The Levels of Web-Based Discussions:

Using Perspective Taking Theory as an Analytical Tool

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Considerable promises have been made for the use of the World Wide Web for this millennium's educational purposes. Various Web-based learning environments have been developed and different Web courses have been designed for higher education and continuing education. Recently, virtual universities have been actively planned. There has been an optimistic view that global networks and the use of computers for intellectual communication will further enhance and expand how humans connect, communicate, and create a sense of community (Bonk & King, 1998; Fetterman, 1998; Harasim, 1993; Owsten, 1997). The strongest argument for Web-based learning has been access: learning can be made available to students for whom distance or time is the primary impediment to certain studies. Learners can, for example, access virtual classrooms, online collaborative groups, learning circles, peer networks, and online libraries in a shared space. Also, pessimistic views about the quality of web-based learning have been presented (Cothrel & Williams, 1999; Järvelä & Häkkinen, 2001; Schlager, Fusco, & Schank, 2000). Roschelle and Pea (1999) indicated several difficulties for using today's Web as a medium for productive interaction: (a) Interactive communication on the Web is very much dependent on text. Thus, it is much easier to passively read and view information than to actively create it; (b) Collaborative processes are overemphasized, generalized, and their Web-specific features are not explicated; (c) Asynchronous communication is very different than face-to-face communication. Some of the most important processes in human communication, like creation of mutual understanding or shared values and goals, are hard to reproduce in the Web environment.

The ideas presented in this article are especially challenged by the critical questions focused on Web-based interaction. Are the students able to reach out in such an interaction, leading them to educationally relevant, higher level Web-based asynchronous discussion? For analysing the level of Web-based discussion, we developed a theory-based tool following the ideas of Selman's (Selman, 1980) sociocognitive construct of perspective taking. The model and its theoretical basis are introduced and the practical stages for data analysis are demonstrated in an empirical study of Web-based learning in teacher education.

**IS WEB-BASED DISCUSSION EDUCATIONALLY VALUABLE?**

There is growing documentation regarding the differences in communication patterns, teacher roles, and student performances when using Web-based learning environments in college or higher education settings (e.g. Khan, 1997; Lehtinen, Hakkarainen, Rahikainen, Lipponen & Muukkonen, 1999). It is, however, very difficult to evaluate the educational relevance of Web-based learning because most research on the use of different Web-based communication tools still lacks theoretical grounding in contemporary learning theory (Koschmann, 1994). Too often, research on technologies for learning emphasises things like tool features, attractive intercultural designs, and technological procedures, and much of the
published work concerning the use of Internet has been anecdotal
descriptions of the activities performed.

More depth and quality in electronically networked communication is
needed. Studies report how networked interaction in many learning projects
results in superficial and experience-based discussion, but does not reach
the level of theory-based reflection and argument. Yet, theory-based
discussions and expert knowledge are crucial for high-quality knowledge
construction and learning (Bereiter & Scardamalia, 1993). The nature of
computer mediated discussion differs from face-to-face communication. In
written communication, the main medium of communication in the Internet,
the reference relations of text should be explicated, and the context created.
In face-to-face communication, in contrast, they are usually known by
participants or are easily checked. However, in many cases, students do not
explicate such referential relations in networked discussions. In this respect,
their written activity resembles oral discourse (Lipponen, 2000).

THE PROPERTIES OF SOCIAL INTERACTION AND RECIPROCAL
UNDERSTANDING IN ASYNCHRONOUS DISCUSSION

Asynchronous interaction without immediate social interaction has many
challenges to overcome because communicating parties are faced continuously
with the task of constructing their common cognitive environment. A great
deal of information conveyed by face-to-face interaction is derived from such
things
as tone of voice, facial expressions and appearance.

