discussion—are made explicit, i.e., interpreted in the discourse. According to Stahl, building on Polanyi (1966), tacit knowledge refers to knowledge that participants possess but may not be able to put into words. Tacit knowledge may include, for example, the ability to use certain physical tools or unstated background knowledge about the world, about other people and about objects referred to in discussion (Stahl 2004). Thus, in Vygotsky's terms, this tacit knowledge can be seen to be based on existing psychological or physical tools that may be used in the process of shared interpretation. In collaborative knowledge construction these tacit meanings are made explicit, clarified and negotiated in an interpretive process, and a shared understanding of them is created as a result of this process (Stahl 2004). As discussion proceeds, this explicitly stated and negotiated shared understanding, for example, about some concept, procedure or artefact becomes tacit knowledge that can be used as a resource in developing understanding further, so that again something tacit is made explicit and in turn becomes a focus of attention. Collaborative knowledge about the subject at hand thus develops further and further by negotiating over different viewpoints, perspectives and meanings in a continuous interpretive process mediated by psychological and physical tools. As a result of this process, new tools are built. In their interpretive process the group constructs a new degree of understanding about the topic they are discussing. This process of understanding can also be described through the concepts of context and object (content of discussion; Valleala 2006). According to philosophical hermeneutics, context is a familiar aspect; for example, a previous experience (or unconscious pre-understanding), through which the object (content) of discussion can be described or understood. Understanding always involves building a new context, thus making something previously unknown familiar or, according to Stahl (2004), making explicit tacit knowledge, which can then become a context for a new object of discussion and its understanding (Valleala 2006). The understanding produced by the group can be made explicit by analyzing the network of conceptual relationships constructed by the discourse within the group (Stahl 2004).

Linell's (1998) notion of *contextual resources* can be used as a description of the possible resources that participants use in the meaning-making process. According to Linell (1998), contextual resources refer to aspects of *potential* contexts that the participants can make *actual* and *relevant* through their activities in interaction. Linell (1998) defines three general categories of contextual resources. The first of these, often called co-text, comprises the participants' previous actions and discourse that is actively used in the "new act of sense making" (p. 132). The second type of contextual resources consists of the surrounding concrete situation in which the participants act. This includes, for example, other persons, objects and artefacts that are present. While the first and the second category deal with the immediate contextual resources, the third category deals with contextual resources that are mediated and abstract. The third category includes background knowledge, assumptions or beliefs about the things talked about in the discourse in question or about other persons involved in the discourse. It also includes socio-cultural contexts. These are, for example, the abstract situation definition or the frame of "what is going on" in the actual situation as well as the specific organizational context with its regulations and hierarchies. Similar to Linell's (1998) notion of the abstract situation definition is Hicks's (1996) notion of the socio-cognitive history of an activity setting. Thus, for example, in the school context activities like 'writing texts,' 'doing schoolwork,' and 'using computers' have particular meanings for the students, depending on the previous experiences, attitudes and meanings they have attached to the activity through extended participation in their relevant (learning)

communities (Crook and Light 1999). To study collaborative knowledge construction is to make visible the process of meaning-making mediated by tools used as resources. Thus, the focus of analysis is on the interpretations participants make in their context.

According to the above view, learning is always situated and it must be considered in the context where it takes place. Thus, collaborative knowledge construction has to be analyzed within the context of the group situated within a larger community, where the knowledge is distributed in the material and discursive environment in the form of tools, symbol systems, social practices and physical spaces (Crook and Light 1999; Goodwin 2000; Stahl 2004). Thus, to study collaborative knowledge construction is to study a group's activity in its specific context. However, context is not a predefined or objective environment (Goodwin 2000; Linell 1998) but only includes those contextual dimensions that are and become relevant to the participants in the activity (Linell 1998). Thus, the participants themselves produce and create the context through their joint activity (Goodwin and Duranti 1992; Linehan and McCarthy 2001; Linell 1998). The context produced involves aspects of the physical, social and cognitive environments that the participants perceive, believe, or know to be relevant. Only some contextual resources, or tools, of all the potential and available resources are made use of or, in Stahl's (2004) terms, are made explicit, in the production of joint meanings (Goodwin 2000; Linell 1998). For example, whenever something is said or done, it is added to the pool of resources, but only some of these resources are made use of in building new meanings via re-contextualization (Linell 1998). Thus, the relevant contexts are constructed through communication, which means that contexts are to some extent communicative constructs (Linell 1998).

This paper presents a methodology designed to explore the role of context in collaborative knowledge construction activity in asynchronous web-based discussion. The discussions of two student groups participating in a web-based teacher education course studying the pedagogy of preschool and primary education were compared. Combination of the analysis of the thematic structure, communicative functions and contextual resources of the groups' discussions was performed to explore the similarities and differences in the groups' collaborative knowledge construction activity. The possibilities of the present methodology for evaluating collaborative knowledge construction in context are also discussed in the paper.

## Materials and methods

### Participants and context

The subjects of the study consisted of two small groups of teacher education students studying the pedagogy of pre-school and primary education in a web-based learning environment. Each group consisted of three students, one male and two female. The students were set a so called 'open problem,' meaning that they had to create and resolve a problem relating to the theme "Differentiation in teaching reading." The students worked in a web-based learning environment comprising an asynchronous discussion tool, a tool for making text documents, and folders containing course material such as teacher's lecture notes, articles in PDF format, and hyperlinks in web-pages. The students' task was to discuss the problem they had created in an asynchronous discussion forum and finally to prepare a lesson plan for teaching reading. The lesson plan was then to be written in a document base in the learning environment. The two groups were chosen for detailed analysis and comparison from among seven groups engaged on the same basic task because

they had created the same problem: “How to differentiate teaching reading in a classroom where pupils are on different levels as regards reading ability.”

Data collection

This study concentrated on studying the asynchronous web-based discussion that each group had. Thus, the data consists of students’ web-based messages. The messages were translated from Finnish to English. Also, all the material that was used in the course (lecture notes, articles and links) was used in interpreting the students’ knowledge construction activity.

Data analysis

The analysis of the students’ shared knowledge construction activity was divided into three steps: First, *content analysis* of the messages was conducted to explore the thematic network of the messages: What knowledge or information was handled in each message? How were the messages thematically related to each other? Thus, the unit of analysis was the thematic meaning unit rather than message, paragraph or sentence as such (Rourke et al. 2001). After reading the messages through a number of times, two broader themes were identified in both groups’ discussions: “Methods for teaching reading” and “Differentiating activities in teaching reading.” Thematic content analysis was also conducted at the utterance level to identify specific (sub) themes of discussion within the two broader discussion themes.

Second, the discussions within these two broader themes were analyzed according to their *communicative functions*. These were adapted from the framework for analyzing language functions developed by Kumpulainen and Mutanen (1999). However, these language functions were not used as predefined categories, but the specific context of the data was taken into account in interpreting the function of communication. Thus, the communicative functions were contextual in their nature, depending on the topic of the discussion and the interpretations made by the participants involved in these discussions. The functional analysis of the web-based messages focused on the purposes for which the language was used in the given context. The communicative functions were not identified on the basis of their linguistic form as such. Rather, they were identified by their content and form and by their effect on and relation to the discourse of which they were part. The analysis of communicative functions focused on the nature of the exchanges between the students. Thus, the interpretation of communicative function was partly made in relation to the preceding message(s)’ thematic content. The function of communication was analyzed mainly at the utterance level. However, in some cases several utterances served the same function. Similarly, in some cases one utterance served multiple functions. It is important to note that, even though the value of social or off-task talk on knowledge construction in the CSCL context is well demonstrated (Chen et al. 2005), the analysis of communicative functions was limited to sentences where the task content was discussed, and did not include, for example, sentences where students were organizing their activities or talking about their personal affairs (see, however, Arvaja et al. 2007). The focus of this study was limited to students’ content-based knowledge construction activity.

