PRELIMINARY EVALUATION OF A VIRTUAL MEETING ROOM FOR SUPPORTING GROUP WORK

Eric Ras, Niniek Angkasaputra, Patrick Waterson
(ras, angkasa, waterson@iese.fraunhofer.de)
Fraunhofer IESE
Sauerwiesen 6
67661 Kaiserslautern
http://www.iese.fraunhofer.de/

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Abstract

The Virtual Meeting Room (VMR) system is a part of the CORONET collaborative learning system. This system provides support for knowledge sharing in the context of collaborative learning and working. This paper describes the preliminary evaluation of the VMR in supporting group work. In this evaluation, a group activity was planned to compare two conditions: using VMR and not using it. The overall results indicate that using VMR helped the group to finish the given task with less effort and in less time. The findings are discussed in the light of previous research that examined technological support for group work.

INTRODUCTION

Meetings are an everyday occurrence at the workplace and are an important mechanism for the support of organizational learning and communication. More and more time is spent in meetings and at the same time, distributed and virtual working is also becoming more frequent. Despite their prevalence, there are many questions regarding the effectiveness of meetings. For example, group members may refrain from actively participating in a meeting because they are apprehensive about how their ideas will be received, or because a few members dominate the discussions. Furthermore, scheduling meetings can be a difficult task when all members are expected to be present at the same time, either physically or virtually. Partly as a result of these problems, a number of technological systems that aim to support meetings, and more generally group work, have been developed over the course of the last decade.

It has been suggested by a number of authors (e.g., McLeod 1992; Rodden 1991) that the various technologies that have been designed to support meetings and group work have several advantages when compared to conventional face-to-face work, including:

- Enabling participants to work simultaneously;
- Providing equal opportunities for participants to contribute to the meeting;
- Discouraging behavior that might negatively impact productivity;
- Allowing the group to choose from a spectrum of structured or unstructured techniques and methods with which to carry out tasks;
- Supporting knowledge management processes such as the development of shared understanding and organizational memory as well as knowledge dissemination.

Our literature survey shows that most of the evaluation studies of group support systems still focus more on the technical aspects than on other aspects such as usability and user acceptance. In our work reported in the present paper, we evaluated Virtual Meeting Room (VMR), a group work support system, in terms of user satisfaction and its efficiency for meetings in a real work situation. We also consider some of the issues raised by the results of our evaluation in the light of other research that has been conducted within the area of technological support for meetings and group work.

THE VMR SYSTEM

The VMR system is a part of the CORONET collaborative learning system. This system provides support for knowledge sharing in the context of collaborative learning and working (Pfahl et al., 2002). Users can access the VMR system *synchronously* or *asynchronously* using Internet browsers. Users share the same screen view as shown in Figure 1. Once a document to be discussed has been previewed on the virtual room projector, users can then use the virtual pointer to mark a certain position in the document and write corresponding messages into the message area. Each message can therefore be related to a certain pointer position in the document. Different documents can be alternately previewed on the room projector and be discussed. VMR also provides a meeting history to allow previous conversation tracks to remain accessible.

VMR allows users to: (1) upload documents to the *shared room library*; (2) open and view a document to be shared on the *VMR projector*; (3) direct the *virtual pointer* to a certain location in the document; (4) write corresponding messages into the *message area*; and (5) use the *function buttons* to access online help, read the moderator's contact information, view the online users, access the personal mailbox, open the 'write a discussion' panel, open the shared room library, and read the meeting minutes.

