
Approaches for analyzing tutor's role in a networked inquiry discourse


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Abstract
The purpose of the present study was to find new approaches for evaluating the tutor's contribution to students' knowledge building discourse in a computer-supported collaborative learning (CSCL) environment. Most recent studies in CSCL concentrate on students' processes, whereas the teacher's or tutor's role has not been analyzed closely. Guidance, however, is known to be crucial in promoting students' higher-level learning.

The study was based on an analysis of database material from one university course using the web-based tool, Future Learning Environment (FLE). First, written messages in FLE's database were analyzed to compare tutors' and students' contributions as participants in inquiry discourse. Second, methods of social network analysis were applied to study interaction structures between tutors and students. Third, tutors' messages were re-analyzed qualitatively to evaluate tutors' guidance techniques.

The results indicated that the three approaches revealed new aspects of networked tutoring. Classification of progressive inquiry elements revealed that tutors acted more like metalevel commentators rather than equal participants in the inquiry process. Methods of social network analysis showed tutors' varied roles as initiators of new discussion-openings or commentators of students' messages. Classification of guidance techniques showed differences in the three tutors' guidance patterns and the possible effects of tutors' contribution to students' discourse.

Keywords: Tutoring, Networked learning environment, Collaborative inquiry

Introduction
The possibilities and challenges of computer-supported collaborative learning (CSCL) have been intensively investigated in recent teaching and learning research. Practices of problem-based inquiry supported by collaborative technology appear to be an especially promising way to develop teaching and learning methods with information and communication technology (Lehtinen & al., 1999). CSCL environments provide tools to facilitate students' advancement of inquiry, learning and knowledge building (Scardamalia & Bereiter, 1993).

It is important, however, that students not be left working alone without guidance in the inquiry process. A tutor is needed to structure the process, to give advice when needed and to promote deepening of understanding. If students and tutors are communicating mainly through a networked learning environment, tutors have to learn new ways to support students. Most of the CSCL studies have concentrated on students' learning processes; the tutor's role has been much less often investigated. Earlier models of skillful tutoring are based on individual tutoring situations (Lepper & al., 1997) or face-to-face group instruction (Mercer & Fisher, 1992; Levin, 1999), and they do not necessarily apply very well to networked learning. Therefore, one important aspect that needs more research is the challenges of tutoring in CSCL.

In our research group a model of progressive inquiry has been developed to provide a framework for structuring pedagogical practices in CSCL (Hakkarainen & Sintonen, in press). The basic idea of progressive inquiry is that students gain deeper understanding by engaging in a research-like process, where they generate their own problems, make hypotheses and search out explanatory scientific information collaboratively with other students. A web-based environment, Future Learning Environment (FLE) has been designed to provide a tool to support collaborative processes of progressive inquiry in instructional settings (Muukkonen, & al., 1999; http://fle2.uiah.fi). In this research FLE's Knowledge Building module was used for students collaborative inquiry. In the Knowledge Building module, the sent messages are organized in threads under main questions, and the messages are visible to all members in the same study group. Each message has to be labeled by a category of inquiry label.
Teacher's role in the inquiry approach and in CSCL

In instructional settings where study is intended to be collaborative scientific inquiry, the teacher’s role is quite different from traditional teacher-centered instruction. Wells (2000) has argued that inquiry approach should not only change the organization of students’ activity, it should also characterize the teacher’s role in the learning community. He distinguished two levels at which the teacher needs to be involved in inquiry: 1) as a co-inquirer with the students in the topics that they have chosen to investigate, and 2) as a leader and organizer of the community's activities.

According to Hogan & Pressley (1997), the prototypical one-to-one scaffolding model is impractical for group instruction in science teaching. They found several types of statements that teachers used in inquiry classrooms to prompt student thinking during whole-class discussions; there were statements: to frame a problem or articulate a goal; to encourage attention to differences of opinion; to refocus the discussion or invite interaction of ideas; to prompt refinement of language, turn a question back to its owner, to communicate standards for explanations; to ask for elaboration, ask for clarification, and to restate or summarize students' statements.