The analysis of communicative functions was also used, in part, in evaluating the quality of the collaborative interaction. According to Mercer (1996), different types of talk represent different ways in which the participants in a dialogue engage in the joint construction of knowledge. Exploratory talk, which is beneficial for collaborative knowledge construction, occurs when the participants engage critically but constructively in each other’s ideas. In exploratory talk, statements and suggestions are offered for joint

consideration. These are challenged and counter-challenged with justifications and alternative hypotheses. Thus, within collaborative discourse it is possible to identify different kinds of activities such as elaboration (e.g., van Boxtel et al. 2000) or argumentation that are beneficial to learning (e.g., Weinberger and Fischer 2006). From the data, eleven broader categories of communicative functions were detected. These are presented in Table 1 with descriptions.

Third, Linell's (1998) notion of *contextual resources* was adapted and used as an analytical tool in studying what resources students used in negotiating their meanings from the knowledge construction point of view. Contextual resources refer to those aspects of the potential context that the participants make relevant in the on-going activity. The (potential) context(s) provides resources for understanding and interpretation of the topic under discussion (Goodwin and Duranti 1992). Relevant contextual resources are those referred or oriented to in the discourse (e.g., Buttny 1998). From the data, five broader categories of contextual resources were detected. These are described in Table 2.

Contextual resources were extracted from the web-based messages through students' contextual references and the content of the messages, which directly or indirectly reveal the 'source of the resources.' This means that, for example, in analyzing whether the resource used was course material depended whether it was directly referred to as course material ("In the article I read...") or whether the content was identified as course material even though not directly referred to as such. However, the source of some other resources—e.g. idea or conception—could not be identified as course material, although these resources might equally have their roots in such material. Thus, assigning items into the different categories may have been in some cases more technical than actual, as resources—tools of thinking and acting—"overlap considerably" (Linell 1998, p. 132). It is also important to note that in this study "co-text" was used in a narrow sense to represent collaborative knowledge construction activity (Table 2). Thus, for example, the judgmental and evaluative function of communication was not categorized as co-text, even though previous discussion was reflected in those functions. This is because in these functions knowledge was not developed further but only acknowledged. As in the case of communicative functions contextual resources were analyzed at the utterance level.

**Table 1** Communicative functions in web-based discussion

Communicative function	Description
Interrogative	Asking for a piece of opinion, information, suggestion or clarification
Responsive	Answering a question or giving clarification
Suggestive	Giving a suggestion relating to the topic of discussion
Informative	Giving information relating to the topic of discussion. Information refers to theoretical knowledge
Exemplification	Giving a concrete example
Elaborative	Developing further a previously offered piece of information, suggestion or example
Justificational	Justifying a piece of information, suggestion or example
Reasoning	Reasoning about knowledge
Evaluative (positive)	Giving positive feedback on a previously offered piece of information, suggestion or example
Judgemental (positive)	Expressing agreement on a previously offered piece of information, suggestion or example
Summarizing	Summarizing a previously offered piece of information, suggestion or example

Table 2 Contextual resources in web-based discussion

Contextual resource	Description
Course material	In discourse students refer directly, for example, to lectures, articles or web-based links which serve as theoretical background material for the course, or the discussion may be identified as based on the course material. Specific resources are mainly <i>concepts</i> and their <i>theoretical description or definition</i> (e.g. methods and their features)
Own idea	In discourse students use their own ideas, which are usually manifested in practical or concrete suggestions. Specific resources are mainly <i>concepts</i> and their <i>practical application</i> (e.g. differentiation and its concrete means), which are usually manifested in <i>action and activity descriptions</i>
Own conception	In discourse students use their own conceptions of either practical or more abstract issues or knowledge. Specific resources are students' <i>interpretations</i> of issues or knowledge presented by self or other students (e.g. the consequences of a practical suggestion or the application of theoretical knowledge). In discourse this shows in reasoning and justifying
Own experience	In discourse students use their own experiences, which are either directly referred to as such or can be so identified. Specific resources are mainly <i>case descriptions</i> or <i>examples</i>
Co-text	Co-text refers to the fact that students build their thoughts on other students' thoughts. In discourse students directly or indirectly refer to <i>concepts, interpretations, case descriptions or examples presented by others</i> by developing them further. This shows in elaborating on, reasoning about or justifying others' knowledge further and answering questions. However, co-text can co-occur with other resources. For example, a student may use information from articles in developing further previous thoughts or ideas

Results

The thematic analysis of the discussions in both groups revealed two broader themes: "Methods for teaching reading" and "Differentiating activities in teaching reading." The comparison of the two groups as regards the function of communication and contextual resources used in discussions within these two themes are presented below (Tables 3 and 4). Table 3 presents the frequencies of the function of communication and contextual resources within the theme "Methods for teaching reading."

First, with respect to the frequency of communicative functions, we see that the amount of discussion on the theme 'Methods for teaching reading' differed between the two groups. Group A discussed the theme more ( $n=56$ ) than did Group B ( $n=18$ ). As can be seen from Table 3, the interrogative and justificational function of communication was among the three most used functions of communication in both groups. However, the two groups differed in the way knowledge was shared or constructed. Whereas, Group A students mainly elaborated each other's knowledge further (16%), gave information indicating they used theoretical knowledge (12.5 %) or made suggestions (12.5 %), the main function of communication in Group B was suggestive (33.5%) or exemplificatory (11%), indicating that they suggested ideas without relating these to others' ideas or used more practical knowledge. It is notable that the students in Group B did not elaborate at all. Thus, they built their knowledge construction in each other's thoughts less than those in Group A. However, this does not mean that giving examples or suggestions did not relate to the overall discussion. It indicates that, whereas for example, elaborate refers to the further development of a sub-theme in a discussion and thus directly building it into the content of some other message, giving a suggestion relates to the broader theme of a discussion, but it

**Table 3** Functions of communication and contextual resources used by two groups on the theme “Methods for teaching reading” t3.1

	Group A (%)	Group B (%)	t3.2
Communicative functions			t3.3
Interrogative	16	17	t3.4
Responsive	11	5,5	t3.5
Judgmental (positive)	7	5,5	t3.6
Evaluative (positive)	2	0	t3.7
Suggestive	12,5	33,5	t3.8
Informative	12,5	5,5	t3.9
Exemplification	0	11	t3.10
Elaborative	16	0	t3.11
Justificational	16	22	t3.12
Reasoning	5	0	t3.13
Summarizing	2	0	t3.14
In total	100% (n=56)	100% (n=18)	t3.15
Contextual resources			t3.16
Course material	31	8	t3.17
Own idea	19	17	t3.18
Own conception	13,5	33	t3.19
Own experience	0	42	t3.20
Co-text	36,5	0	t3.21
In total	100% (n=52)	100% (n=12)	t3.22

**Table 4** Functions of communication and contextual resources used by two groups on the theme “Differentiating in teaching reading” t4.1

	Group A (%)	Group B (%)	t4.2
Communicative functions			t4.3
Interrogative	23	7,5	t4.4
Responsive	4	1,5	t4.5
Judgmental (positive)	12,5	13,5	t4.6
Evaluative (positive)	2	10,5	t4.7
Suggestive	12,5	16,5	t4.8
Informative	0	1,5	t4.9
Exemplification	0	12,25	t4.10
Elaborative	23	13,5	t4.11
Justificational	12,5	18,25	t4.12
Reasoning	6,5	1,5	t4.13
Summarizing	4	3	t4.14
In total	100% (n=48)	100% (n=66)	t4.15
Contextual resources			t4.16
Course material	2,5	2	t4.17
Own idea	38,5	20	t4.18
Own conception	20,5	22	t4.19
Own experience	0	32	t4.20
Co-text	38,5	24	t4.21
In total	100% (n=39)	100% (n=50)	t4.22

is not directly related to any message or its content. Thus, all of the messages in Group B were related to the broader theme “Methods for teaching reading.”