The absence of visual information (e.g., missing facial expressions and
nonverbal cues) reduces the richness of the social cues available to the
participants, increasing the social distance. For people to communicate
effectively, they must solve the mutual knowledge problem (Graumann, 1995;
Krauss & Fussell, 1990; Nystrand, 1986). According to the researchers in the
field of sociolinguistics, the mutual knowledge problem derives from the
assumption that to be understood, speakers must formulate their contributions
with an awareness of their addressees’ knowledge bases. That is, they must
develop some idea of what their communication partners know and do not
know in order to formulate what they have to say to them. Research on
collaborative learning also calls for reciprocity in social interaction (Crook,
1994). Nystrand (1986) defined reciprocity as a principle that governs how
people share knowledge. It rules their determination of what knowledge they
will exchange when they communicate and how they choose to present this
knowledge in discourse. Evidently, people acquire knowledge and patterns of
reasoning from one another but for some kinds of shared knowledge,
individually rooted processes play a central role. Regarding collaborative
learning, in the grounding phase of coordinated problem solving, the
participants negotiate common goals, which means that they do not only
develop shared goals but they also become mutually aware of their shared
goals (Guy & Lentini, 1995). The question arises how can we better enable
participants to find each other and form collaborative teams around mutual
goals, skills, and work processes in technology-based environments. There is a
need to find variables in communication processes that mediate discussions in the Web environment, and also new ways to characterize discussions in categories related to quality.

FROM RECIPROCAL UNDERSTANDING TO PERSPECTIVE TAKING – DEVELOPING A THEORY-BASED ANALYSIS TOOL

Our earlier empirical studies on students’ interactions in the computer environment gave evidence that reciprocal understanding is a typical phenomenon in technology-based interactions (e.g. Arvaja, Hääkinen, Eteläpelto, & Rasku-Puttonen, 2000; Järvelä, 1998; Roschelle & Teasley, 1995). In a study by Järvelä, Bonk, Lehtinen, and Lehti (1999), detailed qualitative data - videotapings, tape recordings and interviews - related to students’ working processes and teaching–learning interactions were collected during three experiments. The results of the analysis point to the ways in which technology can improve task-related social interaction and provide multiple opportunities for students to negotiate meanings. Reciprocal understanding seems to be connected with students’ social interaction by the computer. Instead, virtual, networked interaction, as in Web-based asynchronous interaction, is a phenomenon of reciprocity that has not yet been analysed. As in face-to-face interaction, in asynchronous interaction, reciprocal understanding can play an important role.

Conditions for social interaction have been analysed by many researchers in different theoretical traditions, for example, human development based on Piagetian and Vygotskian tradition (Newman, Griffin, & Cole, 1989), social psychology (Mead, 1934) and communications (Markova, Graumann & Foppa, 1995).

In social psychology, Mead (1934) argued that human capacity to coordinate roles is both the source of a sense of the self and the core of social intelligence. Hence, in Mead’s sense, without social interaction, there could not be a psychological self. Selman (1980) spoke about social perspective taking, which includes developing an understanding of how human points of view are related and coordinated with one another. Similar to this view is Flavell, Botkin, Fry, Wright & Jarvis’s (Flavell, Botkin, Fry, Wright & Jarvis, 1968) focus on role taking, characterizing social or psychological information from another individual’s perspective. These perspectives coalesce in pointing to the importance of social cognition or perspective taking in the building of common spaces or shared worlds between the interactors.

Perspective taking skills are critical to successful human functioning and involvement in everyday social interaction. We suppose that global networked technologies can give influence student perspective taking and raise interpersonal understanding. We also assume that if Web-based interaction is aimed at educationally valuable higher level discussion among the students, the level of perspective taking will correspond to the improved quality of discussion. As the grade of perspective taking in electronic asynchronous discussion improves, so the interaction and learning among
the students advances. We also believe that the coordination of different perspectives and mutual negotiation produces reasoning on a more general level (cf. Schwartz, 1995).

