Assisting the facilitator: Striking a balance between intelligent and human support of computer-mediated discussions

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Research on computer-supported collaborative learning (CSCL) is traditionally rooted in constructivism. It intensively focuses on how productive peer collaboration can be stimulated and sustained in meticulously designed computer-mediated environments. Within the field of e-discussions, for example, it has been found that providing sentence openers, software-embedded collaboration scripts, representational guidance and even the medium itself may improve the quality of online collaborative argumentation. The role of the teacher and his/her impact on these activities, on the other hand, has been regarded to a far lesser extent. Teachers do not only plan, design and give feedback on students' collaborative activities, but they may also play an important role during these activities: They moderate, coach and guide groups of students. The research on F2F settings has unequivocally shown the positive effects of carefully calibrated, non-intrusive human facilitation of small-group discussions on its quality. When this is achieved in an on-line environment, it is often referred to as e-moderation or e-facilitation.

However, it is also known that e-moderation of group learning is not an easy task: Teachers not only have to monitor task progress and subject matter understanding, but the collaborative process as well. In an average-sized classroom or e-course with students working in small groups, the amount of information available to a teacher can become quite overwhelming. Compared to face-to-face group learning, this workload is even increased in CSCL environments (and especially synchronous discussion formats), since it lacks many of the traditional cues that teacher use to detect group dysfunction or individual difficulties. Moreover, since most CSCL environments are student-focused they do not offer tailored moderator tools that will allow teachers to unobtrusively intervene and support group work. Although e-moderation is a challenging task, CSCL environments also offer an opportunity to support e-moderation: Since many aspects of the collaborative process are logged, this information can be made available to teachers with the help of teacher-tailored visualizations of group interaction features (i.e., awareness tools), alerts and offline analysis tools. Teachers can subsequently use this information to determine which activities or interventions they further need to initiate.

This combination of intelligent support for human facilitation of group processes seems to be particularly suited for ill-defined learning activities that involve multiple agents, such as small group discussions on social dilemmas and controversial issues. These activities do not have one (or even multiple) correct answers; the strength of a certain proposition or standpoint depends on the quality of the arguments brought forward to support it and to refute alternative views. In addition, such discussions often touch upon personal value systems and strong emotions. Guiding such discussions thus requires a deep understanding of rather complex group dynamics and subtleties. In the present paper, we describe a system that aims to capitalize on the combination of intelligent technology and on human expertise. This system, Argunaut, is designed to provide intelligent support for human facilitators of multiple discussions.

2 Description of the environment

The Argunaut system (De Groot et al, 2007; http://www.argunaut.org) is a platform, which combines two graphical discussion environments, among which Digalo (Asterhan & Schwarz, in press), a separate moderation environment and a module for user and session management. In this paper we refer to two of these components: (a) the Digalo v.2 discussion environment, in which students log in to and participate in pre-assigned discussion sessions through diagram-like representations (see Figure 1 for an impression); and (b) the Moderator's Interface, from which teachers or tutors can monitor these discussions and intervene when necessary. The Moderator's Interface (MI) is a multipurpose tool that can be used for real-time moderation of ongoing discussions as well as offline analysis of completed discussions. Despite these multiple uses, the main design goal was to generate a user interface for real-time moderation. It provides an interface capable of supporting simultaneous moderation of parallel discussions. It was designed in a collaborative, iterative design process involving pedagogical experts, technological experts, and teachers (Hoppe, de Groot & Hever, 2009).

The main user interface is a single window with a predefined layout. A typical view is shown in Figure 1. The window contains four main components: The session and user list (left column), the main focus view (center), remote control panel (bottom center, collapsed to a button), and aggregated miniature views (right column). We will shortly describe the first three:
The session and user list includes tools for monitoring presence and for selecting groups and/or individuals within groups to be shown in the main focus view. Switching between different group discussions is done through this list. It is also responsible for showing alerts of important events in sessions other than the currently observed one. The alerting options that the MI offers range from the detection of superficial discussion features (based on keywords, inactivity, participation, responsiveness, etceteras) to alerts based on content-related dialogue analyses (e.g., patterns of reasoning, of interaction, see McLaren Scheuer & Mikšátko, in press). Since the alerting features were not activated in this study, we will not further report on them here.

The main focus view shows detailed information on the currently selected discussion with the help of a range of awareness displays that are continuously updated in real time. They are designed to provide quick and accurate updates on group and individual processes. Figure 2 presents four of the array of Awareness Displays moderators can choose from. By default, however, the main focus view shows the session's discussion graph, which is almost identical to the discussants’ Digalo interface. Navigation through the main discussion graph enables the moderator to read the content of contribution (tooltip) and see how they are arranged. The moderator can resize and rearrange maps to follow the discussion as well as make patterns in the discussion appear clearer, all without affecting the discussants' environment.

The Remote Control panel enables real-time moderation of discussions (see bottom column in Figure 1). It offers a collection of tools to intervene in the discussion without actually being defined as one of the map’s discussants and without acting from within the discussants’ EUE. The moderator can choose to send these interventions to all groups, selected groups or (a) selected individual(s) only. This then enables both private and public communication, since the interventions are shown on the screens of selected users only. The three most
relevant intervention options are (1) sending pop-ups with graphical and/or textual content; (2) attaching textual “stick-it” notes to one or more selected contribution shapes that are visually distinguishable from the discussants contributions; and (3) highlighting selected contributions.