Differences in relatedness of the messages was also detected in the use of contextual resources. As can be seen from Table 3, 36.5% of Group A’s contextual resources consisted of co-text, meaning that the students developed or reasoned previous knowledge further. However, the students in Group B did not develop or reason others’ knowledge further in any of the messages. The students in Group A also used course material (31%) as a main resource in their discussion. Thus, this group mostly used theoretical knowledge and others’ thoughts as resources in their knowledge construction activity. However, Group B used mostly their own experiences (42%) and conceptions (33%) as main resources within this discussion theme.

The following two examples shed light on the nature of the discussions on the theme “Methods for teaching reading” in the two groups and highlight the above-mentioned differences. These examples complement the former quantitative comparison between the groups by giving a more detailed and contextualized interpretation of the students’ activity (Hicks 1996). The analysis is also exemplified by student messages.

Example 1: Group A’s asynchronous web-based discussion on the theme “methods for teaching reading”

Message 8

Re: More about the task [Heading] Otto [Sender] 21.03.2005 [Date]

Hi!

I read a few articles and searched for information on the net. I thought particularly about learning to read from dyslexics’ point of view. Dyslexics have the greatest difficulties in learning grammar. However, some dyslexic pupils have very dominant creative, visual and wholeness perceiving brain half. I was wondering whether we can use this information somehow in our favour?

Dyslexic pupils also often lack concentration and their attention is easily disturbed. Probably one way to dealing with that issue would be for the teacher to create as peaceful a situation as possible for learning reading. Long sentences are difficult for them. Therefore it would be better to start with sentences containing only a few words and then as their skills develop increase the number of words.

It would be probably useful for dyslexics, as for others as well, to use many learning channels: listening, seeing, talking and doing. One could visualize sentences for example by drawing.

[...]\*

—Otto—

[Theme (Function of communication; Contextual resource): Shares information about features relating to dyslexic pupil’s learning to read (Informative; Course material) Asks other’s opinion (Interrogative) Shares information about problems dyslexic pupils have in working (Informative; Course material) Offers means to take into account the difficulties in teaching a dyslexic pupil (Suggestive, Reasoning; Own idea), Shares information about difficulties dyslexic pupils have in working (Informative; Course material) Offers means to take these difficulties into account in teaching dyslexic pupils (Suggestive, Reasoning; Own

idea) Shares information about means to support learning of dyslexic pupils (Informative, Suggestive; Course material, Own idea)]  
\*= excluded discussion

## Message 11

Thoughts Alisa 22.03.2005

Like Otto and Iina [in message 7] said, for dyslexic children and probably for the others as well it would be beneficial to use multiple teaching and learning methods. The KPL method \* (=listen, speak, read—the whole word method) that was handled in the lectures could be a partly useful method to use together with some other method. In this method one uses picture and word cards. And also the LPP method\* could be good in my opinion because those children who have difficulties in learning to read could participate fully in the discussion phase and dictation phase without feeling inferior. Could we still use as a foundation the KÄTS method\*? In this method one uses all the senses and the learning process proceeds slowly, which gives the teacher a good opportunity to follow the development of each pupil. This is very important in the classroom where there are large differences between the pupils.

\*KPL=kuuntelen, puhun, luen -kokosamenetelmä (in English = listen, speak, read—the whole word method)

\*LPP=lukemaan puheen perusteella (in English = Learning to read based on talk)

\*KÄTS=kirjain, äänne, tavu, sana (in English = letter, speech sound, syllable, word)

[Agrees with Otto and Iina in using different means to teach dyslexic pupils (Judgemental). Shares information on KPL method (Informative, Suggestive; Course material, Co-text). Gives information and justifies the use of method LPP (Suggestive, Informative, Justificational; Course material, Own conception, Co-text). Asks others' opinions about using one particular method (KÄTS) (Suggestive, Interrogative). Gives information and justifies the use of KÄTS (Informative, Justificational; Course material, Own conception, Co-text).]

## Message 12

Re: Thoughts Iina 22.03.2005

Those suggestions for methods sound good. We could use the LPP method at least for shared teaching, because the pupils don't need to be able to read at all. This would practise that visual perception and the perception of wholeness, which is important for everyone no matter what phase of reading they are in. And this method allows the pupils themselves to produce text, which is a good way to motivate them.

The KÄTS method we could use as a foundation as you said. And for the weaker readers it is probably a very important method for learning to read and for the perception of letters and speech sounds.

I don't recall much about the KPL method, but would it somehow suit this lesson plan? 359  
[...] 361

[Comments on proposals for methods (Evaluative). Elaborates on and justifies the use of the LPP method (misinterpretation, talks about the features of KPL) (Elaborative, Justificational; Co-text, Course material). Elaborates on and justifies the use of the LPP method (Elaborative, Justificational; Co-text, Course material, Own conception), Answers question about the use of KÄTS (Responsive). Justifies the use of KÄTS (Justificational, Elaborative; Co-text, Own conception, Course material). Asks about the KPL method (Interrogative).] 362-368

## Message 20

Hello Alisa 24.03.2005

It's very difficult to decide what to do with those who have difficulties. It is anyway the case that these children have difficulties in many different areas... I cannot offer any method, the only thing that comes into my mind is that the teacher supports every child and tries to help them forward. Was it the case that the KÄTS method was initially developed for children who have difficulties in reading, or is my memory at fault? If it is so, could we apply KÄTS in this group as well? 373-378

[Agrees with others about deciding the methods for the dyslexic group (Judgemental). Reasons about the features of dyslexic children (Reasoning; Co-text, Own conception). Answers question about method (Responsive; Co-text, Own idea). Asks for clarification on the KÄTS method (Interrogative, Elaborative; Course material, Co-text). Suggests using the KÄTS method (Suggestive; Own idea).] 379-383

## Message 21

Re: Hello Iina 24.03.2005

Yeah, it was the case that KÄTS was initially for those who had difficulties in reading...if I remember correctly. Let's start with that method, I can't figure out anything else. And KÄTS is a method that deals with these letters and speech sounds and their perception, which I think is important for those with dyslexia. 388-392  
-iina-

[Gives clarification about the KÄTS method (Responsive; Co-text, Course material). Agrees on using the KÄTS method (Judgemental). Justifies the selection of the method (Justificational; Course material, Own conception)]. 393-395

In Example 1, the *thematic analysis* and analysis of *communicative functions* reveal what the students in Group A were discussing the theme "Methods for teaching reading" and how. First, Otto gives information on the specific features of dyslexic children and how these should be taken into account in teaching (Message 8). Finally, he concludes it would be useful for dyslexic children to be taught through multiple channels. Alisa agrees with 396-400

Otto and Iina about using different methods for teaching reading (Iina's message is not included in the example) and gives information about the features of different methods (Message 10). She also justifies the use of different methods. At the end she suggests one method that they could use for the lesson plan. In her message, (Message 12) Iina agrees with Alisa's suggestions and elaborates the theme further by justifying the use of particular methods. Hence, communicative functions and contextual resources reveal that, first, Otto and Alisa seek to build the foundation for discussion by giving information based on course material. Iina then starts to elaborate further on this information on the basis of others' statements (co-text) and course material. The communicative functions justifying and reasoning in turn reveal that the students are not just providing information, but they are offering well-grounded knowledge.

