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GSS FOR PRESENTATION-STYLE MEETINGS

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Abstract

Presentation-style meetings are an ubiquitous fixture in both the workplace and academia. In presentation-style meetings one participant makes a formal oral presentation while others listen and assimilate the presented content. Many presentation-style meetings also provide a forum for participants to discuss the presented ideas with the presenter and with one another to deepen and broaden understanding of the content. However, it can be difficult to balance the time for presentation with the time for discussion.

This paper reports on two exploratory studies where we intervened in a series of presentation-style meetings with a Group Support System (GSS) in an effort to increase the value derived by the participants and the presenters. The paper describes the interventions and the reactions of presenters, participants, and session moderators. Results were generally positive, although not unmixed. Participants did become more actively involved in the presentations. Interest and participation rose. However, participants also expressed social concerns that on-line discussion might be considered rude by the speakers. The paper concludes with lessons learned and directions for future investigations.

Introduction

Presentation-style meetings are an important fixture of government, industry, and academia. In a presentation-style meeting at least one person makes a formal oral presentation while other participants listen and assimilate the content. Many presentation-style meetings also provide a forum for participants to discuss issues with the presenter and with one another to deepen and broaden understanding of the content. If the meeting does not also provide such a forum, its value may be little different from that of a high-resolution television broadcast. However, it is often difficult to balance the time required for

presentation with the time required for interaction. At many presentation-style meetings the post-presentation discussions are quick and shallow. Often only a small percentage of the participants can contribute to the discussion. Further, the discussions are ephemeral, being oral. Their value fades with the memories of the participants. Group Support Systems (GSS) may be useful for enhancing the value of presentation-style meetings for both presenters and participants.

A group support system is a suite of software tools used to focus and structure group deliberation, reduce the cognitive cost of communication, and ease the burden of information access as team members make a joint cognitive effort towards a goal. Participants can enter their contributions simultaneously into a network of personal computers. The system immediately makes each contribution available to all participants on their workstations. Thus, nobody forgets what they want to say while waiting for a turn to speak, and the discussion is not dominated by a strong or loud personality. A GSS also allows participants to contribute their ideas anonymously if the group feels that is appropriate. Thus, people need not worry about negative evaluations from peers or superiors for submitting an unusual or unpopular idea. The next section of this paper details a theoretical argument about how GSS might improve presentation-style meetings. This is followed by a brief theoretical argument about the acceptability of GSS to participants. The paper then describes two cases where GSS were used in presentation-style meetings, one unsuccessful and one successful. It details the positive and negative issues raised by the participants in the successful meeting. Finally, it concludes with a discussion of lessons learned and directions for future research.

Theory

GSS may improve the quality of presentation style meetings in three ways. First, GSS use may *reduce*

production blocking, leading to increased participant interaction. This increased interaction should, in turn, leave participants with a better understanding of the meeting content and increased feedback for the presenter. Secondly, the GSS may *extend the time available for interaction* by allowing the participants to interact with one another and with the speaker during the presentation without actually interrupting the speaker. This in turn should lead to more complete discussion and better understanding of key issues.

Thirdly, the use of a GSS *leaves a permanent record* of interactions, which should result in the participants and presenters deriving longer-term value from the interactions than would be possible with oral exchanges.

Reduced Production Blocking.

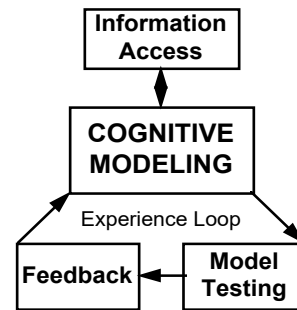
Human attention resources are limited. *Attention* is defined as cognitive effort over time (Briggs, Reinig, Brandt, & Nunamaker, 1997). Meeting participants can not pay attention to everything. At academic conferences in particular, the thoughts about one presentation may be quickly suppressed by the next presentation. Further, participants wishing to discuss the content of a presentation suffer the same kinds of production blocking faced by participants in other meetings: airtime fragmentation, attention blocking, evaluation apprehension, etc. (Diehl & Stroebe, 1987, Nunamaker, et al., 1991). *Airtime fragmentation* occurs when participants must divide available speaking time among themselves. The more participants contribute, the shorter the time available for any one contribution. *Attention blocking* occurs when participants stop listening in order to remember what they want to say when they gain the floor. *Evaluation apprehension* occurs when participants refrain from contributing out of a concern for negative evaluations from peers or superiors.