**Figure 2.** The four main Awareness Display tabs in the Moderator Interface.

(a) **Group Relations**

Each node represents a different discussant; width of links represents the frequency with which two discussants created links between each others’ contributions (exact number visible with tooltips).

(b) **User Activity**

The x-axis shows nr. of activities. The y-axis shows name of participants and different bar colors represent different type of activities (e.g., create/delete/modify shape/link).

(c) **Ontology Use**

Pie charts show relative frequency of the use of different shape types (left chart; e.g., argument, question, explanation, claim) and different link types (right chart; e.g., neutral, opposing and supporting) in the discussion graph.

(d) **Chat Table**

Each column contains all the textual contributions from one discussant in a session. Contributions are vertically organized according to chronological order. Deletions or modifications are marked with the help of strike-through font and font colors.

3 **A short description of the study**

Twelve Israeli undergraduate students participated as discussants in this study. The discussions were not part of an existing course but were conducted in a co-located, laboratory type setting. One individual, Rhonna, moderated all discussions. She had mastered the technical aspect of Argunaut very well and had some, but not much prior experience with online moderation. Two moderated discussion sessions (1 two-group and 1 four-group session) were recorded with screen-recording software and converted to video-files. The topics for discussion discerned controversial topics: (1) the (dis)advantage of organized Holocaust Education trips for teenagers to Poland; and (2) whether the Gay Parade should be held in Jerusalem. These video files then displayed all the moderator actions and all the information received by the moderator within a given session. In addition, the actions of several discussants were videotaped with the same screen-recording technique. Two weeks following the experiment we interviewed Rhonna and several selected discussants separately, with the help of cued retrospective reporting, that is, they were asked to retrospectively comment on their actions while looking at the video file. Comments were audio-recorded in synchronization with the screen-recording files.
4 Selected findings and discussion

Unfortunately, space limitations do not allow us to present the complete and rich analyses of the way the moderator interacted with the participants and moderated the discussion in a caring, yet non-intrusive manner, how she developed different moderation strategies and how this development was closely related to the affordances embedded in the software (see Schwarz & Asterhan, in press, for a full report). We will show here only one illustrative example of how, on the one hand, the different MI features supported the human moderator in handling a particularly sensitive issue and how, on the other hand, the sensitivity, the empathy and understanding of complex social dynamics that a human expert can bring to the table was crucial in order to bring it to a successful solution.

Rhonna’s initial strategy in both sessions was to observe the collaborative development of ideas and the contribution of each individual. This initial first strategy enabled Rhonna to notice particular behaviours that needed care. In one of the groups in the two-group session on educational trips to Poland’s Holocaust landmarks, Rhonna noticed that one particular student had not contributed at all. She then realized that this particular student, Sohier, is a Christian Arab, whereas the other two and herself were Jewish. At first, Rhonna was not sure whether this student is not comfortable discussing the topic or whether she did not understand the question. To clarify this with Sohier, Rhonna used the private channel of the MI. From the clear position in favor of trips to Poland that Sohier expressed right after Rhonna’s inquiry, she understood that the issue is not lack of understanding, but is socially motivated. She then had to switch to the other group, however, to monitor and support their progress. Upon returning to Sohier’s group, her first care was to look at Sohier’s engagement in the discussion by using the session and users session list to trace all her contributions and interactions in the discussion map. She quickly realized that Sohier still did not genuinely engage in the discussion and that Sohier found a way to respond to her (writing that she cannot follow up on the moderator’s request). Rhonna immediately noticed this message and renewed her communication with her through the private channel. This time, she actively encouraged and supported her to participate. Among others, she stressed how her being different is actually an asset in the discussion, and carefully articulated a question that suggested how she could capitalize on her Palestinian identity to contribute to the discussion to the issue.

The third time that Rhonna attended to Sohier’s engagement she used both the tracing options in the session and users list, as well as the Group Relations awareness display. She found that Sohier’s vertex still appeared isolated from the other vertices, indicating little interaction between her and the other two discussants. However, she noticed that Sohier was in the midst of writing something and decided to await the content of her contribution before intervening. After a few minutes, she returned to Sohier’s group and was pleased to find that Sohier had begun to express herself with a clear set of reasoned arguments. However, no one had reacted to her postings. In addition, and in line with the goal of the activity (critical, reasoned discussions) she would like Sohier to also consider alternative perspectives and be critical towards her own ideas. However, Rhonna hesitated on how to handle these two issues, since sending direct requests about either is likely to be interpreted as patronizing. She then browsed the Chat table for suitable postings by others that are relevant, but opposite to Sohier’s, and used the highlighting and “stick-it note” functions of the Intervention panel to gently draw their attention to their potential connection, without further direct instructions.

This small sequence illustrates how an intelligent system can provide important information in a user-friendly way to support human moderators in their endeavors to facilitate several simultaneously running e-discussions. It also shows how in these ill-defined, complex, multi-agent activities human expertise and judgment is often called for to: (1) adequately evaluate the social and motivational dimensions of these complex interpersonal situations; (2) to flexibly and instantly adapt support for individual and group processes in ways that were foreseen or unforeseen; and (3) to intervene in a matter that is sensitive to these subtleties. The combination of intelligent support and human expertise then seems a promising combination.

References