The above example shows that in Group A the theme "Methods for teaching reading" is handled rather thoroughly. The students describe different methods and give justifications why these methods should/or should not be used. The students build on each other's messages by evaluating what the others have said and elaborate on the theme further by offering more knowledge about the different methods. However, the students also ask for clarifications from other students, as where Alisa and Iina are wondering what method would be best for students who have difficulties (messages 20 and 21). Thus, the situation is at the same time a problem-solving situation for them.

Contextual resources serve as a tool to conceptualize what elements students make use of in building their knowledge while at the same time contextualizing their activity. As pointed out earlier, students use each other's knowledge or information to build on their knowledge. It is this that is referred to as "co-text." Students also use course material; that is, lectures given by the teacher or the material offered on the internet (links to articles, for example). As can be deduced from the discursive features of the students' messages, the students have no prior experience of using these methods. For example, in Message 20, Alisa asks "Was it the case that KÄTS method was initially developed for children who have difficulties in reading, or is my memory at fault?" and Iina gives the clarification "Yeah, it was the case that KÄTS was initially for those who had difficulties in reading...if I remember correctly." indicating their inexperience and reliance on course material as regards the methods. Thus, in this context of activity they need each other's ideas and thoughts (e.g., theoretical or practical concepts and interpretations) as resources in their knowledge construction and in obtaining support for their own concepts and interpretations based on the course material, which they use as another resource for reasoning.

Example 2: Group B's asynchronous web-based discussion on the theme "methods for teaching reading"

### Message 8

Re: About the task

Jaana

19.03.2005

[...]

I myself have used the KÄTS method, but I noticed that if you have dyslexia, you have to slide the letters close together and then it almost changed the old a-u au t-o to auto [car in Finnish]... So after reading tests and after one sees how each pupil is progressing one should adapt these different methods individually.

[...]

444

[Gives example of using KÄTS in dyslexic children (Exemplification; Own experience),  
Gives suggestion on using different methods (Suggestive; Own experience)]

445

446

## Message 13

Re: About the task

Jaana

23.03.2005

[...]

451

—pictures and objects as a support for dyslexics. In this way one “catches” the subject before reading.<sup>1</sup>

452

453

—developing linguistic awareness in every lesson, not just in reading. This way the child learns the language “unobserved”.<sup>2</sup>

454

455

—finger alphabets are good support for dyslexics. Especially if one doesn’t remember letters; through them one can remember. I used them with one dyslexic child and he learned the letters.<sup>3</sup>

456

457

458

—in the article there were help questions, anticipation of and discussion about the text, which can also motivate poor readers to read and at least to participate.<sup>4</sup>

459

460

[...]

461

[<sup>1</sup>Suggests and justifies means to help dyslexics learn to read (Suggestive, Justificational; Own idea, Own conception) <sup>2</sup>Suggests and justifies means to help dyslexics learn to read (Suggestive, Justificational; Own idea, Own conception), <sup>3</sup>Suggests, justifies and gives example of means to help dyslexics learn to read (Suggestive, Justificational; Exemplification; Own conception, Own experience), <sup>4</sup>Suggests and justifies means to help dyslexics learn to read (Informative, Justificational; Course material, Own conception)]

462

463

464

465

466

467

468

## Message 15

Action plan....?

Mari

23.03.2005

[...]

472

I suppose we should decide whether we teach reading ‘in our class’ with analytic or synthetic methods...

473

474

[...]

475

[Asks for suggestion about the method (Interrogative; Course material)]

477

## Message 17

About the document

Jaana

23.03.2005

Hi! 481  
[...] 482  
I don't properly know any other method than KÄTS, but I don't mind what method 483  
we select for this class... 484  
Happy Easter, Jaana 485  
[Suggests KÄTS as a method (Suggestive; Own experience).] 486

## Message 20

Inquiry ☺ Mari 29.03.2005  
  
Hi Jaana and Jussi, 490  
I added something to our story, but I was wondering whether we should put in 491  
some concrete details about KÄTS, that is to say how we are teaching/ differentiating 492  
dysphasic and dyslexic pupils? 493  
Mari 494  
[Asks and suggests what they should write about the KÄTS method (Suggestive, 495  
Interrogative; Own idea)] 496

## Message 21

Re: Inquiry ☺ Jaana 29.03.2005  
  
[...] 500  
I put down something about KÄTS, that is, some ordinary thing, how one 501  
teaches... 502  
[Answers about the writing of KÄTS (Responsive)] 503  
In these few messages where the theme "Methods for teaching reading" is handled, the 504  
students in Group B are not actually discussing more than one method - KÄTS. However, 505  
the method itself is not jointly discussed nor is its selection justified from the pupils' point 506  
of view. The selection is justified because at least one of them, Jaana, is familiar with it and 507  
has used it in her teaching (Messages 8, 17). In Messages 8 and 13, Jaana gives examples 508  
and suggests means of helping dyslexic children learn to read. She also justifies those 509  
means. In the remaining messages, the two students are wondering what method should 510  
they select (Messages 15, 17), with Mari indirectly accepting Jaana's suggestion (Messages 511  
8, 17). Finally, they inform the others what they have written in their shared document 512  
(Messages 20, 21). Thus, as compared to Group A, the (practical) information they add into 513  
the document about the method is not jointly discussed or reasoned about in the forum. 514  
In this group, all three students had teaching experience. This is immediately evident in 515  
the above example where Jaana refers to her own teaching experience (Messages, 8, 13, 516  
17). Thus, it seems that the students heavily rely on their own background knowledge and 517  
teaching experience as a resource for doing the task in hand. In coping with this particular 518  
theme the students perhaps feel that there is no need for collaborative reasoning on the 519  
subject, because they already share a common view of it. Therefore, the task itself is not 520

actually a problem-solving task for them as it is for Group A, who do not know any of the methods from experience. Thus, they use and accept their experience as legitimate knowledge in the situation.

In the theme “Methods for teaching reading” the function of communication as regards both of the groups seems cumulative in its nature (Mercer 1996). This means that in the students’ communication there are no disagreements, no argumentation or counter argumentation, which would indicate the presence of cognitive conflict in the discussion. Thus, the subject is discussed quite uncritically and the discussion is built on agreement. However, the nature of the activity in Group A can be called *collaborative knowledge construction*, because the students are actually constructing the knowledge together, even though it is done in a mutually supportive, uncritical way. However, Group’s B activity is like *knowledge sharing*, as the knowledge itself is less constructed or reasoned about together than shared, mainly by one person, Jaana. Thus, knowledge in Group B is not built on the members’ contributions.

In the next Table 4, the frequency of the functions of communication and the contextual resources used in the other broader theme of discussion “Differentiating activities in teaching reading” are presented.

Under the theme “Differentiating activities in teaching reading” Group B’s discussion was slightly longer (Table 4). In the discussion in Group A, the function of communication was mostly interrogative (23%), elaborative (23%) suggestive (12.5%), justificational (12.5%) and judgmental (12.5%). The students in Group B were also mostly justifying (18.25%), suggesting (16.5%), elaborating (13.5%) and agreeing (judgmental) (13.5%). Although the discussion in the two groups was rather similar as regards the main functions of communication, the students in Group A elaborated—that is, build their knowledge on others’ knowledge—more than the students in Group B. The biggest difference between the groups was that the students in Group A asked more questions (23%) than the students in Group B (7.5%), and the students in Group B gave examples (12.25%), but the students in Group A did not.