Roehler and Cantlon (1997) studied teachers' scaffolding in two 'social constructivist classrooms' and classified types of scaffolding into five categories: Offering explanations, inviting student participation, verifying and clarifying student understandings, modeling of desired behaviors and inviting students to contribute clues. Scaffolding was reduced as the students gained responsibility for their learning. Hogan, Nastasi and Pressley (2000) found out that in the inquiry-based science classrooms the roles of teacher as a questioner and student as an answerer were similar to those found in traditional recitation-based classroom interchanges. However, the crucial differentiating feature was the lack of evaluative statements by the teacher.

The teacher's role should not only be a pedagogical organizer but an expert participant in the inquiry process. Ahern, Peck and Laycock (1992) studied teachers' performance especially in computer-mediated discussions. They compared the effects of three different styles of teacher discourse (questions only, statements only and conversational) in computer-mediated discussions in an undergraduate university course for eighty students. In the question-only condition students' responses tended to concentrate on the topics selected by the instructor. The statement-only condition produced more complex interactions. The conversational style was the most effective in encouraging students' exploration and engagement into collaborative inquiry.

One interesting question in inquiry learning is the centrality of teacher's role in a learning community. The teacher is very often at the center of discussions in traditional classrooms, and the same can happen in networked learning. Guzdial (1997) reported findings about the teacher's dominant role in college courses where a CSCL forum was used. In eight courses out of ten it was the teacher or teaching assistant who produced the highest number of notes, and also the second most productive writer was the teaching assistant in three of the ten courses.

In networked discussions the tutor might also unconsciously concentrate on the most interesting discussions. Hakkarainen and Palonen (2000) studied patterns of elementary school students’ peer interaction in computer-mediated discourse using methods of social network analysis. Their study revealed that although the teacher was not very central actor in discussions, he communicated mainly with the most active and high-achieving students. Should the tutor concentrate on the passive students who do not produce many messages to the discussion, but who might need support?

In the pedagogical model of progressive inquiry the aim is to guide students to take upon themselves the responsibility for collaborative knowledge building. It is a challenge for a tutor to find a balance between relevant guidance, own participation as an expert model, and gradual assignment of the regulatory responsibility to students.

Aims of the study

This was a pilot study to investigate aspects of tutoring in a networked inquiry process. The aims of the study were as follows:

- To develop methods for analyzing the tutor’s role and contribution in networked inquiry discourse from multiple perspectives. Using only one method does not give a sufficiently diversified insight into the characteristics of networked tutoring.
- To investigate three tutors’ contribution to university students' progressive inquiry process in a networked learning environment.
- To find good practices of tutoring in CSCL.
Methods

Participants and data collection
The data were collected from a four-month course on "Psychology of Learning and Thinking" at the University of Helsinki. The course consisted of weekly lectures, and reading and writing tasks between the lectures. Three groups (17 students in all) volunteered to use the Future Learning Environment (FLE), between lectures for collaborative knowledge building. This study is based on an analysis of participants' written postings to FLE's Knowledge Building database.

Students' study process was organized according to principles of progressive inquiry. The students worked in three groups, and each group had 3-4 problems to discuss. The original research problems were constructed collaboratively in the first course lecture, e.g. “How does motivation affect learning?” or “What is intelligence and how can it be measured?” The teacher modified the questions to fit FLE. Each group had a tutor. The tutors did not meet the students in person during the course. The teacher in the course, who gave the lectures, did not participate in the FLE-discussions.

Students were undergraduate Open University students. The three tutors were post-graduate female students who were members of the CSCL research group. They were familiar with the progressive inquiry model and the basics of cognitive psychology. Tutors were 30 (tutor 1), 39 (tutor 2) and 26 (tutor 3) years old. The youngest tutor did not have earlier teaching or tutoring experience.

Analysis 1: Tutors' participation in progressive inquiry
To analyze the progressive inquiry patterns in FLE, we compared how tutors and students used the category of inquiry labels in FLE's Knowledge Building module to describe their messages. The number of each category used – Problem, Working theory, Deepening knowledge, Comment, Metacomment, and Summary – was counted from posted messages.

