Effects of Awareness Support on Moderating Multiple Parallel E-Discussions

Astrid Wichmann, Adam Giemza, Ulrich Hoppe,
Collide Group - Institute for Computer Science and Interactive Systems
University of Duisburg-Essen, Forsthausweg 2, 47057 Duisburg, Germany
{wichmann, giemza, hoppe}@collide.info

Matthias Krauß
Competence Center Virtual Environments
Fraunhofer Gesellschaft I AIS, Schloß Birlinghoven, 53754 Sankt Augustin, Germany
matthias.krauss@iais.fraunhofer.de

Abstract: Moderating multiple e-discussions at a time puts high demands on teachers as moderators. Therefore, to be able to provide effective moderation, teachers should be given adequate awareness support. We evaluated our e-moderation system called “Moderator’s Interface” comparing moderation with and without awareness support. Following a within subject design, our cases were two teachers who were asked to moderate discussions of their students and to choose and prepare a discussion topic compliant with the curriculum. Results indicate that additional awareness support was deliberately used during moderation when available. An analysis of data from the teachers' answers to 120 questions and tasks indicates that in the awareness condition, both teachers performed better on the tasks as compared to moderating without awareness support. However, it could not be corroborated that teachers gained additional knowledge about the discussion solely from using the awareness support in absence of an external task.

Moderating E-Discussions
Research on supporting e-discussions has been a strong interest of the CSCL community (e.g. Kirschner, Buckingham Shum, & Carr, 2003). Existing e-discussion environments such as Belvedere (Suthers, 2003) and Digalo (Lotan-Kochan, 2006) offer a context in which learners can synchronously develop argumentation maps on a collaborative workspace. There has been a focus on facilitating learners’ to engage in synchronous e-discussions, specifically investigating ways to provide guidance to the learner. For example Schwarz and Glassner (Schwarz & Glassner, 2007) found that floor control and providing specific ontological argumentation types can be beneficial to reduce superficial, chat-like discussions. While these efforts help to sustain autonomous discussions between peers, they do not take into account the role of the teacher in classroom-based e-discussions. Supporting the role of the teacher during e-discussions in classrooms has been taken up only recently (De Groot et al., 2007). Especially when it comes to synchronous e-discussions (and possibly multiple discussion spaces), teachers need to be supported to effectively moderate the students’ flow of a discussion.

Problems of E-Moderation
Moderation during synchronous e-discussions puts high demands on a teacher. In a previous study on moderation investigating teachers’ moderation styles and strategies, we found that teachers have difficulties to moderate effectively. For example, results indicated that teachers rarely encouraged students to formulate arguments or pose scaffolding questions but rather gave feedback only with respect to the process and social level (Wichmann, Harrer, & Hoppe, 2007). According to Chi and colleagues (Chi, Siler, Jeoug, Yamauchi, & Hausmann, 2001) only scaffolding questions and informative feedback is beneficial and has a positive effect on students’ knowledge construction behavior. Interventions such as scaffolding questions and informative feedback require the teacher to evaluate the students' actions in terms of content, process, and social behavior. On a content level, a teacher needs to be able to grasp the focus of a student’s contribution and monitor the content focus of the overall discussion. On a process level, teachers need to understand whether students engage in a critical style of argumentation. For instance, a student, who only contributes using affirming arguments, might need to be encouraged to critically reflect specific aspects in the discussion. Social behavior needs to be in focus of the teacher’s attention to intervene on time when for example a student stops contributing. While engaging in effective moderation turns out to be to be a general problem for teachers during discussions, a specific challenge derives from moderating multiple e-discussions at the same time. Concurrent moderation of multiple discussions requires the moderator to switch between discussions and to perform several tasks at once. A prerequisite for effective moderation (in form of posing scaffolding questions etc.) is the teachers’ understanding of the students’ activities during e-discussions. Especially when it comes to moderating multiple
parallel discussions, teachers need to be supported to handle the vast amount of information and to enable them to moderate a discussion effectively. The present research endeavor focuses on supporting teachers during moderations in terms of awareness support.

**Awareness Support during Moderation**

Awareness can be characterized as the understanding of the activities of others, which provides a context for one’s own activity (Dourish & Bellotti, 1992). During the moderation of multiple parallel e-discussions, we believe that gaining awareness (an understanding of students’ activities) needs to be supported. Awareness information needs to be provided in terms of: a) content awareness b) process awareness and c) social awareness (De Groot et al., 2007). This awareness support is expected to enable teachers to effectively carry out tasks. On a content level, it should enable teachers to provide informative feedback to the students. On a process level, awareness support should provide a teacher with information on how far a discussion has advanced with respect to a planned workflow. With regard to social aspects, awareness support should help a teacher to identify strong and weak collaborators instantly. A general problem (Manuele, Valdeni de Lima, & Marcos, 2003) of providing additional information often results in the opposite effect: Instead of enabling a user to make deliberate choices, the additional information leads to a mental overload and hence to ineffective or no use at all. Therefore, awareness information needs to be pre-selected and smoothly integrated with the environment.