Group Support Systems are known to reduce production blocking in ways not possible using standard meeting technologies. The parallel input enabled by a GSS can overcome attention blocking and airtime fragmentation (Nunamaker, et al., 1991). The anonymous input enabled by a GSS can overcome evaluation apprehension (Connolly, Jessup, & Valacich, 1990). A great deal of empirical research suggests that these two factors, parallel input and anonymity, cause groups using GSS to produce more and higher-quality comments than teams using conventional meeting methods (For example: Connolly, Routhiaux, & Schneider, 1993; Dennis & Valacich, 1993). Thus, using should increase participant interaction during the discussion portions of the meeting.

However, there would be little value in increasing participant interaction if that interaction did not lead to better understanding of the material at hand. One of the key goals of a presentation-style meeting is that the

participants should learn the content offered by the presenter. Cognitive learning theory posits that people learn by forming and testing mental models of the domain under study, and integrating the new mental models with existing models of the world (Figure 1.) (Rumelhart, 1980; Brainerd & Reyna, 1991). Hundreds of studies of cooperative learning techniques show that when participants are allowed to discuss, argue, and explain to one another they develop a better understanding of the material than if they do not interact (see Wade et al., 1995 for a review). Explaining and arguing give the participants many opportunities to test and refine their mental models. Therefore, if GSS can be used to increase participant interaction, this increase could lead to a better grasp of the material offered in the presentation.

Figure 1.
Simplified Model of Cognitive Learning Theory
(From Walsh, Briggs, Ayoub, Vanderboom, & Glynn, 1996)



Extending the Interaction Time.

Participants in a GSS-supported meeting can enter their thoughts into the system without interrupting the presenter. If the participants type in comments during the presentation rather than waiting until the end to ask aloud, it may effectively extend the available time for discussion, which could have several benefits. It might reduce attention blocking. Participants may record thoughts as soon as they occur rather than trying to remember them for later discussion. Having entered their comments, participants are free to return their full attention to the speaker. Second, because more time is available, the issues may be discussed more thoroughly, which may in turn lead to more feedback for the presenter and better understanding for the participants.

Allowing the participants to type during the presentation, however, could prove a mixed blessing. Typing or reading comments might distract the participants from the oral presentation. Too much on-line interaction could cause the participants to miss something

important in the presentation. It would therefore be important to monitor participant behavior and attitudes to determine whether the benefits of extending discussion time outweigh the losses from distraction.

Permanent Record of Discourse

If we assume that human memory fades over time then the value people derive from presentation-style meetings would also fade over time unless a permanent record is made of the discourse. A GSS automatically captures a permanent on-line record of participant contributions. The GSS transcripts may allow the participants and the presenters to derive more durable benefits.

Two Cases from the Field

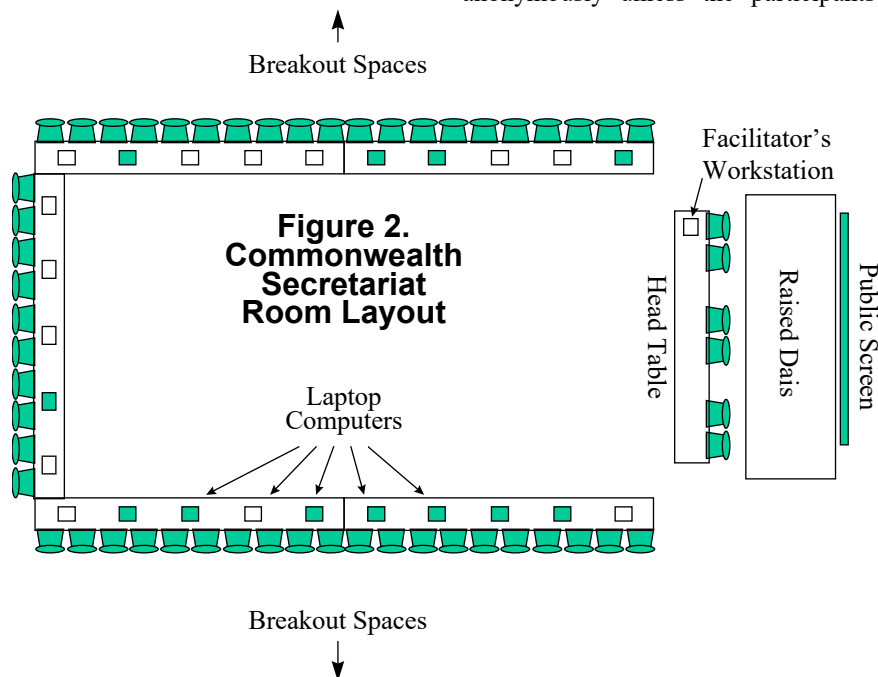
Although there were theoretical reasons to believe that GSS might improve the value of presentation-style