Students' and tutors' written productions were also analyzed more closely by qualitative content analysis (see Chi, 1997). The classification was developed in an earlier study, which analyzed university students' participation in networked inquiry (Muukkonen & al., 1999). All text in each message was first divided into segments, each representing a separate idea. To analyze the reliability of segmentation, an independent coder classified approximately 5% of all messages. The inter-coder reliability (single measure intraclass correlation; see McGraw & Wong, 1996) was .88, indicating that the reliability of segmentation was satisfactory. Then each idea was classified to one of the following inquiry categories: Problem, Own explanation, Scientific explanation, Quotes participant and Metacomment. To analyze the reliability of classification, an independent coder classified approximately 10% of all ideas; the coefficient for rater agreement (Cohen's Kappa) was .83, which was considered satisfactory.

Analysis 2: Tutors' role in the social interaction of networked discourse
Methods based on social network analysis (Scott, 1991) were used to study tutors' social position in the networked discussions. The same methods have been used in other studies to analyze patterns of social interaction in CSCL (Palonen & Hakkarainen, 2000; Nurmele & al., 1999).

The tutors' position in the networked discussions was analyzed using Freeman's degree as a centrality measure. Centrality describes the importance or isolation of a member in the communication network. The degrees were counted from the number of comments that the participants sent to others' messages (outdegree) or received from others (indegree) in FLE. Each tutors' degree measures were compared to the students' average degree measures in the same group.

The measure of density was used to evaluate the general level of interaction in discourse groups. Density is a simple way to measure a network: the more actors that have relationships with one another, the denser will the network be (Scott, 1991; 74); hence it indicates, here, the proportion of the intensity of interaction among the participants in FLE discussions. Density was counted from a dichotomized matrix of commenting (the participants had or had not commented each other, the frequency of commenting didn't matter) and, thus, it could vary from 0 to 1. The density of the three study groups was compared both with and without tutors' contribution in order to analyze the tutors' influence on the group interactions. All social networked analyses were performed using the Ucinet program (Borgatti & al., 1999).

Analysis 3: Tutors' guidance activity
The three tutors' messages to FLE database were re-analyzed qualitatively to assess their guidance activity in the discourse. The same division of message texts into segments was used as in the former analysis. A few segments were divided into two separate segments, because in guidance perspective they were evaluated to include two different ideas. Four categories representing guidance activity were used in the final classification. Categories were as follows:
1) **Recommend study practices**: Ideas assigned to this category represented technical advice about FLE and instructions for working in the course or in the inquiry process.

2) **Review and evaluate the discourse**: Ideas assigned to this category included summaries or reviews of the discourse, references to students’ contribution, positive and supportive evaluation or unmodified quotations from students’ texts.

3) **Produce expert’s explanation**: Ideas in this category represented the tutors’ own explanations of the problems discussed or references to scientific explanations or theories.

4) **Ask explanation-seeking question**: Ideas assigned to this category were research questions into the inquiry process, questions about refocusing the discussion or questions directed explicitly to students to elaborate their explanations.

As a reliability test, an independent coder classified about 40% of ideas in the tutors' messages. The coefficient for rater agreement (Cohen’s Kappa) was .89, which was considered good.

We wanted also to analyze at some level the effect of tutors’ contribution to students discourse, although the development of more sophisticated methods to analyze discourse processes is not within the scope of this research. Tutors’ messages were classified as messages that were commented on (led to at least one further message in the discourse thread) and messages that were not commented on (ended the thread or sub-thread) in FLE’s Knowledge Building. Then these two types of messages were compared according to the proportions of the various categories of guidance activity they included.

### Results

**Analysis 1: The tutors as participants in progressive inquiry**

The students posted 203 messages, 11.9 messages per student on average (minimum was 3, maximum 33 messages), to FLE’s database during the course. Tutors posted 35 messages, 11.7 messages per average. Tutor 1 posted 9 messages (16% of her group's messages), Tutor 2 posted 16 messages (18%) and Tutor 3 posted 10 messages (11%). Table 1 presents how the tutors and students used the inquiry labels in FLE to describe the contents of their messages. Cell-specific exact tests (Bergman & El-Khouri, 1987) were carried out in order to examine whether the observed frequencies in each cell deviated from what could be expected by chance alone.