**The ARGUNAUT Approach**

The goal of the EC-funded ARGUNAUT project (IST-2005027728) was to provide a moderation component called “Moderator’s Interface”, which enables teachers to moderate multiple parallel e-discussions. The Moderator’s Interface allows the teacher to observe the development of the discussions via a Discussion Graph display. In addition, it offers awareness support and a remote intervention mechanism. Awareness support displays characteristics of a discussion in terms of content, process, and social aspects. Aspects related to content of students’ contributions is represented in a Contribution Sequence display consisting (see Table 1) of a chat-like table. Process-related aspects are represented in the User Activity display and the Ontology display. The User Activity display shows number and type (e.g. new contribution, new relation etc.) of contributions by each student. The Ontology display shows number of pro – arguments and counterarguments as well as contribution type (e.g. argument, question, comment etc.) per discussion space. Social behavior is represented in the display called user relations. This display offers a visualization of collaborative activity per student using a social network diagram, which visualizes the level of interaction between users.

<table>
<thead>
<tr>
<th>Awareness Information about:</th>
<th>Content</th>
<th>Process</th>
<th>Social Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderator’s Interface</td>
<td>Contribution Sequence</td>
<td>User Activity, Ontology</td>
<td>User relations</td>
</tr>
<tr>
<td>Awareness Support:</td>
<td></td>
<td></td>
<td>Mini View</td>
</tr>
</tbody>
</table>

Awareness displays are provided for every discussion space. A teacher can switch between existing discussion spaces and can view awareness displays and discussion graph display accordingly. Correspondingly, a teacher can send remote interventions (see Figure 1) in form of pop-ups and annotations using the Intervention Panel to every student individually or cumulative to all students of a discussion space.

![Figure 1. Moderator’s Interface with Discussion Graph display only and Discussion Graph display + Awareness Support](image-url)
Assumptions and Questions

The focus of this study is on the additional value of awareness support for teachers while moderating multiple parallel discussion spaces. We investigate whether teachers benefit from additional awareness support or not (see Figure 1). Specifically we expect that teachers will use the awareness support displays deliberately. However, it is an open question whether teachers gain more understanding through the deliberate use of awareness support. In addition, we assert that additional awareness support will lead to better task performance.

Method

Participants

Two teachers (teacher A and B) from two secondary schools in Germany served as cases for the study. Their respective school classes took part in the study. 24 students participated in the study the first day (class A) and 21 students participated the second day (class B). The students were between 15 and 16 years old. Class A was taught by a male teacher, instructing economy as a school subject. Class B was instructed by a female teacher within the subject of computer science. A teachers judgement on the students level of activity (1=very active, 2=average active, 3= not active) in the classroom was used for balancing purposes to assign each student randomly to one of the two conditions.

Design

The study followed a within subject design (see Table 2) regarding the teachers who worked as moderators in this study. In the Awareness condition, the teacher moderated the discussions using all components of the Moderator’s Interface including the Discussion Graph display and the other awareness displays. In the control condition (No Awareness condition), the moderator could only access the Discussion Graph display, hence no awareness displays were available. The conditions were counterbalanced for avoiding sequence effects. That means, on the first day, teacher A moderated first in the No Awareness condition and afterwards in the Awareness condition. For Teacher B, moderating on the second day, we reversed this sequence.

Table 2: Within subject study design

<table>
<thead>
<tr>
<th>Teacher A + class A(Day 1)</th>
<th>Teacher B + class B(Day 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Awareness Condition</td>
<td>Awareness Condition</td>
</tr>
<tr>
<td>(Moderator’s Interface</td>
<td>(Moderator’s Interface</td>
</tr>
<tr>
<td>incl. Discussion Graph only)</td>
<td>Incl. Discussion Graph</td>
</tr>
<tr>
<td></td>
<td>+ Awareness Support)</td>
</tr>
<tr>
<td>Awareness Condition</td>
<td>No Awareness Condition</td>
</tr>
<tr>
<td>(Moderator’s Interface</td>
<td>(Moderator’s Interface</td>
</tr>
<tr>
<td>Incl. Discussion Graph</td>
<td>Incl. Discussion Graph</td>
</tr>
<tr>
<td>+ Awareness Support)</td>
<td>only)</td>
</tr>
</tbody>
</table>

Procedure

The study took place in a university computer lab room. Each one of the two school classes visited the university for one school day to perform a discussion. The discussion topics were chosen and developed by the teacher and part of the curriculum. The teachers prepared the topic of the discussion sessions with lessons prior the study. For the class A the teacher discussed an economy subject related to an activity that has been planned and organized within the school year. The class B teacher decided to discuss the topic of privacy in the context of internet. On both study days, half of a class participated in the first condition. Before starting the discussions, we demonstrated the software FreeStyler (Hoppe & Gaßner, 2002). FreeStyler is a collaborative modelling environment, which offers various visual languages with handwriting support to engage in rich scenarios. For the purpose of this study, students participated in Freestyler discussion spaces to collaboratively develop
argumentation maps. Students could choose various contribution types (e.g. Argument, Comment etc.) and related them to contributions of themselves or others using supporting or disputing links. Students spent 15 minutes trialling the software. After that, the students participated for about 50 minutes in the discussion. On both days, the first half of the class participated in the first condition (see Table 2), distributed in one of three FreeStyler discussion spaces (see Figure 2) while the second half of the class did other non-related activities. For the second condition, the second half of the class participated in the study while the first half did not. The moderation consisted of two moderation phases, an unguided moderation phase and a guided moderation phase. In the unguided moderation phase the teacher was being left alone with the moderation task. In the guided moderation phase, a research assistant asked questions.