afternoon sessions were devoted to presentations from representatives of countries that already had national IT policies. Evening sessions were set aside for subteams to discuss the issues raised during the daytime presentations.

We placed twenty-five laptop computers around a large U-shaped table that seated twenty along each leg and 10 along the bottom of the U (Figure 2).

At the beginning of the first session we made a 10-minute presentation about GSS to the conferees to introduce them to the technology. As the conference proceeded we created a new electronic discussion page in the GSS¹ for each presentation. We placed each page on the participant workstation screens at the beginning of the presentation and closed it at the end of the presentation.

At the start of each day we encouraged the conferees to enter any questions or comments that occurred to them as the talks proceeded. All comments were to be submitted anonymously unless the participants chose to identify



meetings, it was not immediately clear how best to apply the technology in the field. This section describes four attempts to do so, three of which were mostly unsuccessful, and one of which was successful.

Case 1. Creating National IT Policy

Our first experience using GSS to support presentation style meetings came in October of 1995. Fifty officials from 24 countries in the British Commonwealth gathered in Malta for a three-day conference to develop recommendations about creating a National IT policy for their heads of government. Nearly all the participants were computer literate. Each day was divided into three sessions: morning, afternoon, and evening. Morning and

themselves.

During the three-day conference there were approximately 20 presentations. No presentation received more than 6 comments, and many presentations had no more than three comments.

At the end of each presentation the speakers allowed five minutes for oral discussion. No reference was ever made to the contents of the electronic discussions, even

¹ For this case we used the Categorizer tool of Ventana Corporation's GroupSystems for Windows Version 1.0c. Categorizer allows a team to jointly build a set of list, hold on-line discussions about any item on the lists, and to move items from one list to another.

though the comments were displayed on the participant workstations and on a public screen.

During the first day we hypothesized that the disappointing lack of on-line engagement might have occurred because the participants did not like or did not understand the technology. However, that evening in the working session, the participants used the GSS technology vigorously and declaimed its value to one another, to the conference organizer and to the facilitator. Using the GSS they created a list of 38 key issues relating to IT policy and discussed the implications of each on line in some detail. Clearly the group embraced the technology, and yet they had not used it during the presentations.

After the success of the first evening, we expected the participants would engage one another and the speakers on-line during the morning of the second day. However, conferees once again refrained from contributing on-line. During the evening of the second day, the participants again engaged in vigorous and productive on-line exchanges, actually drafting text for the final report, which they had not expected to be able to do during the conference. The conference organizer asserted that the two one-hour evening sessions with GSS had been more productive than rest of the conference combined. And yet the participants chose not to use the technology during presentations.

At the end of the conference we conducted informal interviews with participants to learn why they chose not to contribute comments and questions on-line during the presentations. These interviews revealed a strong social barrier: keyboards were an unfamiliar fixture during presentations, and many participants expressed concern that typing might be considered rude by the speaker. They reported that they had wanted to contribute, but chose not to risk being discourteous.

A key event at this conference suggested that worries about keyboard work being considered discourteous were probably unfounded. A twelve-person steering committee felt a strong need to hold an important meeting during the afternoon of the second day, yet all were reluctant to miss the plenary presentations. The committee therefore decided to try holding a meeting-within-a-meeting on-line using the GSS during the plenary session. In Figure 2 the laptops of those who participated in the on-line meeting are colored gray. The laptops not used for this meeting are colored white.