<table>
<thead>
<tr>
<th>Inquiry label</th>
<th>Tutors’ messages</th>
<th>Students’ messages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Problem</td>
<td>5</td>
<td>14.3</td>
</tr>
<tr>
<td>Working theory</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Deepening knowledge</td>
<td>3</td>
<td>8.6</td>
</tr>
<tr>
<td>Comment</td>
<td>10</td>
<td>28.6</td>
</tr>
<tr>
<td>Metacomment</td>
<td>15†</td>
<td>42.9</td>
</tr>
<tr>
<td>Summary</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Note.* Significance tests are based on binomial probability estimations (Bergman & El-Khouri, 1987); * = Observed frequency smaller than expected by chance alone (p < .01); † = Observed frequency larger than expected by chance alone (p < .01).

The students classified over 50% of their messages as Comments, but the tutors also used that inquiry label frequently. The tutors used the inquiry label, Metacomment, in over 40% of their messages, which indicates that they themselves considered their role to be metalevel evaluators rather than equal participants in the process.

The contents of posted messages were also analyzed more closely to find out what progressive inquiry elements they contained. Students' 203 messages included 1353 segmented ideas, 6.7 ideas per message in average. Tutors' 35 messages consisted of 149 ideas, 4.3 ideas per message in average. Tutor 1 had 40 ideas (4.4 on average), Tutor 2 had 57 ideas (3.6 on average) and Tutor 3 had 63 (6.3 on average) ideas in the messages. Messages of Tutor 3 included on average more ideas than the other tutors’ messages, almost as many as students’ messages. In Table 2 are presented the amounts and proportions of inquiry categories that the messages contained. Cell-specific exact tests were performed to examine observed frequencies (see above).
Table 2. Proportions of inquiry elements in the produced messages.

<table>
<thead>
<tr>
<th>Category of inquiry</th>
<th>Ideas in tutors' messages</th>
<th>Ideas in students' messages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Problem</td>
<td>56†</td>
<td>37.6</td>
</tr>
<tr>
<td>Own explanation</td>
<td>29*</td>
<td>19.5</td>
</tr>
<tr>
<td>Scientific explanation</td>
<td>11</td>
<td>7.4</td>
</tr>
<tr>
<td>Quotes participant</td>
<td>13</td>
<td>8.7</td>
</tr>
<tr>
<td>Metacomment</td>
<td>40†</td>
<td>26.8</td>
</tr>
</tbody>
</table>

Note. Significance tests are based on binomial probability estimations (Bergman & El-Khoury, 1987); * = Observed frequency smaller than expected by chance alone (p < .01); † = Observed frequency larger than expected by chance alone (p < .01).

Tutors' messages included more problems and metacomments and less their own explanations. Because the tutors' role should be to act as an expert model of scientific-like inquiry, we had expected that they would produce relatively more ideas classified as scientific explanations, but most of their explanations had no reference to scientific sources.

Analysis 2: Tutors' social position in networked discourse

The tutors' centrality in the networked discussions was analyzed by measures of received and sent comments to other participants' messages. In Table 3 are presented the amounts of posted messages and sent and received comments by tutors and students (on average) in each group.

Table 3. The tutors' sent and received comments compared to the students' average degree measures in each study group.

<table>
<thead>
<tr>
<th></th>
<th>Produced messages</th>
<th>Sent comments</th>
<th>Received comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 Students (n=4)</td>
<td>11.75</td>
<td>5.25</td>
<td>6.75</td>
</tr>
<tr>
<td>Tutor 1</td>
<td>9.00</td>
<td>8.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Group 2 Students (n=7)</td>
<td>10.14</td>
<td>5.29</td>
<td>7.00</td>
</tr>
<tr>
<td>Tutor 2</td>
<td>16.00</td>
<td>16.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Group 3 Students (n=6)</td>
<td>14.17</td>
<td>8.83</td>
<td>8.17</td>
</tr>
<tr>
<td>Tutor 3</td>
<td>10.00</td>
<td>5.00</td>
<td>9.00</td>
</tr>
<tr>
<td>Summary Students</td>
<td>12.02</td>
<td>6.46</td>
<td>7.31</td>
</tr>
<tr>
<td>Tutors</td>
<td>11.67</td>
<td>9.67</td>
<td>5.00</td>
</tr>
</tbody>
</table>

The degrees reveal the tutors' different activity patterns. Most of the messages sent by tutors 1 and 2 were comments on other messages, whereas Tutor 3 posted half of her messages as starting messages, not as comments. Tutors 1 and 2 commented on other students more actively than students on average in their groups. Students commented more actively on messages of Tutor 3 than other tutors' messages.