Figure 2. Freestyler discussion Spaces

**Data sources**
The research questions were evaluated with regard to teachers’ knowledge and task performance. We measured the teacher’s knowledge by asking 10 questions about the discussion state, during and after the moderation. For example, one question was: “Who is the strongest collaborator in the discussion?” Other questions were for example concerned with the number of links made by a specific person: e.g. “How many links were established by student X?” Every question could be answered using the Discussion Graph Display only, in other words, the questions were not tailored to aspects, which were only displayed in the awareness displays. Every question was asked for each of the 3 discussion spaces in one condition respectively. We measured teacher’s task performance by prompting the teacher after each question to find (or confirm) the answer by using the Moderator’s Interface. In each condition (Awareness condition and No Awareness condition), every question was read twice (one time to assess knowledge and one time to assess task performance) to the teacher and in addition provided on a paper. 120 answers (60 for knowledge and 60 for task performance) per teacher were written down, audio recorded and the teachers’ actions were logged. We used a dichotomous coding to determine whether answers were correct (2 points) or incorrect (1 point).

**Results**
One hundred and twenty answers per teacher were first averaged across the 3 discussion spaces for every question and task respectively. Then means for all questions and tasks were in turn averaged separately again to have final mean scores for knowledge gain and task performance in both conditions respectively. Deliberate use of awareness displays: We analyzed the teachers’ moderation behaviour in the Awareness Support condition in both phases the unguided moderation phase find out whether, the awareness support was used deliberately (instead of sticking to using the Discussion Graph only). Both teachers used all awareness displays available in addition to the Discussion Graph display. Most favoured displays were the Contribution Sequence Table display and the User Activity display.

Knowledge gain: Comparing the knowledge gain between the Awareness Support Condition and the No Awareness Support Condition indicated no differences. In both conditions, the moderators were not able to answer most of the questions correctly. Only one question was answered correctly in both conditions by both moderators (“Did everyone contribute?”). In addition, both teachers could identify correctly the strongest collaborator in almost all spaces (one teacher guessed incorrectly in one space). For all other questions, the moderators provided either no or an incorrect answer.

Task Performance: Results show that teachers in the Awareness Support condition, could perform all required tasks successfully (see Table 3). However, in the No Awareness Support condition, several tasks were not conducted at all or incorrectly. Especially tasks that cannot be answered through first glance at the Discussion Graph display have been conducted not at all or incorrectly if awareness support was not available.
For example, in the Awareness Support condition, the teachers could easily determine strong collaborators, which they were not able to determine in the No Awareness Condition. With awareness support available, the teachers used the awareness display "User Relations" to determine the answer successfully. In most cases, both teachers used the same awareness displays to perform a requested task. Two tasks were performed using different displays: When tasks were concerned with determining the number of links made by a specific person, teachers used either the User Activity display or User Relations display.

Table 3. Tasks determined successfully

<table>
<thead>
<tr>
<th></th>
<th>Teacher A</th>
<th>Teacher B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tasks without Awareness Support</td>
<td>1.36</td>
<td>1.69</td>
</tr>
<tr>
<td>Tasks with Awareness Support</td>
<td>2.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Summary and Discussion

The results indicate that teachers took advantage of awareness support provided during the moderation of multiple e-discussions. Moreover, we found that awareness support was not only helpful but also necessary to complete the tasks successfully, since these required deeper insight into the argumentation maps. However, teachers did not gain more knowledge from using awareness displays alone. Rather, making use of awareness support by carrying out specific tasks resulted in better task performance and thus in better understanding of the students’ activities. Gaining understanding during moderation is important because it is necessary for providing appropriate feedback to students.

A particular problem that arises from moderating multiple discussions is giving on time feedback. Even if feedback entails scaffolding questions as suggested by Chi et al. (2001), this information will only be helpful when provided within the respective situation. Interventions such as feedback that are provided out of context will rather be confusing than supportive to students. During moderation without awareness support, teachers spent a lot of time searching the Discussion Graph display to gain understanding of the students’ activities. In the awareness support condition, the teacher avoided long searches by identifying relevant information using appropriate awareness displays.

Although our study consisted of only two cases, we collected 240 items. The items included 10 questions regarding understanding and 10 tasks, which have been measured repeatedly with 3 discussion groups in two conditions. In this sense, our N is small but still we have a reasonable collection of data to ensure reliability while assessing the added value of awareness support. One aim of this study was to evaluate the moderation component Moderator’s Interface within the context of classroom lessons. Therefore, we accepted our small sample in favor of evaluating the software within a real classroom context. Research towards developing e-moderation software is a new field in the CSCL community. Future exploration on moderating e-discussions is needed.

References