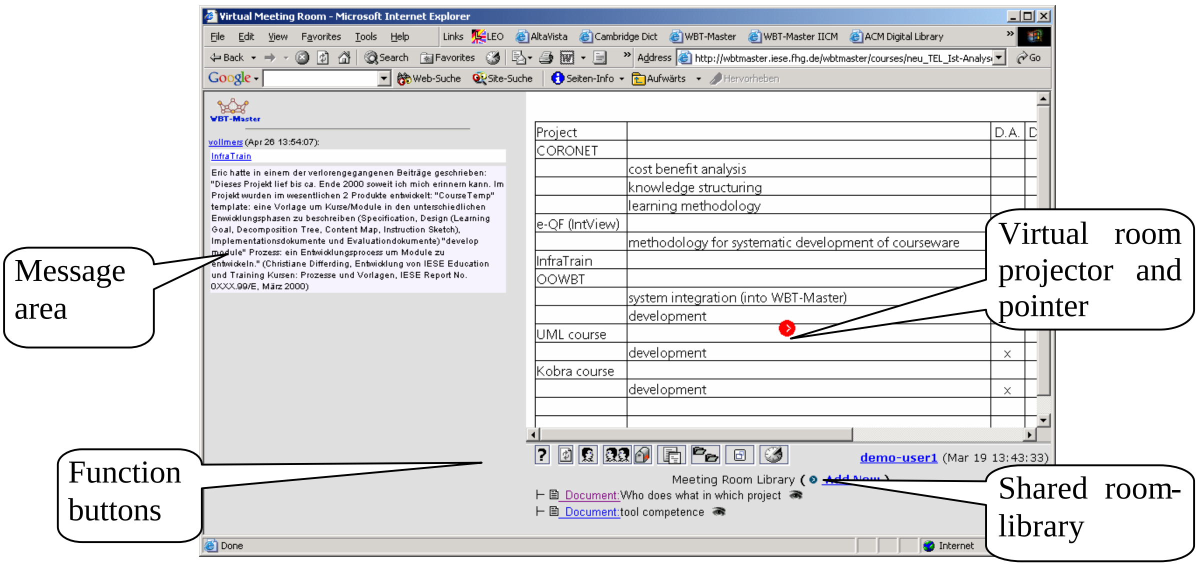

Figure 1. User interface of the Virtual Meeting Room

EVALUATION OF THE VMR SYSTEM

We evaluated the VMR system to get a better understanding of how it supports group work and how it has been initially accepted. Ten scientists of a software research group were chosen at random to take part in the evaluation. One of them assumed out the moderator role and led the group in developing profiles for two research products with the same complexity. The group was given the task of communicating and gathering information on the related products.

Two conditions for communication during the performance of task were compared in the evaluation: *unsupported group work*, where the group communicated in a usual way (i.e., using email and face-to-face meetings) and *supported group work,* where the same group communicated by means of VMR.

The unsupported group work condition was applied first: the moderator arranged a two-hour face-to-face meeting for a preliminary discussion. During this meeting, all of the work group members were supposed to contribute as much information as possible to complete the product profile. Following this, they individually sent more information to the moderator through e-mails. Finally, the moderator scheduled and carried out interviews with each person to finalize the table.

Afterwards, the supported group work began with the work group receiving a one-hour tutorial on VMR. Next, the moderator created a VMR session and announced it to the group. The moderator showed an initial product profile on the VMR projector. This profile had to be completed and discussed by the group. Users accessed the VMR in their own time plan to write feedback on contributions by others and to submit their own contributions. The moderator regularly updated the current version of the profile based on the contributions from the group. This session lasted until the moderator considered the profile to be completed.

During the evaluation, we were interested in measuring user satisfaction regarding VMR and the overall effort and duration spent on finishing the task. User satisfaction was measured by asking the participants to fill out questionnaires. A time sheet was used to record and calculate the effort and duration of each activity.

RESULTS

Table 1 shows the main results of measuring user satisfaction. In general, the participants were satisfied with the VMR system. The majority of them agreed that the tool enabled them to carry out their tasks (see Q1). Some participants commented that VMR was: “*a good way of supporting virtual discussion”;* that it provided *“a rich set of features”;* and, that they found some aspects of the functionality especially useful (e.g., the virtual projector). There were also some comments that were either critical of the system or suggested modifications to its design. One person, for example, would have preferred to have the conversation structure in thread form instead of in chronological form.

A number of opinions were expressed regarding the degree to which the tool increased the quality of contributions made by individuals (see Q2). Some participants found that the quality of their contributions increased since they had more time to think carefully before submitting a contribution. One person, who viewed the quality of his/her contribution from the layout perspective, mentioned: “*the layout of my contribution seems to be worse.”* Two other participants felt that the field for writing the message content was too small. Another one remarked that the quality of a contribution also depended on the moderation skills of the moderator.

The majority of the participants agreed that navigating through the previous conversation was easy (see Q3). They could browse and read previous contributions in the message area, where the virtual meeting room projector simultaneously showed documents related to these contributions. All of the participants agreed that their awareness of other people was heightened through the use of VMR (see Q4). Different opinions on the ease of communication via VMR were given (see Q5).

Most participants found that it was easy to use the tool (see Q6). Only two persons commented that they were not satisfied with the user interface of the VMR (see Q7). Four persons felt that the user interface was not intuitive enough for them to handle the tool. Nonetheless, the rest of the participants stated that the tool had a clear user interface that was easy to follow.

Question **n=10**	$\bar{x}$	s
Q1. The tool enabled me to perform my tasks.	3.0	0.5
Q2. The use of the tool increased the quality of my contribution.	2.3	1.0
Q3. The navigation through the conversation was easy.	3.1	0.9
Q4. The tool provided useful support to my awareness about other people.	3.6	0.5
Q5. I found it was easy to communicate with the other participants.	2.9	0.5
Q6. I found it was easy to use the tool.	3.0	0.6
Q7. The user interface was intuitive for me.	2.7	0.6

Table 1. Main questionnaire results from measuring user satisfaction, using the scale: 1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree

Table 2 and Table 3 show the total effort and duration of time spent during unsupported and supported group work. The total effort was calculated from the sum of the effort spent by participants in person-hour(s). Duration was calculated in workdays to give some indication of how long a task took in total.