None of the other attendees evidenced awareness that the on-line meeting was being conducted in their midst. No sign of discontent manifested with presenters, moderators, or participants, even though the electronic meeting went on for more than two hours and spanned several presentations. None of the participants in the post-conference interviews had noticed the event. This

suggested that the fear of appearing rude by typing might have been misplaced.

Case 2. Academic Conference Sessions

In January of 1996, forty-three participants attended a three-hour tutorial on Business Process Re-engineering as part of an academic conference in the United States. All attendees were computer literate.

For this session we placed 20 laptop computers around two sets of tables formed as a U-within-a-U (Figure 3). As before, we introduced the participants to the technology, and encouraged them to enter their ideas as they occurred. In an effort to overcome the perceived-rudeness issue, the primary presenter expressed great interest in the participant feedback. He told the group explicitly that he considered typing to be polite and desirable during his talk.

Only 8 comments were submitted during the three hours. Informal interviews following the session suggested that some participants were still uncomfortable with the idea of typing while someone was talking. Others reported that they reported that they simply forgot the system was there. Apparently the assurances and encouragement of the presenter were not sufficient to overcome the concerns many had that they might appear rude if they typed during a presentation.

The following day, using the same computer setup, we supported two one-and-a-half hour academic conference sessions on Business Process Re-engineering. Each session involved three half-hour presentations from conferees. At the opening of each session there were about 20 participants, and by the end of each session about 15 remained.

The sessions began with a brief introduction to the GSS, and exhortations from the moderator to make contributions. No presentation garnered more than six comments on line, yet people vied for the floor during the oral question-and-answer period at the end of each paper. Clearly people had issues they wanted to discuss, and yet they elected not to contribute on-line. Informal interviews after the session revealed that, as before, the groups were concerned about appearing impolite. However, two participants also mentioned that they didn't know exactly when they would be allowed to type. We reasoned that in the session it might be useful to instruct the participants explicitly to begin typing.

The final day of the case study we supported three hour-and-a-half conference sessions on the subject of technology-supported learning. The first two sessions consisted of three half-hour presentations. The third session included two half-hour presentations and a half-hour debriefing session for participants. The first session opened with 21 in the audience. The final session closed with 45 attendees. Nearly all were computer literate.

We asked the presenters in advance whether each wanted GSS support. All elected to use the technology. We asked them each to think of a specific question for the audience to address.

At the opening of the session the moderator asked the participants to engage in a brief on-line warm-up exercise. He then briefly instructed them in the use of the GSS, and introduced the first speaker. He suggested that the participants engage one another and the speaker on-line during the presentation as they had during the warm-up exercise. He also told the participants that in addition to the comments they submitted during the talk, they would have one minute at the end of the talk to enter their final ideas before oral discussion began. We expected that this instruction would give the participants a sense of permission to type and notify them that they would be expected to type at some point in the near future.

The first presenter then opened five prepared electronic discussion cards and asked the participants explicitly to address five issues relating to her presentation. The group began typing immediately, and typed intermittently throughout the first talk. In subsequent presentations two more speakers asked the audience to address specific questions while the rest simply placed a generic discussion card before the group. The participants entered comments and questions more-or-less continuously throughout the presentations. Participation dramatically higher than in the previous sessions. The following section reports the details of the interactions and the reactions of the participants to their experience with GSS.

Analysis

We analyzed the transcripts of the on-line discussions to assess the degree to which the GSS affected participation and distraction. We also analyzed the transcripts of a post-session debriefing and a post-conference questionnaire to gain insight into participant attitudes toward the GSS intervention.

Increased Participation

The participants produced a total of 275 comments over the course of the eight paper presentations, with a

high of 54 and a low of 20 per paper. At the opening of the first session there were about 20 participants. By the end of the last session there were about 45 people in attendance.

Most of the contributions were on-task, and the percentage of non-redundant comments was very high. In the initial papers, comments were largely devoted to the paper being presented. In the later presentations the on-line interactions evolved into discussions of related issues rather than focusing only on the papers and the presenter.