For example, asynchronous Web-based discussion in pre-service teacher education, as reported in this chapter, students from different countries create cases on problems encountered in schools. In such an electronic discussion, perspectives can be shared at the level of superficial information, common interests, or deeper theoretical or societal levels. Selman’s (Selman, 1980) model of sociocognitive perspective taking includes developing understanding of how human points of view are related and coordinated with one another. Although the theoretical approach is a strongly structural-developmental construct following Piagetian tradition and originally developed in studies of social and moral reasoning (Selman, 1971), it’s basic model gives a theoretical insight of the level of interaction in other contexts, such as in negotiations and shared experiences (DeVries & Zan, 1996).

Because Web-based interaction basically involves the essential features of reciprocity, Selman’s (Selman, 1980) theory can give a theoretical insight for developing a model for analysing the deeper meaning of Web-based interaction features and for analysing the level of interactors’ perspective taking. Adopting Selman’s ideas for Web-based interaction analysis does not follow its original research tradition but rather allows this interaction to be used as a theory-based analysis tool. In the next section, the theory of perspective-taking is introduced and the way it has been applied to the Web-based interaction analysis is explained.

A THEORY OF PERSPECTIVE TAKING

Based on Piaget’s (1963) cognitive developmental theory, Selman (1980) suggested that educators need to devise new ways for students to progress beyond their egocentric views of the world, that is, grow interpersonally. Selman’s developmental construct of social cognition and perspective taking is the ability to see the world from another person’s perspective or to infer another’s capabilities, attributions, expectations, feelings, and potential reactions. Following Piaget’s cognitive developmental theory, Selman (1980) outlined a social cognitive developmental model of five distinct stages with increasing abilities to take into account alternative viewpoints.

In our study, Selman’s (1980) developmental theory of social cognitive skills offered a theoretical basis to develop a tool for exploring the level of electronic discussion. Selman and colleagues have studied the ontogenesis of interpersonal conceptions as a function of developmental levels of social perspective taking. They have defined it as the ontogenetic process by which a child comes to understand the way psychological points of view between self and the other are coordinated (Gurucharri & Selman, 1982; Selman, Beardslee, Schultz, Krupa & Podorefsky, 1986). As a result of
these studies, five developmental levels of the coordination of social perspectives are defined:
Stage 0: Undifferentiated and egocentric;
Stage 1: differentiated and subjective role-taking;
Stage 2: self-reflective/second person and reciprocal perspective;
Stage 3: third-person and mutual perspective taking;
Stage 4: in-depth and societal-symbolic perspective taking.

Descriptions of concepts at each level are divided into sections on persons and on relations. The former concept describes a person’s notions of how an individual functions psychologically. The latter concept describes the closely related notions of how these individual perspectives are related and concepts of how viewpoints are mutually understood and coordinated (Selman, 1980). In other words, in his structural description of categories, Selman describes each level with two different conceptions: the conceptions of persons and conceptions of relations.

**A SYSTEM OF CATEGORY FOR ANALYSING THE LEVEL OF WEB-BASED DISCUSSION**

Selman’s original category descriptions (Selman, 1980) were used for developing a system of categories for analysing the level of discussion in asynchronous electronic discussion, but the categories were adapted to the new context. It was created so that after studying the theoretical basis of perspective taking, the researchers made the first draft of a category system on the most typical elements of electronic discussion and in particular, on the different perspective taking stages. The category system was revised after becoming familiar with the data of students’ Web-based discussions and the contextual features of the electronic discussion were added. The system of categories for analysing the level of discussion is as follows:

**Stage 0: Egocentric**
Students present very subjective and egocentric opinions and expressions. They do not pay attention to the point that the other students may or may have interpreted the same situation or experience differently. Conceptions of relations of perspectives are very limited. Because most of the students present their own egocentric opinions and experiences, the electronic discussion does not progress, and the postings remain very scattered.

**Stage 1: Subjective Role Taking**
The subjective perspectives and other students’ perspectives are clearly differentiated. Students’ opinions, experiences and feelings are subjective. The discussion is constructed of a one-way conception of relating perspectives and students’ responses to postings are very much alike.