Density measures were counted for the three study groups' discourse both with and without the tutors' participation. The density was almost the same in every group regardless of tutor's participation (in the first group 0.65 with and 0.67 without the tutor; in the second group 0.48 both with and without the tutor; and in third group 0.60 with and 0.57 without the tutor). It indicates that tutor's role was not very essential in any group's collaborative interaction.

Analysis 3: Tutors' guidance activity in networked discourse

The tutors posted altogether 35 messages to knowledge building discourse. About 60% of the messages concentrated mostly on the contents of the discussion. For example:

**Problem 7.4.1999 12:15:58 Tutor 2: Do we need the concept of intelligence?**

*If the concept of intelligence is so vague, should we stop using it in scientific and formal discussions? Would it be better to use the sub-concepts that Pekka mentioned (memory, ability to learn, ability to concentrate etc.), which can be better defined and more accurately measured.*

About 40% of the tutor's messages mostly handled issues of study methods and practices in the course. For example:
The contents of tutors' messages were qualitatively re-analyzed to inspect their guidance activity. The tutors' messages were divided into 159 ideas.

In the guidance category Recommend study practices the tutors gave recommendations for sophisticated inquiry practices ("Next you could for example take into account the comments and define more specific working theory or problem that you first try to answer.") or more general advice for studying ("You have to ask the teacher about his evaluation"). Every tutor wrote one or two reminders about the importance of active participation in the FLE-discussions (see above). A few advices concerned use of FLE's tools.

Ideas in the category Review and evaluate the discourse included almost as many neutral summaries of the discourse process ("I think that earlier messages have dealt with both general thinking skills (Matti's first message) and learning content in some domain (Paula's first message."). unmodified quotations from students' messages, and positive and supportive evaluations of the processes ("Good start for an important topic").

The category Produce expert's explanation included the tutors explanations to inquiry questions ("Apparently, intelligence is also always relative, so that a person is intelligent in some domain when compared to other people.", or references to some scientific theory or source ("I suppose you know Vygotsky's theory of the Zone of Proximal Development, according to which cognitive development occurs in social interaction, where one member of a group is more able than the other (this can also be called vertical interaction; from top down, from bottom up").

About half of the ideas in the category Produce explanation-seeking question were sub-questions to the research problems discussed in the discourse ("Is it even possible to describe intelligence in some sub-domain in an absolute way?"). In other questions the tutors explicitly asked students to elaborate their explanations ("Can you explain more closely, why a motivated person achieves better learning outcomes than unmotivated person?") or to focus the inquiry ("Could you start by defining, what intelligence is?").

In Table 4 are the frequencies and relative proportions of guidance activity categories in the tutors' messages. Cell-specific exact tests were performed to examine observed frequencies (see above).

<table>
<thead>
<tr>
<th>Category of guidance activity</th>
<th>Ideas in all tutors' messages</th>
<th>Tutor 1</th>
<th>Tutor 2</th>
<th>Tutor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommend study practices</td>
<td>f 159.00%</td>
<td>10 25.0%</td>
<td>10 17.9%</td>
<td>6 9.5%</td>
</tr>
<tr>
<td>Produce expert's explanation</td>
<td>26 16.4%</td>
<td>10 25.0%</td>
<td>10 30.4%</td>
<td>9 14.3%</td>
</tr>
<tr>
<td>Review and evaluate the discourse</td>
<td>36 22.6%</td>
<td>11 27.5%</td>
<td>14 25.0%</td>
<td>35 55.6%</td>
</tr>
<tr>
<td>Ask explanation-seeking question</td>
<td>39 24.5%</td>
<td>11 27.5%</td>
<td>15 26.8%</td>
<td>13 20.6%</td>
</tr>
<tr>
<td></td>
<td>58 36.5%</td>
<td>9* 22.5%</td>
<td>10 100.0%</td>
<td>63 100.0%</td>
</tr>
</tbody>
</table>

Note. Significance tests are based on hyper-geometric probability estimations (see Bergman & El-Khoury, 1987);

* = Observed frequency smaller than expected by chance alone (p < .05);
† = Observed frequency larger than expected by chance alone (p < .05).