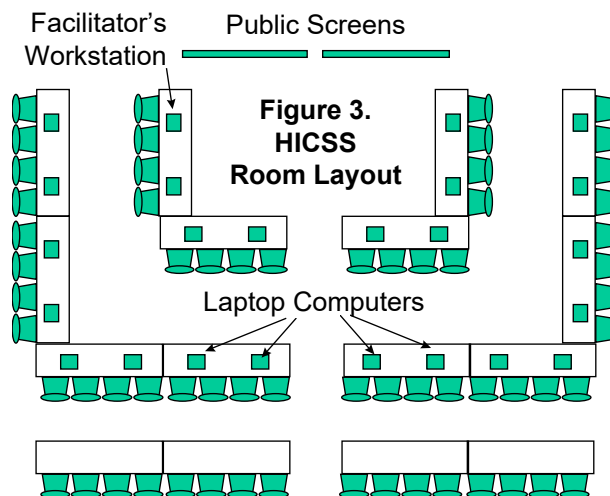
Although the comments were anonymous, no instances of flaming occurred. A fraction of a percent of the of the 275 comments connoted hostility toward an idea offered by others, and fewer than 5% were irreverent or jocular. Although some of the remaining comments moved into areas tangential to the paper, all the threads began with an issue raised by the speaker. More than 94% of the

participant contributions constituted valid and serious discussion threads in their own right.

It was clear that the GSS had extended the time available for interactions because the participants had the usual oral interactions at the end of their sessions, and they had the on-line interactions during and after the presentations. To get some sense of the magnitude of the increase in interaction, we estimated the time spent on-line as follows:

1. We learned in previous field work that novice typists tend to contribute comments into a GSS at about 10 words per minute (WPM). (Note that contribution speed is different than typing speed. Contribution speed includes time spent thinking, typing, and reading the comments of others.) Further, we learned that 60 WPM typists only contributed comments at the rate of about 15 WPM because they were slowed by thinking and reading.

2. Participants in this session contributed 5,770 words during the sessions. If we assume contributions at the rate of 15 WPM (the higher contribution rate results in a more conservative estimate of the increase in participation time), then the participants spent approximately $5,770 / 15 = 385$ person-minutes interacting with one another on-line during the 240 minutes of the sessions.



3. In the same number of standard (non-GSS) presentations at other session of the same conference, the most person-minutes that could have been spent contributing to the group was 80, or 10 minutes per paper.

4. Even allowing for time spent on jocularity and off-task comments, and assuming 80 minutes of verbal interaction, using the GSS increased person-minutes spent on interaction almost five-fold ($385 / 80 = 4.8$). However, most presenters ran over their allotted speaking time, a more reasonable estimate of person-minutes that could have been spent in verbal discussion would be 40-50. Thus, we estimate that using the GSS increased interaction time seven- to nine-fold.

Table 1. GSS Effect on Participation

| | |
|---|-------|
| On-line Contributions | 275 |
| On-line Words Contributed | 5,778 |
| Person/minutes spent contributing on-line | 378 |
| Person/minutes spent contributing orally | 80 |
| Percentage gain in interaction time | 475% |

Distraction Costs

Did the increased interaction cause undue distraction? We calculated the percentage of total person-minutes spent on-line as follows:

1. The sessions began with about 20 participants and grew to 45 by the end. If we assume a steady rate of growth, the average number of participants in the sessions would have been approximately 32 ($(20 + 45) / 2 = 32.5$)

2. Therefore the total available participant-minutes in the eight half-hour presentations was approximately $8 \times 30 \times 32 = 7680$ person-minutes.

3. We estimated that participants spent about 385 person-minutes interacting on-line. Therefore about $385 / 7680 = 5\%$ of the available person-minutes were spent interacting on-line. Therefore, about 95% of the participant time was spent attending to something other than the on-line discussion.

Table 2. Distraction from GSS

| | |
|--|-------|
| Total Available Person/Minutes | 7,680 |
| Person/minutes spent for on-line interaction | 378 |
| Percent of person/minutes spent on line | 4.92% |

From the quality of the on-line discussion and the oral discussion after presentations and during breaks, we

inferred that the technology had not distracted participants to the point that they had missed the meaning of the presentations. To double-check the degree to which participants had assimilated the presentations, at the end of the four hours we asked the participants to use an electronic brainstorming tool to generate a set of critical research issues arising from the papers. We then asked them to converge on 15 key issues, which we moved to an electronic voting tool. The participants ranked the issues in order of importance (Table 2). The presenters and researchers agreed that the issues raised did indeed reflect an understanding of the presentations.