At first glance it would seem that in this discussion theme the groups’ communication was rather similar as the four most frequently used functions of communication were the same. However, the comparison of contextual resources reveals that the resources the groups used in their discussions differed. Again, the students in Group B relied mostly on their own experience (32%), whereas the students in Group A did not (0%). During this discussion theme neither of the groups used course material in their knowledge construction (2.5% / 2%). They both used previous discussion as one of their main resources, although Group A (38.5%) had more co-text than Group B (24%). Group A (38.5%) also used their own ideas more than Group B (20%). Overall, the discussion in both groups showed a practical orientation with the students relying either on their own ideas (Group A) or on their own experiences (Group B) as their main resources. The next two examples illustrate the nature of the discussion under the theme “Differentiating activities in teaching reading” in the two groups.

Example 3: Group A’s asynchronous web-based discussion on the theme “differentiating activities in teaching reading”

Message 7

More about the task...

Iina

20.03.2005

... 567  
 Would it be good idea to divide the pupils into “ability groups” and for every group 568  
 think of what method to start with? Could we have, for example, a school assistant in 569  
 our classroom (could be) so differentiating the pupils would be easier? 570  
 We still need to think how often we should have these kinds of “ability groups”, I 571  
 suppose not every lesson, I suppose we should have some joint teaching as well... 572  
 [...] 573  
 —lina— 574

[Suggests dividing students into ability groups (Suggestive, Interrogative; Own idea). Sug- 576  
 gests and justifies the use of a school assistant (Suggestive, Justificational, Interrogative; Own 577  
 idea). Reasons about frequency of teaching in ability groups (Reasoning; Own conception). 578

## Message 8

Re: More about the task Otto 21.03.2005

[...] 583  
 As lina said, it isn’t necessary to differentiate the pupils in every lesson. It is 584  
 probably good for the dyslexic as well to be with “normal” learners. Those who can 585  
 already read could read in small groups and those who are still trying to acquire the 586  
 ability to read would listen and would see the others act. This way all could participate 587  
 on their own level. I believe it also motivates the more skilful pupils. Otherwise they 588  
 escape the teacher’s attention. 589  
 [...] 590

[Agrees about the frequency of differentiating pupils (Judgemental). Justifies the issue 592  
 (Justificational; Own conception, Co-text). Gives idea how to unite ability groups 593  
 (Elaborative; Own idea, Co-text). Justifies the issue (Justificational; Own conception).] 594

## Message 11

Thoughts Alisa 22.03.2005

[...] 600  
 —School assistant available. 601  
 —Ability groups in teaching every now and then. How will ability group activity 602  
 work so that there is no negative attention (bullying, envy) because of the different 603  
 activities the groups are doing?

[Summarizes previous ideas (Summarizing). Asks for clarification about the use of 604  
 ability groups (Interrogative; Co-text).] 605

—Differentiating pupils will succeed in that when, for example, there is reading as homework the more advanced pupils will read a longer section and the weaker a shorter section. Each according to their own level. It would be good if the teacher monitored this, for example, with the help of some kind of reading diary. The section to be read will be read aloud to a parent (mother, father, granny etc.) and the parent write down what is read and when. This will not work of course until everyone can read. If we start from the beginning, then something else.

[Gives ideas on how to differentiate homework (Elaborative; Co-text, Own idea). Gives idea how to control homework (Suggestive; Own idea). Reasons about the suitability of differentiation (Reasoning; Own conception).]

—Dyslexic children and those who have difficulties in perceiving text and letters will attend a special teacher, I guess. It also occurred to my mind that if a teacher gives remedial instruction to a weaker pupil, one could in advance go through the section etc. to be handled together in the next lesson, already in the remedial session. In this way the weaker pupils could experience feelings of success, as they don't always have to be the slowest ones.

[Gives idea about teaching dyslexic pupils; special teacher (Elaborative; Co-text, Own idea). Gives idea about remedial instruction for weaker pupils (Elaborative; Co-text, Own idea). Justifies the idea (Justificational; Own conception).]

## Message 12

Re: Thoughts Iina 22.03.2005

[...] 629

As such ability groups could be a success because in our classroom there would be several children for every group, thus no one would have to be alone. 630

That homework thing is good and it can be put in our lessonplan that after every lesson we'll give every group some homework according to their ability. For the weaker readers it could be simply rehearsing some speech sounds and reading them to their parents. Then write home acknowledgement in the homework-diary, that way it becomes controlled. The better readers can, for example, draw a picture of what they read. 632  
633  
634  
635  
636

The weaker readers will probably go to remedial instruction. 637

[...] 638

[Gives clarification about the use of ability groups (Responsive; Co-text). Agrees about giving homework based on ability (Judgemental). Gives idea on homework for weaker readers (Elaborative; Co-text, Own idea). Agrees about the use of diary (Judgemental). Gives idea on homework for advanced readers (Elaborative; Co-text, Own idea). Agrees about remedial instruction for weaker pupils (Judgemental).] 639  
640  
641  
642  
643

## Message 15

Re: hi! Iina 23.03.2005

[...] 648  
How about the other groups? Could an assistant cope with those who have “learned 649  
normally”, if the teacher begins the task first? Then the teacher could take the dyslexic 650  
pupils herself and work with them? 651  
I have no experience of this kind of teaching, so it’s hard to say if this works or not... 652  
[Asks for a suggestion and gives idea how to teach different ability groups 653  
(Interrogative, Elaborative; Co-text, Own idea).] 654

## Message 16

Re: hi! Otto 24.03.2005

I definitely support the idea of an assistant being with the group learning normally and 659  
those advanced work individually, of course getting some guidance occasionally. The 660  
teacher’s professional expertise would then be used with those who have difficulties. 661  
[...] 662  
Now I cannot think of else, because I don’t have much experience, but I’ll be back... 663

[Agrees with Iina’s idea and elaborates on the teaching of advanced pupils and justifies it 664  
(Judgemental, Elaborative, Justificational; Co-text, Own conception).] 665

In all the above messages, the students are wondering how they should differentiate the 666  
teaching to fit pupils’ abilities. Iina first suggests dividing the pupils into ability groups 667  
(Message 7). After that, the students start to negotiate on how the pupils should be taught 668  
in those groups. Iina suggests using a school assistant (Message 7) and Alisa agrees 669  
(Message 11). Iina and Otto specify this later in elaboration on the idea of using an 670  
assistant with those who have “learned normally” (Messages 15 and 16). Alisa elaborates 671  
further on differentiation by suggesting the use of a special teacher for dyslexic and 672  
remedial instruction for weaker pupils (Message 11). Iina agrees about remedial instruction 673  
(Message 12). Finally Otto elaborates on the suggestion that the advanced could cope 674  
individually (Message 16). In the messages, the students mostly elaborate others’ ideas and 675  
justify their own and others’ suggestions. They also ask for confirmation of their ideas 676  
(Interrogative; Messages 7, 11, 15). The frequent occurrence of the judgemental function 677  
of communication reveals that communication is based on agreement (Messages 8, 12 and 678  
16). They build their discussion mostly on each other’s (co-text) and their own ideas. 679  
Another sub-theme under differentiation concerns homework. In messages 11 and 12 Alisa 680  
and Iina elaborate on this theme as regards two ability groups: advanced and weaker. Iina 681  
also agrees (Message 12) on how to supervise homework according to Alisa’s idea 682  
(Message 11). 683

Again, this episode from the discussion demonstrates the students’ lack of experience. 684  
This is directly shown in two messages where Iina and Otto refer to their inexperience: “I 685  
have no experience...” (Message 15), “...I don’t have much experience...” (Message 16). 686  
Some discursive features of their communication also indicate their uncertainty: “I 687  
suppose” (Message 7), “It is probably”, “I believe” (Message 8), “I guess” (Message 11), 688  
“probably” (Message 12). The high frequency and also the nature of questions—mostly 689  
requests for confirmation of one’s suggestion—supports, in part, this uncertainty. Thus, 690