Unsupported group		
Task	**Effort[1]**	**Duration[2]**
Preparation of meeting	9.25	7
Carrying out the face-to-face meeting	14	1
Carrying out individual interviews between moderator and the group members to finish the product profile table	8	8
Total	31.25	16

[1] in person-hours; [2] in workdays

Table 2. Summary of effort and duration of unsupported group

Supported group		
Task	**Effort[1]**	**Duration[2]**
Conducting a tool tutorial incl. self-practice with VMR	12.5	1
Preparation of meeting	7.3	3
Carrying out the meeting using VMR	8.2	6
Total	28	10

[1] in person-hours; [2] in workdays

Table 3. Summary of effort and duration of supported group

During the preparation of the meeting, the unsupported group spent some amount of effort during seven workdays on preparing the agenda and scheduling the meeting. In total, the face-to-face meeting and individual interviews took 22 person-hours in nine workdays to finalize the task of profiling the research product 'A'. From the observation, it was clear that most of the time (in terms of duration) and effort was spent on scheduling times that were acceptable to all participants for having the face-to-face meeting and the interviews.

A one-hour tutorial and time for self-practice was given to the supported group to teach the use of VMR, which took 12.5 person-hours in one day. The preparation that took 7.3 person-hours in three days included defining the agenda, creating user accounts and a VMR session, and informing the people about the VMR meeting session. The VMR meeting session took 8.2 person-hours in six days for the work group and the moderator to communicate, to read and write contributions by using the VMR. The result shows that the efficiency of the meetings was clearly increased by using VMR.

DISCUSSION AND FUTURE WORK

The evaluation we conducted was a first attempt at finding out to which degree users accept VMR for supporting meetings and group work. Comparisons between our work and previous research yield a number of interesting similarities in terms of the results as well as some key differences, which are both summarized in the following.

Discussions depend a great deal upon a shared context and the achievement of "common ground" (Clark, 1996), that is, a situation in which all of the participants share a similar understanding about the 'object' being discussed. Most of the CSCW systems already facilitate discussions in virtual space, either synchronously or asynchronously (Graveline et al., 2000; Girgensohn and Lee, 2002; Kraut et al., 2002). However, only some of the current work emphasizes the importance of a shared context for document-related discussions. Churchill et al. (2000) argued that virtual chat spaces do not enable close integration of conversations with work documents used by people as reference during a face-to-face discussion. Through their work on Anchored Conversations (AC), they proposed a synchronous communication tool that allows text chats to be anchored into documents and that enables users to share documents.

The VMR system and AC share the same idea. Nevertheless, VMR and AC differ in some ways. Unlike VMR, which was described in the previous section, AC requires an application to be run at the client site and can be meaningfully used only in synchronous mode. AC application centers on the document part; the so-called "sticky chat" window should be anchored into a document area where the users can write their messages. Thus, for one document, there can be several windows containing messages. In contrast, VMR users write their messages in only one window and, using a virtual pointer, relate each message to a certain place in the document that is shown on the projector.

McLeod (1992) reports a meta-analysis of different experimental studies published between 1980 and 1990 on group support systems usage compared to unsupported group work. Some of our findings correspond with her results. Those systems led to increased task focus because the amount of "articulation work" is reduced, for example, the effort that was put into scheduling face-to-face meetings and interviews. Such systems also allowed more equal participation and mutual influence among group members, and encouraged higher quality outcomes.

On the other hand, according to the meta-analysis result, people working with such systems needed more time to complete tasks, and it was more difficult to achieve a consensus. These findings contrast with our results - VMR allowed people to complete their tasks with less effort and duration than the unsupported group. Furthermore, both our work and that of McLeod (1992) demonstrated that the effects of electronic support systems on increasing user satisfaction in terms of quality of the contributions were not proven. Future work should seek to clarify in more detail the reasons for poor user satisfaction in this context.

Similarly, research by Graveline et al. (2000) investigated users' attitudes toward co-located and distributed collaboration situations regarding the use of communication technologies. Their results showed that even when teams were co-located, some would supplement their face-to-face interactions with computer-mediated collaboration to cut down on meetings. Asynchronicity of the work by using an e-mail system allowed the users to thread a conversation across time and around scheduling obstacles, while synchronicity using a shared application environment gave them the ability to provide and receive immediate feedback. This is also the case in our study.

In general, the evaluation participants found the VMR to be a good support for conducting meetings. The most important aspects of virtual meeting systems are the shared context for document related discussions, the achievement of “common ground”, the awareness of changes to the discussion and the work documents, and the integration of written contributions with the work documents. By using VMR, the amount of “articulation work” was reduced and the overall effort was 49.6% less compared to a face-to-face meeting.

Note that our experimental design is limited in terms of the following aspect: Due to the small size of the research group, we were forced to use a within-subjects experimental design (i.e., the subjects took part in both experimental setups). This led to a certain degree of bias: The participants might have had a learning effect from performing the task under the first condition (unsupported group work), meaning they might have finished the task easier and faster under the second condition (supported group work). However, the overall effort was increased again due to the time the participants needed to get used to the new system.

Further experiments are necessary to significantly strengthen our current findings. We suggest focusing more on investigating the impact of such systems on user behavior in real work situations by having longer studies with discrete groups. The influence of anchored conversation on common grounding is still imprecise. We should find out how the users establish common ground in such systems, how to measure the learning effect, and why user satisfaction is relatively low. In addition, it seems that e-moderation skills play a crucial role in electronically supported conversations. Our challenge is to provide specific guidelines for shared context based moderation, which are not available yet.

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