**Stage 2: Reciprocal Perspective taking**
Students recognize and value the uniqueness of each person’s opinions and expressions in discussion. A two-way reciprocity of thoughts and feelings, not merely actions, is typical. Students consider the case of an electronic
discussion from variety of different viewpoints and the discussion progresses, but still, different perspectives are not taken enough into account.

Stage 3: Mutual Perspective taking
Students coordinate the perspectives of self and others, and thus, the topic in discussion is seen from the third person or generalised other perspective. Each one has his or her own experience about the topic under discussion. Relations are viewed as ongoing systems in which thoughts and experiences are mutually shared. The electronic discussion progresses from mutual experiences to more elaborative argumentation and develops toward discussions on more general views in education or society.

Stage 4: Societal-Symbolic Perspective
The students conceptualise subjective perspectives of persons toward each other at existing, not only on multidimensional or higher levels of communication. In discussion, they can abstract multiple mutual perspectives to societal, conventional, legal, or moral perspectives that all the individuals can share.

Even though finding the relevant theory and creating a theory-based system of categories for analysing Web-based discussion are the most important phases, there are certain other important steps to be done in data analysis before the category system can be used. Web-based data are usually very rich and multidimensional. There may be hundreds of postings or tens of discussions, the amount of participating subjects may vary from tens to hundreds of students; also the discussions are typically unstructured and multidimensional. Following the main ideas of content analysis (Miles & Huberman, 1994), it is very important to develop different ways to reduce and organize data. For analysing the levels of Web-based discussion, a graph model for characterizing the progress and dynamics of a discussion was developed. The following study demonstrates how the theory-based method was used for analysing the levels of web-based discussion.

A STUDY OF THE LEVELS OF A WEB-BASED DISCUSSION

A case-based model for Web conferencing was used in a pre-service teacher education course (see Bonk, Malikowski, Angeli, & East, 1998; Järvelä & Häkkinen, 2001; Saarenkunnas, Järvelä, Häkkinen, Kuure, Taalas & Kunelius, 2000). The subjects were pre-service teachers in the United states, University of Indiana, (N=40) and Finland, Universities of Jyväskylä and Oulu (N=30), who used an asynchronous Web-based tool called Conferencing on the Web (COW) to collaborate in creating joint, case-based descriptions in different areas of teaching and learning. The aim of the study was to examine the level of Web-based discussion, especially focusing on the level of perspective taking between the interactors.
Procedure
The students constructed case-based descriptions (see Bonk et al., 1998) in the areas such as motivation, multicultural education, or technology in education as well as the change these practices impose on traditional teaching and learning. Different levels of expertise in peer and mentor collaboration were provided during the learning process in order to apprentice student learning. Mentoring was organized by senior students in other countries as well as by in-service teachers and faculty members from other universities.

An asynchronous Web-based tool called Conferencing on the Web (COW) was applied for the learning environment. COW is a shareware program, which allows users to read, browse, and add to multiple discussions asynchronously by using a Web browser anywhere in the world at any time. In order to strengthen the feeling of a virtual community, the Web-work was supported by two international videoconferences between the two Finnish sites and the American counterpart (see Saarenkunnas et al., 2000). The Web-based learning project proceeded in the following way: 1. The students read a selection of articles in the areas of learning and teaching; 2. ISDN video conference meeting between Finland and United States was organized for introducing the students; 3. The students wrote cases in COW. Each case created an electronic discussion; 4. Different levels of mentoring (peer, experienced teacher, researcher, local, and global) were provided; 5. The students summarized the discussions and the web work was closed; 6. Final video conference meeting between Finland and United States was organized for reflection.

Data Collection and Analysis

Transcript data of students’ postings was collected. Following the principles of qualitative content analysis, three successive phases were formulated for the analysis. First, in order to organize the data, it was grouped for different types of postings (an analysis focused on individual postings). Second, a graph model was developed for structuring the detailed information received from the data and making a complete interpretation for different levels of discussions (an analysis focused on each discussion). Third, the previous two phases were exploited in classifying the data according the system of categories developed. The second and third analyses helped us to consider the connection in between the level of discussion and the quality of discussion; that is how the perspective taking stage contributes to the level of discussion.