Group A's discussion is the talk of 'an inexperienced student-teacher,' as it was during the discussion of the other theme. 691  
692

Example 4: Group B's asynchronous web-based discussion on the theme "Differentiating activities in teaching reading" 693  
694

## Message 5

About the task Jaana 16.03.2005

[...] 697

I think every first grader should have and could learn reading from their own level, thus we should at first organize reading groups according to level. And then teaching for these groups according to their level. 698  
699  
700

[Justifies and suggests teaching in different groups (Justificational, Suggestive; Own conception; Own idea).] 701  
702

## Message 6

Re: About the task Mari 16.03.2005

The reading groups Jaana suggested are a good idea! The teacher makes small sub groups from pupils at the same level, also puts dyslexic pupils in a group of course, although (in my experience) they probably get special teaching for reading. If there is an assistant in the classroom the situation becomes easier from before. Teacher collects/makes appropriate material besides the primer and in this way differentiates children at different levels. It is good to keep the bar a little bit "too" high to keep up the pupils' motivation. For example, a couple of reading lessons a week would be a good amount for these kinds of small groups. 706  
707  
708  
709  
710  
711  
712  
713

You can also differentiate pupils according to remedial instruction, but I have noticed that with the existing time frames it is impossible as the only way, as you can only give remedial teaching for an hour or two in months. 714  
715  
716

[Agrees with Jaana's suggestion (Judgmental). Elaborates on differentiating teaching: groups, special teacher, assistant (Elaborative; Co-text, Own experience). Elaborates by suggesting concrete way to differentiate: material (Elaborative; Co-text, Own experience). Suggests and justifies the 'standard' for teaching (Suggestive, Justificational; Own conception). Gives suggestion about the amount of time to be spent teaching small groups (Suggestive; Own idea). Elaborates on differentiation by suggesting remedial instruction and gives an example from practical experience (Elaborative, Exemplification; Co-text, Own experience).] 717  
718  
719  
720  
721  
722  
723  
724

## Message 7

Re: About the task Jussi 19.03.2005

Yeah, those reading groups are a very good thing. A school assistant could be given (that is if we have one) a big role with some reading group. Gladly with those reading fluently, so the teacher could help those who have difficulties. This kind of lesson could be done one or two times a week, so that at other times the teacher could see the others as well. On the other hand could a group of fluent readers be autonomous even so that pupils would guide each others? I don't know if first-graders are too young for this kind of teaching, but one could give it a try.

[Comments on reading groups (Evaluative). Suggests how to use an assistant in teaching, justifies (Elaborative, Justificational; Co-text, Own conception). Agrees on (repeats) the frequency of groups, justifies (Judgmental; Justificational; Own idea). Reasons about and asks opinion on group of fluent readers (Interrogative, Reasoning; Co-text, Own conception).]

## Message 8

Re: About the task Jaana 19.03.2005

Yeah, I also think that a reading group of the best readers could work quite quickly autonomously. I have practical experience of that and it went well! First-graders are small, but happy when they are given responsibility. This way they do things that are jointly agreed well autonomously. There is no need to "bunk off" yet.

[...]

With these challenging pupils we also have to get parents to join the reading bee at once. That is, one must abide by the joint rules. I have noticed that one good way is to have a book for reading homework, which the parents sign, when it is well read. This way one reads at home as well. Unfortunately parents are often too soft-hearted to demand that the child wrestling with difficulties does his homework well...

[Agrees with and answers Jussi's reasoning (Judgmental, Responsive; Co-text). Justifies the issue (Justificational; Own experience). Elaborates on the teaching of challenging pupils by suggesting co-operation with parents (Elaborative; Own idea, Co-text) Gives example of how to monitor homework (Exemplification; Own experience). Justifies and gives example from practice (Justificational, Exemplification; Own experience).]

## Message 10

Re: About the task Mari 20.03.2005

[...]

Yet it came into my mind about the learning environment, that it should also advance differentiated teaching that is, in the classroom there should be a lot of children's books at hand (different levels, some syllabified with big letters, some with more demanding text) and, for example, a reading corner. When I was a teacher with first-second graders I had such a reading corner in my classroom, and it was used a lot.

Every day I read a shared book aloud to the pupils for about 10 minutes and then pupils wrote, draw etc. from it...The books that were read in the reading corner, were marked as “railway coaches”, which were connected as an out-of-the-world long and cool “reading train” on the classroom wall :). That is every student made the own coach every time they read a book or a Donald Duck, for example... The second graders became enthusiastic about using the reading corner also for reading aloud to the first graders and pre-schoolers, and it was a huge success.  
[...]

769  
770  
771  
772  
773  
774  
775  
776

[Suggests how learning environment enhances differentiation (Elaborative; Co-text, Own experience). Gives example of reading corner (Exemplification; Own experience). Gives example of reading train (Exemplification; Own experience). Gives example of how students used the corner by themselves (Exemplification; Own experience).]

777  
778  
779  
780

## Message 11

Re: About the task

Jussi

22.03.2005

The reading train sounds really good. An alternative could be a reading tree that could grow for a longer time. That is, on the wall the trunk of a tree from cardboard/paper and then after reading a book one could add a leaf with the name of the book, writer and reader. In this way there would be some teaching of writing as well...

785  
786  
787  
788

[Comments on reading train (Evaluative). Elaborates by giving alternative idea (Elaborative; Co-text, Own idea). Justifies the issue (Justificational; Own conception).]

789  
790

Group B's discussion proceeded similarly to that in Group A. The students justified, suggested, elaborated and gave examples of the same topics: how to differentiate groups and their teaching in the classroom. In the Message 5 Jaana suggests using reading groups according to the pupils' level. Mari accepts this and elaborates on the idea further by adding special teaching for dyslexic pupils, and the use of an assistant and remedial instruction (Message 6). Jussi elaborates on the use of an assistant with those reading fluently, and finally reasons that fluent readers could guide each other (Message 7). In Message 8, Jaana agrees that fluent readers can cope autonomously and justifies this by reference to her own experience. Jaana also elaborates on the teaching of challenging pupils by co-operating with parents and again gives an example from her own experience (Message 7). In the example the students also discuss how the learning environment could enhance differentiation. In Messages 10 and 11 Mari and Jussi discuss offering books on different levels and give concrete examples of activities centering around them. Differentiation with the help of teaching material is also mentioned earlier by Mari in Message 6.

791  
792  
793  
794  
795  
796  
797  
798  
799  
800  
801  
802  
803  
804

This example illustrates the students' reliance on their own experiences as their main resources in discussing the theme. They elaborate on, give examples, and justify issues on the basis of their experience (Messages 6, 8 and 10). Thus, their teaching experiences are relevant (context) for shared understanding of the object under discussion (Linell 1998). Thus, again, the students bring 'the teacher' into the discussion. When we compare the two groups, we can see this difference in their discourse. Where Group A students discuss “ability” groups—using quotation marks to indicate that they don't know the ‘official’ term—Group B students discuss ‘reading groups’ in a professional-like manner. In addition,

805  
806  
807  
808  
809  
810  
811  
812

Group A students categorize the groups of pupils into dyslexic/weaker, normal and advanced, whereas Group B mainly discusses challenging (dyslexic) pupils and fluent readers, thus again using more professional terms.