As can be seen from Table 4, the guidance activity of Tutor 3 was different from that of other tutors. She generated more questions than could be expected and less advice and expert explanation. Tutors 1 and 2 produced fewer questions than could be expected.

Further analysis of commented-on and not-commented-on messages revealed that from the 35 tutors' messages, 15 were commented on, 20 were not. Commented-on messages had 4.7 ideas, not-commented-on messages had 4.2 ideas on average. Table 5 shows a comparison of proportions of guidance categories in tutors' messages on both types. Cell-specific exact tests were performed to examine observed frequencies (see above).
Table 5. Proportions of guidance categories in commented-on and not-commented-on messages.

<table>
<thead>
<tr>
<th>Ideas in commented-on messages</th>
<th>Ideas in not-commented-on messages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
</tr>
<tr>
<td>Recommend study practices</td>
<td>4*</td>
</tr>
<tr>
<td>Produce expert's explanation</td>
<td>13</td>
</tr>
<tr>
<td>Review and evaluate the discourse</td>
<td>17</td>
</tr>
<tr>
<td>Ask explanation-seeking question</td>
<td>40 †</td>
</tr>
<tr>
<td></td>
<td>74</td>
</tr>
</tbody>
</table>

*Note.* Significance tests are based on binomial probability estimations (Bergman & El-Khoury, 1987); * = Observed frequency smaller than expected by chance alone (p < .05); † = Observed frequency larger than expected by chance alone (p < .05).

In not-commented-on messages there were more and in commented-on messages less guidance focusing on concrete study practices than could be expected by chance. It is understandable that students didn't comment on these recommendations, they either acted according to the guidance or ignored it. For example, Tutor 2 advised three students to choose a research problem and continue the discourse under that question in FLE's Knowledge Building module, and the students acted accordingly.

A most interesting difference is the high proportion of questions in commented-on messages. Questions that tutors produced were explanation-seeking questions, and messages that contained this kind of questions seem to have inspired the students to participate in the discourse.

Conclusions

The main purpose of the present study was to develop new approaches for analyzing the tutors' role in networked inquiry and collaborative knowledge building. The tutors' contribution was viewed from three perspectives. First, tutors' inquiry practices were compared to students' action by classifying elements of progressive inquiry from the posted messages. This approach revealed that tutors acted more like metalevel commentators rather than equal participants in the inquiry process. Second, methods based on social network analysis were applied to analyze the tutors' position in social interaction of the study groups. The analysis showed that the tutors had two interaction patterns: they concentrated either on generating new discussion openings or on commenting upon students' messages.

Third, qualitative analysis of the tutors' messages from a guidance perspective produced a classification that exposed clear differences in the three tutors' guidance practices. Further, comparing the differences in tutors' commented-on and not-commented-on messages revealed that those messages that had been commented on by students included a large number of explanation-seeking questions. Consequently, if the aim of tutoring is to activate inquiry discussions, one way might be to generate good questions to the discussion forum. However, in progressive inquiry the aim is for students to learn to define good research questions and regulate the collaborative inquiry process themselves. Additional methods would be required to investigate, whether tutors should actively produce questions or only give advice when needed to affect the quality of students' discourse in networked inquiry.

In particular the combination of approaches gave new insights into the dimensions of tutors' role as participant, expert or adviser in the inquiry process. The analyses revealed, for instance, that Tutor 3 had a different role from that of the other tutors: she produced longer messages, a high proportion of questions and initiated new discourse chains. Her messages got plentiful comments from students, but she didn't comment on others so much. The more experienced tutors 1 and 2 acted more like expert commentators and advisers of students' inquiry.

We conclude that the approaches used in the study can be used in investigating tutoring in computer-mediated inquiry, because they revealed significant new aspects of the tutor's role in the discourse. Also, the approaches can be very useful in teacher training, because teachers and tutors need methods for evaluating their own guidance practices in networked learning environments.
References

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