PRELIMINARY ANALYSIS OF EACH DISCUSSION: THE TYPE OF POSTINGS

During the 2-month period, the students produced 25 different discussions involving 10 to 30 postings in each discussion. First, the category of the type of postings was determined in order to organize the data. The types of postings were grouped into the following categorizations: theory, new point, question, experience, suggestion, and comment. The categories were
formulated from transcript data from the researchers. Second, cross-references between the student postings within discussions and mentors’ postings were marked. Third, quantifications were made such as the number of postings by mentors, the number of each type of posting, and the number of cross-references.

ANALYSIS OF THE INTERACTION: THE LEVEL OF DISCUSSIONS

Preliminary analysis provided the necessary detailed information needed for analysing the levels of discussions. Graphs were drawn (see Fig. 4.1), which demonstrate the progress of a discussion, dynamics of different types of postings, postings created by a case presenter, mentors’ postings, and type of postings. The in-going and out-going arrows describe the amount and direction of cross-referring between the postings. The Fig. 4.1 demonstrates the graph used as a tool to organize the detailed data in the discussion, “Do computers replace teachers?,” which included 17 postings. This particular graph describes a progressive discussion.

Because each graph organizes multiple information, such as posting types, mentors’ scaffolding, and overall cross-referencing, it was possible to see the dynamics of different pieces of information and to take them into consideration when evaluating the level of discussion. The graphs were the researchers’ tools, which facilitated formulation of three groups of 25 discussions: higher-level discussions, progressive discussions and low-level discussions.

**High–level discussions** can be characterised as shared, theory-based discussions. The discussions maintain high-level postings, such as theory-based postings and postings involving a new point or question. Comments do not degrade the quality of discussion, but support the construction of a topic to be discussed. Rich cross-referring is typical.

**Progressive discussions** involve some cross-references, generalizations, and joint knowledge-building (see Fig. 4.1.). They have plenty of comments, but also experience-based postings and postings with new points or questions. In the course of the discussions, the students’ postings are constructed on the previous, mainly experience-based postings, but in the end of the discussion, general thoughts and ideas are usually voiced. No theory-based discussion occurs. A typical feature of the discussions is a rich dynamic in conversation: cross-references and variety in types of postings.
Low-level discussions involve mainly separate comments and opinions. Students’ comments do not take into consideration the earlier discussion but rather represent each student’s independent and often unilateral comments. The amount of other type of postings other than comments is minor.

For confirming the validity of the analysis, two researchers made independent estimates of levels of discussions. Their classifications matched perfectly with 90% of the coding. The 10% of contradictory analyses (3 discussions) were negotiated until uniform estimation was reached.

SPECIFIC ANALYSIS OF THE QUALITY OF INTERACTION: PERSPECTIVE TAKING STAGE IN DISCUSSIONS

The particular attempt was to find out what stage of perspective taking occurs among the students in an asynchronous discussion. For classifying the data according to the system of categories based on perspective taking, each of three levels, high-level, progressive level, and low-level discussions were analysed in detail in order to understand the reciprocal understanding and perspective taking stage of each level of discussion. The idea was to better understand the characteristics of each discussion level, whether perspective taking is observable in electronic discussion, and what is the possible contribution of electronic discussion to quality of discussion. Again, two researchers made independent estimates for coding and this time classification matched perfectly in 80% of the coding. The 20% of contradictory analyses were discussed until uniform estimation was reached.

RESULTS

Three different levels of discussions were found in the qualitative analysis. Six discussions were found that belong to the high-level discussions, ten discussions to progressive discussions, and nine discussions to low-level discussions. This is illustrated in Fig.4.2.