However, the fact that both student groups discuss the same means to differentiate teaching reading—groups, assistants, remedial instruction and special teachers—demonstrate that all the students share, at least on some level, common knowledge about these school practices, whether acquired through their own teaching experience, own experience as a pupil, or formal teacher education manifested in their own practical conceptualizations (ideas) or interpretations (conceptions) in the situation. Altogether, no matter with what specific resources, they deploy shared cultural background knowledge in their knowledge construction activity, even though the two groups differ in the ‘level’ of this cultural knowledge. This clearly demonstrates the mediated nature of learning. Discussion in this second theme in both groups is again cumulative in nature (Mercer 1996). The knowledge both shared (no co-text) and constructed (co-text) is based on sharing perspectives, which can be partly explained by the shared cultural knowledge mentioned above. Especially for ‘the teacher’ group their commonly shared wide-ranging knowledge about familiar school practices does not leave much space or need for negotiation.

It is important to pay attention to one more resource that in fact frames all the discussions above (Examples 1–4). The task itself is a contextual frame that gives meaning and shape to the students’ discussion. Thus, the contextual resource that the students implicitly (or explicitly) refer to throughout the discussion is a lesson plan. “Discussing the content of the lesson plan” is a kind of ‘activity frame’ that structures the students’ working. In fact, the students seem to share a common understanding about what is (and thus, what should be in) a lesson plan, and this shows in the content and the features of the discussion. The discussion as a whole mostly takes a practical orientation and knowledge is built through the deployment of practical knowledge resources in the form of action descriptions, interpretations, case descriptions and examples. Discussion is also future oriented. In almost every message the students discuss something ‘possible’ or ‘to be’: “Could an assistant cope with those who have “learned normally”, if the teacher begins the task first? Then the teacher could take the dyslexic pupils herself and work with them?” Altogether, a large part of the discussion is characterized as ‘planning talk’ as opposed, for example, to ‘academic talk.’ This may explain why the students’ knowledge construction activity has more of the features of ‘cumulative talk’ than ‘exploratory talk’ (see Mercer 1996).

## Discussion

The aim of this study was to demonstrate and discuss a methodology designed to explore the contextual nature of collaborative knowledge construction in web-based discussion. Two groups participating in a web-based teacher education course studying the pedagogy of preschool and primary education were compared with regard to the thematic structure, communicative functions and contextual resources of their discussions to highlight the similarities and differences in their collaborative activity.

The analysis of communicative functions allowed interpretations to be made about the quality of the discussions in the two groups (Mercer 1996; Weinberger and Fischer 2006). The results demonstrated that students in both groups were mostly engaged in asking questions and presenting justifications and suggestions. In Group A, the discussions also included elaborations. Asking questions and elaboration are both discourse activities that have been found beneficial to learning (e.g., van Bostel et al. 2000). However, in both

groups, the lack of communicative functions such as argumentation and counter argumentation indicate that the groups did not engage in critical evaluation of the knowledge discussed (Mercer 1996). The analysis of communicative functions as such makes it difficult to draw conclusions about the collaborative knowledge construction process or the reasons for the differences in the groups' knowledge construction, because it reveals little about the students' efforts to attain shared meaning or understanding (Crook 1999). However, in the CSCL area this research tradition is common. Many of the studies investigating collaboration in computer-mediated discussions have concentrated on evaluating the quality of collaboration on the basis of the quality of individual messages or speech acts (e.g., Lipponen et al. 2003). It is only recently that the focus has shifted more towards analyzing what goes on *between* the participants in computer-mediated discussions (e.g., Puntambekar 2006).

Connecting the analysis of communicative functions and contextual resources made it possible to obtain a fuller picture of the process of collaborative knowledge construction because it allowed interpretations to be made about the conceptual or material resources the students used in building their discussions and about the nature of those discussions. Thus, the analyses complemented one another. Although the elaborative function of communication indicated that students developed previously offered knowledge further, the concept of co-text additionally indicated whether some other functions, such as asking and answering questions, justifications or reasoning were built on each other's ideas or thoughts, thereby developing the group's reasoning further, or whether it was more a case of the students sharing knowledge (no co-text) and following their individual paths of reasoning. Contextual resources also indicated whether the knowledge discussed was based on practical or theoretical knowledge; that is, on experiences, ideas, or course material. The results showed that the students in Group A used more co-text and course material in their discussion than the students in Group B, whereas the students in Group B used more experiences in their discussion than the students in Group A. Altogether, the combination of analyses was able to illuminate the situated and mediated nature of learning (Wertsch 1991). The students' knowledge construction activity was grounded in the immediate context in the sense that meaning negotiation was shaped by the moment-by-moment interpretation of others' messages. However, the students' activity was also grounded in mediated contexts in the sense that knowledge construction and sharing were based on prior experience and background knowledge that were brought into the discussion. This is in line with Linell (1998, p. 132), who states that "Contexts anchor discursive events both in social and physical space [...] and in cultural history."

Quantifying the data based on the analyses enabled comparison of the similarities and differences between the two groups in their discussions. Thus it served as a valuable tool to obtain first-hand knowledge about the nature of discussions and knowledge construction in these groups. However, only a detailed qualitative analysis of the groups' discussions and thick descriptions (Hicks 1996) of the relations between the specific thematic content, communicative functions and contextual resources as well as the students' discursive activity made it possible to understand the reasons behind these similarities and differences. The qualitative analysis illuminated how the student groups actually interpreted the task in hand and which potential resources were realized as relevant and why (/not), and thus provided contextualized interpretations of why certain activities occurred. The results indicated that whereas the Group A students were 'novices' as regards both discussion themes, and therefore needed each other (co-text) and the course material in their problem-solving activity, the Group B students, as 'experts' with respect to the discussion themes, relied mostly on their own experiences in sharing knowledge. Group B also used this

expertise to legitimize their 'not sharing and using' course material in their discussion. 908  
Thus, it seemed that the different backgrounds of the students influenced the way context 909  
was created and interpreted, and how meanings were negotiated. 910

The results of this study, based on a relatively open learning task, indicate that the 911  
educational value of the students' discussion was not very high. The students mostly 912  
cumulatively shared or constructed knowledge from the same perspectives. Valuable 913  
exploratory talk (Mercer 1996) based on different perspectives and points of view, and on 914  
critically evaluating them and reasoning about them together was absent from the 915  
discussions. In order to support and enhance collaboration between participants, increasing 916  
attention has been recently paid to the pedagogical structuring of students collaborative 917  
activities, for example, through scripts (Dillenbourg 2002; Weinberger et al. 2005). 918  
However, there seems to be disagreement about what needs to be structured in students' 919  
activity (Stahl 2006); that is, about whether one should interfere with students' detailed 920  
interaction (e.g., Weinberger et al. 2005) or be more flexible (Dillenbourg and Tchounikine 921  
2007) and reflexive to the different needs of individuals and groups. In scripting 922  
collaborative interactions there is the danger of providing too much or too little guidance 923  
(e.g., Dillenbourg 2002; Hämäläinen et al. 2006). The results of the contextual perspective 924  
presented in this study indicate that in designing collaborative tasks and activities we have 925  
to take into account the unique context of students' activity. This also means paying more 926  
attention to the participants' perspectives, as thoughts, conceptions and beliefs are always 927  
reflections of individual backgrounds and life histories. The analysis presented in this study 928  
is a useful tool in testing the 'success' of designed pedagogical solutions and in revealing 929  
the critical junctures during activity because "analysis of [...] small groups engaging in 930  
situated problem solving can reveal how people actually make use of available resources 931  
and where they get stuck trying to follow [...] scripts [...]" (Stahl 2006, p. 6). The critical 932  
junctures with respect to the present task was its unresponsiveness to the different needs of 933  
the groups. Whereas the task was a problem-solving task for the Group A, the students in 934  
Group B faced no challenges as such and merely reproduced their commonly shared status 935  
quo. Therefore, the future research needs to better take into account the different resource 936  
needs of individuals' and groups' in supporting students' collaborative learning. 937