Because we were interested in the quality of discussions in terms of their educational value, a more specific analysis was conducted based on social cognitive theory of perspective taking (see the category system described earlier). From all 25 discussions, none of the discussions reached the highest Stage 4 (Societal-Symbolic Perspective Taking). Five discussions (20%) were in Stage 3 (Mutual Perspective Taking), 9 discussions (36%) in Stage 2 (Reciprocal Perspective Taking), 9 discussions (36%) in Stage 1 (Subjective role-Taking), and 2 discussions (8%) in Stage 0 (Egocentric); see Fig.4.3.
High-level discussions were either in Stage 3 or in Stage 2. In these discussions, mutual or reciprocal perspective taking was apparent. Students recognized the value of other students’ opinions and considered the topic of discussion from a variety of different viewpoints. The communication progressed from mutual understanding to more general argumentation and conclusions.

Excerpt 1 describes mutual perspective taking (Stage 3) in asynchronous discussion. We use Excerpt 1 also to demonstrate the COW discussion. Because of space limits, only the most illustrative parts of the discussion have been chosen to demonstrate the level of perspective taking.

EXCERPT 1. of discussion 204/1, “Prerequisites for Successful Cooperative Learning?”
1. Case -author: Mervi (Finnish student) Date: Mar. 13, 9:43 a.m. 1998
Dear COW participants, I'm an english student doing my teacher training this year. I've tried many different approaches to studying a new text in the classroom, one of which is co-operative learning. I've had two kinds of experiences about co-operative learning. One class was very enthusiastic about it, they worked hard, they supported each other and they took responsibility of their work. They also told me that they enjoyed working that way and that they felt they really learned something. The teacher of this class has a learner-centered teaching style, so they are used to working independently.

I also tried co-operative learning in another class where the students were of same age as the ones I talked about before. This time it didn't work. The students felt very insecure about their skills, they seemed unable to work together without continuous guidance and they said they wanted to do some "real studying" (whatever that is...)

I don't know what kind of teaching style they are used to, because I was a substitute teacher and didn't get a chance to observe the class with their own teacher. Do you think that the teaching style that the students were used to was one reason for this? Can you think of any other reasons? (I know that group dynamics is one very important factor.)

waiting for your comments,
Mervi

2. Author: Carolyn (American student) Date: Mar. 17 9:01 PM 1998
It could be that they were used to one teaching style and when you tried to implement co-operative learning they felt intimidated. They may have felt that it wouldn't help them without giving it a fair chance. I personally think that co-operative learning methods are great and can be very beneficial to students. I also wonder if possibly some of the students felt intimidated by other students who they perceive to be smarter then themselves. Maybe when they were placed in these groups they felt as if they would be made fun of for not being as smart as another student. I would have thought that the children who weren't used to this kind of method would have really enjoyed the change. I'm glad that you had one successful experience with co-operative learning rather than two negative experiences. I am truly surprised that they didn't feel that they were "really studying" in groups with their peers. This was an interesting study!

3. Author: Minna (Finnish mentor, researcher and teacher educator) Date: Mar. 18 5:43 AM 1998
What really surprises me in School today, is that teachers and students rarely talk about learning. For example the text books we use in English courses hardly mention the topic of language learning. I think that raising learning awareness should be one important goal of
all learning activity at school. I guess in Finnish schools (at least in secondary schools) we have left this topic for student counsellors alone. If the topic of learning was addressed frequently in connection with different subjects, and if the students had opportunities to guide their own learning processes, I guess they would be more flexible when it comes to alternative learning/teaching styles.

--Minna

4. Author: Mari (Finnish mentor, researcher and teacher educator) Date: Mar. 20 6:32 AM 1998

An interesting case, Mervi! I think this is a tough one when we talk about change in education and in educational practices. Young students are willing and able to try out new methods but it doesn't take that long a time for them to get accustomed to fixed ways of doing things. This fact lays a heavy responsibility on the teacher and also the educational system. If new approaches to learning are not incorporated in the classroom practices from the very early stages on, it takes time and effort to change and "outlearn" from the old ways of doing things in the classroom and also getting a new perspective on what learning really is about. Do you think that our teacher education system takes this issue seriously when educating becoming teachers? Do they realize the long term effects of being too stuck in the "old ways"?

--- Mari

5. Author: Hanna (Finnish student) Date: Mar. 25 7:38 AM 1998

I wonder if it's ever possible to incorporate practice on all sorts of learning methods into our teacher training system since the amount of lessons you get to keep is factually next to nothing. However, I don't think it's such a disaster as long as during the teacher training you learn to be open to all new ideas and practices. Isn't that after all what keeps wheels turning -- not the fact that you learn new things per se during the training, but the aptitude and willingness to improve yourself throughout your career (ah, and life time, indeed.)

As I think someone said(wrote) earlier on, I also think you have to play it by the ear when in contact with various classes. Only last week did I use a lot of co-operative learning, but realised later on that due to a composition of a number of weaker students, they felt all issues had been left hanging in the air as the teacher didn't provide them with the "correct" answers. Actually I understand their concern as this was grammar what they were dealing with, they need to know whether what they did is accurate or not.

It was my fault not taking care I could provide everyone with the help they felt they needed, but on the other hand it was the pupils' fault for not telling me about it until when it was too late! What are we teachers -- gods who are not to be disturbed???

5. Author: Mervi (case author, Finnish student) Date: Mar. 27 6:43 AM 1998

Hello everybody,

Thanks for your replies. You pointed out to me some things that I didn’t think of - or at least I didn’t place much importance on - when writing this case.

Feeling secure in the group where you work is of course very important. But how to create an atmosphere where everyone feels secure...that’s another thing.

Raising the students’ awareness about learning - I agree that it’s not happening in Finnish schools. Maybe the students have one course that deals with these things when they start high school, but that’s about it. These things should definitely be included in teaching throughout the school year.
And then, something that I found very important: the teacher being open to new ideas. After all, you can’t expect the students to be open to new approaches to learning if you yourself are stuck with the old ways.

So, once again: thanks for your thoughts. I plan to use co-operative learning methods in the future as well, keeping these things in mind.

The quality of communication in *progressive discussions* was mainly in Stage 2 (except one Stage 3 and two Stage 1 discussions). The discussions were characterized with reciprocal perspectives, so that thoughts and feelings were considered especially from a variety of viewpoints contributing to the progressive quality of discussion. For instance “*I agree with Anne’s comment that you cannot motivate anyone. I have been to many leadership workshops, and from them I have learned that…*”. However, in these discussions, general conclusions, evaluations or suggestions were rare.

*Low-level discussions* were all in Stage 1, but two discussions were in Stage 0. The discussions were restricted to subjective perspectives so that students either produced very egocentric, usually feeling-based opinions or responded to earlier postings with “*I agree…*” - like postings without paying attention to the point that the other students may have interpreted the same situation in a different way. In these discussions, the postings remained very scattered and, actually, there was no progressive discussion at all.

In conclusion, the results of this study point out different levels of Web-based discussions. The results also show that the stage of perspective taking in electronic discussion was generally rather low. None of the discussions reached the highest stage, societal-symbolic perspective taking, but most of the discussions indicated mutual or reciprocal perspective taking or even subjective role-taking. Furthermore, high-level discussions involved communication with the highest stage of perspective taking and constructive discussion, whereas lower level discussions were mostly egocentric and superficial. Because the analysis of the level of discussion, such as high, progressive, or low-level describes the nature of discussion in a whole Web-based learning course, we may suppose that it reflects the quality of students’ learning. We may conclude that the higher the level of perspective taking reached, the better the learning.

**EVALUATING THE THEORY-BASED ANALYSIS TOOL FOR ANALYZING THE LEVEL OF WEB-BASED DISCUSSION**

The theoretical insight of reciprocal understanding, in general, and Selman’s (Selma, 1980) perspective taking theory, in particular, helped us to develop a model for analyzing Web-based interaction. The theory gave us a useful framework to explore possible cognitive growth or developing perspectives on Web-based learning. This theoretical “tool” was important because our data did not allow us to consider students’ thought processes or social interaction processes where two or more students negotiate meaning during web-based learning (cf. Reed et al., 1998). We thought that Selman’s
(Selman, 1980) theoretical model on conceptions of relations offers a useful tool for analyzing the quality of asynchronous discussion on a deeper level than merely focusing on linguistic structures or forms of discussion because we did not have simultaneous access on students’ thoughts (cf. Howell-Richardson & Mellar, 1996).