**Acknowledgements** This research was supported by the Academy of Finland (project no. 108488). 938

## References 940

- Arvaja, M., Salovaara, H., Häkkinen, P., & Järvelä, S. (2007). Combining individual and group-level 941  
perspectives for studying collaborative knowledge construction in context. *Learning and Instruction*, 17, 943  
448–459.
- Bliss, J., & Säljö, R. (1999). The human-technological dialectic. In J. Bliss, R. Säljö, & P. Light (Eds.), 944  
*Learning sites: Social and technological resources of learning* (pp. 1–16). Amsterdam: Pergamon. 945
- Buttyn, R. (1998). Putting prior talk into context: Reported speech and the reporting context. *Research on 946  
Language and Social Interaction*, 31(1), 45–58. 947
- Chen, F. C., Lee, Y. W., Chu, H. J., Wang, H. R., & Jiang, H. M. (2005). Effective discussions, social talks 948  
and learning—A paradox on learning in discussion forums. In T. Koschmann, D. D. Suthers, & T-W. 949  
Chan (Eds.), *Proceedings of CSCL 2005. Computer support for collaborative learning: The Next 950  
10 Years!* (pp. 33–42). Mahwah, NJ: Lawrence Erlbaum Associates. 951
- Crook, C. (1999). Computers in the community of classrooms. In K. Littleton & P. Light (Eds.), *Learning 952  
with computers. Analysing productive interaction* (pp. 102–117). London: Routledge. 953

- Crook, C., & Light, P. (1999). Information technology and the culture of student learning. In J. Bliss, R. Säljö, & P. Light (Eds.), *Learning sites: Social and technological resources of learning* (pp. 183–193). Amsterdam: Pergamon. 954
- Dillenbourg, P. (2002). Over-scripting CSCL: The risks of blending collaborative learning with instructional design. In P. A. Kirschner (Ed.), *Three worlds of CSCL. Can we support CSCL* (pp. 61–91). Heerlen: Open Universiteit Nederland. 955
- Dillenbourg, P., & Tchounikine, P. (2007). Flexibility in macro-scripts for computer-supported collaborative learning. *Journal of Computer Assisted Learning*, 23(1), 1–13. 956
- Fischer, F., Bruhn, C., Gräsel, C., & Mandl, H. (2002). Fostering collaborative knowledge construction with visualization tools. *Learning and Instruction*, 12(2), 213–232. 957
- Goodwin, C. (2000). Action and embodiment within situated human interaction. *Journal of Pragmatics*, 32, 1489–1522. 958
- Goodwin, C., & Duranti, A. (1992). Rethinking context: An introduction. In A. Duranti & C. Goodwin (Eds.), *Rethinking context: Language as interactive phenomenon* (pp.1–42). Cambridge: Cambridge University Press. 959
- Guzdial, M., & Turns, J. (2000). Effective discussion through a computer-mediated anchored forum. *The Journal of the Learning Sciences*, 9(4), 437–469. 960
- Hicks, D. (1996). Contextual inquiries: A discourse-oriented study of classroom activity. In D. Hicks (Ed.), *Discourse, learning and schooling* (pp. 104–141). Cambridge: Cambridge University Press. 961
- Hmelo-Silver, C. (2003). Analyzing collaborative knowledge construction: Multiple methods for integrated understanding. *Computers & Education*, 41(4), 397–420. 962
- Hämäläinen, R., Manninen, T., Järvelä, S., & Häkkinen, P. (2006). Learning to collaborate: Designing collaboration in a 3-D game environment. *The Internet and Higher Education*, 9(1), 47–61. 963
- Kumpulainen, K., & Mutanen, M. (1999). The situated dynamics of peer group interaction: An introduction to an analytic framework. *Learning and Instruction*, 9(5), 449–473. 964
- Linehan, C., & McCarthy, J. (2001). Reviewing the “Community of practice” metaphor: An analysis of control relations in a primary classroom. *Mind, Culture and Activity*, 8(2), 129–147. 965
- Linell, P. (1998). *Approaching dialogue. Talk, interaction and contexts in dialogical perspectives*. Amsterdam: John Benjamins. 966
- Lipponen, L., Rahikainen, M., Lallimo, J., & Hakkarainen, K. (2003). Patterns of participation and discourse in elementary students’ computer-supported collaborative learning. *Learning and Instruction*, 13(5), 487–509. 967
- Mercer, N. (1996). The quality of talk in children’s collaborative activity in classroom. *Learning and Instruction*, 6(4), 359–377. 968
- Polanyi, M. (1966). *The tacit dimension*. Garden City, NY: Doubleday. 969
- Puntambekar, S. (2006). Analyzing collaborative interactions: Divergence, shared understanding and construction of knowledge. *Computers & Education*, 47, 332–351. 970
- Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (2001). Methodological issues in the content analysis of computer conference transcripts. *International Journal of Artificial Intelligence in Education*, 12, 8–22. 971
- Säljö, R. (1999). Learning as the use of tools. A sociocultural perspective on the human–technology link. In K. Littleton & P. Light (Eds.), *Learning with computers. Analysing productive interaction* (pp. 144–161). London: Routledge. 972
- Schrire, S. (2006). Knowledge building in asynchronous discussion groups: Going beyond quantitative analysis. *Computers & Education*, 46, 49–70. 973
- Stahl, G. (2002). Rediscovering CSCL. In T. Koschmann, R. Hall, & N. Miyake (Eds.), *CSCL 2: Carrying forward the conversation* (pp. 169–181). Hillsdale, NJ: Lawrence Erlbaum Associates. 974
- Stahl, G. (2004). Building collaborative knowing. Elements of a social theory of CSCL. In P. Dillenbourg (Series Ed.) & J. W. Strijbos, P. A. Kirschner & R. L. Martens (Vol Eds.), *Computer-supported collaborative learning, Vol 3. What we know about CSCL... and implementing it in higher education* (pp. 53–85). Boston, MA: Kluwer Academic Publishers. 975
- Stahl, G. (2006). Scripting group cognition: The problem of guiding situated collaboration. In F. Fischer, H. Kollar, I. Mandl, & J. Haake (Eds.), *Scripting computer-supported collaborative learning: Cognitive, computational and educational perspectives* (pp.327–335). New York: Springer. 976
- Valleala, U. M. (2006). *Yhteinen ymmärtäminen koulutuksessa ja työssä. Kontekstin ymmärtäminen opiskelijaryhmän ja työtiimin keskusteluissa*. [Shared understanding in education and work. Context of understanding in student group and work team discussions]. Jyväskylä Studies in Education, Psychology and Social research 280. Jyväskylä: University of Jyväskylä. 977
- Van Boxtel, C. Van der Linden, J., & Kanselaar, G. (2000). Collaborative learning tasks and the elaboration of conceptual knowledge. *Learning and Instruction*, 10(4), 311–330. 978

- Vygotsky, L. (1978). *Mind and society*. Cambridge, MA: Harvard University Press. 1014
- Vygotsky, L. (1986). *Thought and language*. Cambridge, MA: MIT Press. 1015
- Weinberger, A., Ertl, B., Fischer, F., & Mandl, H. (2005). Epistemic and social scripts in computer-supported 1016  
collaborative learning. *Instructional Science*, 33(1), 1–30. 1017
- Weinberger, A., & Fischer, F. (2006). A framework to analyze argumentative knowledge construction in 1018  
computer-supported collaborative learning. *Computers & Education*, 46, 71–95. 1019
- Wertsch, J. (1991). A sociocultural approach to socially shared cognition. In L. Resnick, J. M. Levine, & S. 1020  
D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 85–100). Washington, DC: American 1021  
Psychological Association. 1022