Selman’s (Selman, 1980) theory is strongly tied to children’s development. In our study, we did not focus on the development of individual students, rather the development of discussion created by them in asynchronous discussion. It must be noticed that we were not measuring students’ social cognitive skills or their development during networked interaction, nor did we pay attention to their developmental level of perspective taking skills.

The same categories of social perspective taking, as the five stages in the original theory, might not always be applicable to the analysis of Web-based discussion. Therefore, it is necessary to evaluate how well the original categories could be applied to the Web-based discussion or how the original categories needed to be revised in order to apply to other contexts. The researcher needs to have a strong theoretical understanding of the theory of perspective taking, which demands continuous interaction between the theory and the contextual features of the data. Because the origin of perspective taking theory comes from a very different tradition than Web-based learning, there is a danger that the model of analysis will be used in a superficial and mechanical way. In order to avoid superficial interpretation, a “graph tool” was developed to enhance the data structuring and facilitating deeper understanding of it. Multidimensional information is easier to visualize in a graphical form than in a transcribed text.

It is, however, typical that web-based discussions are analyzed mainly using the transcribed texts or counting frequencies of different details. Because Web-based learning and interaction processes are not inherently situated in a Web-environment, nor is knowledge construction derived exclusively from writings or notes on the Web, it is urgent to develop ways to organize and analyse the data so that the dynamics of different factors in Web-based learning can be taken into consideration. Different contextual social resources, such as peers, collaborative partners, or mentors are important contributors in creating shared understand. Web-based learning should not be considered only in global networks, but should be seen in a broader social context.

HOW TO FURTHER DEVELOP THE MODEL FOR ANALYZING WEB-BASED DISCUSSION?

One of the weaknesses of using the perspective taking theory as a model for analyzing the Web-based interaction is that it is very difficult to evaluate the real perspective taking level on the basis of a written Web-based discussion. We need to find methods for receiving data of students’ own interpretations and of the social context. A relevant method could be videotaping, stimulated recall interviews, reflective group discussions, or classroom observations. In the future, our aim is to examine the strategies people
employ in an effort to establish common ground in situations where students are collaboratively working with Web-based environments. Important questions will be: How do virtual social groups emerge as a result of Web-based communication? What is the quality of collaboration and how is collaboration formed? Are there certain pedagogical factors that contribute on the development of different levels of discussions? What are the possible contextual and pedagogical contributors for high-quality conversations?

It is important to further elaborate the phenomena of reciprocal understanding and the theory of perspective taking in virtual, networked environments in general. For example, current knowledge intensive organizations in modern industry have practical problems concerning the extent to which knowledge is actually shared, especially among teams of experts at different locations (Allee, 1997). A large part of the experience remains individual tacit knowledge, it is not shared explicitly, and is lost when experts leave the company. A deeper insight into the phenomena of reciprocal understanding and perspective taking could help find answers to such questions as: How do we support the building of a virtual community between these experts? How do we pedagogically support virtual work? How do we support individual participation in an expert community? As we have proposed (Häkkinen, Järvelä, & Dillenbourg, 2000), by utilizing the theoretical knowledge on perspective taking and reciprocal understanding, it may be possible in the future to develop innovative technological ways that help to identify and share tacit knowledge by making collaborative processes visible through concrete representations of these processes.
References


x-axis = type of posting, y-axis = rank-order of posting

Fig. 4.1. An example of a graph used for organizing the detailed data.
Fig. 4. 2. Distribution of discussions according to different levels.
Fig. 4.3. Distribution of discussions between categories of perspective taking.