Dealing with the On-line Discussion

When the presenters received a large number of comments, we found that we did not have an adequate process for integrating the written comments into the post-presentation oral discussions. We tried several strategies, with varying success. First, we had the presenter read comments and respond to them. The reading took too much time, leaving dead air while the participants looked on. Next we tried having the moderator read the comments to the presenter, and letting the presenter respond. After the fourth paper a participant objected to this process, saying that the fastest typists got their comments in first, and therefore dominated the discussion. The group finally settled for having the moderator find interesting comments at random, reading them to the presenter, and letting the presenter respond. Participants also asked questions and made comments from the floor during the post-presentation oral discussion. Participants reported that this approach was still somewhat too structured for their tastes.

We propose to try other protocols in the future to increase the comfort-level of the participants. It may be that a discussant could review the on-line contributions as they unfold, and then offer oral commentary or raise issues to the presenter at the end of the talk. It might also be useful to allow the participants themselves to select which on-line issues, if any, to raise with the speaker. Other protocols may well emerge as the field work continues.

Table 3. Research Issues Generated by Conferees (In Descending Order of Importance)

1. *Measurement and Assessment of Learning*
2. *What are the theoretical bases for improved learning via technology?*
3. *What are practical, workable uses of group technology in the classroom*
4. *How to structure electronic discourse to attain effective outcomes*

5. *Distance learning. (Economics dictates this)*
 6. *How we can train instructors to take advantage of Technology-supported learning*
 7. *Is technology supported learning cost-effective?*
 8. *Does Technology really improve learning?*
 9. *Discriminating the effects of structure from the effects of technology*
 10. *Electronic support for ORGANIZATIONAL learning*
 11. *Design of rooms*
 12. *Inter-cultural differences for technology adoption*
 13. *Loss of the "human" feel.*
 14. *Is Technology Supported Learning (TSL) less labor intensive than non-TSL?*
 15. *How can we provide resources for all economic segments?*
-

Participant Reactions

From the moderator's point of view, the final session was a success - the participants did submit their thoughts, interacting with one another and with the presenter far more than they had in traditional sessions at the same conference. Discussion was both broader and deeper in the GSS supported sessions than in the standard oral discussions in other minitracks at the same conference. In 9 non-GSS presentations at the same conference we observed that oral discussions included an average of three, and no more than six participants.

It is not sufficient to judge the success of the GSS sessions solely on from the facilitator's perspective, however. It was important to determine the attitudes of the audience.

Following the eight paper presentations, we held an anonymous electronic discussion session to debrief the participants and presenters on their attitudes toward the use of GSS in their meeting. We asked participants to record their thoughts about the a) What they liked about the sessions, b) what they would do differently another time, and c) ideas for future conferences. We received a total of 76 comments, which raised a number of interesting issues. We subsequently developed a survey instrument from these comments, which was sent to all participants via e-mail several weeks after the conference was over.

Besides demographic questions and questions about previous GSS experience, the survey asked the participants about their perceptions of:

1. Perceived Value of the Sessions
2. Discussion Quality
3. Willingness to Participate
4. Ability to Participate
5. Satisfaction with the Process
6. Focus/Distracted

7. Acceptability of the Technology.

The instrument had three to five items for each of these constructs. The full list of questions and scales used is available from the authors.

Given the limited number of available respondents, it was not possible to statistically test the reliability of the instrument, so its results must be considered exploratory rather than definitive. Further, our field investigation did not allow for control and comparison with the survey, so the results of the survey can only be regarded as modestly suggestive, rather than conclusive. However, we were able to obtain some useful descriptive information that suggested ways to improve the instrument for future use, and ways to improve the deployment of the technology in the future. Twenty-one of the possible 71 respondents replied (30%). While we are unable to make anything but the most tentative of assertions from such a small data sample, when we combine the survey results with the on-line comments received at the end of the case, we do note a number of interesting features.

Participant Perceptions of the Interaction Process

Distracted

In the post-session on-line debriefing and in the survey, many of the participants still expressed serious concern that the technology might be distracting other people from the presentation. Only three reported that the system actually distracted them.

Our survey contained seven items relating to whether the GSS was a distraction, and whether it side-tracked or focused the discussions. When side-tracking occurred, respondents were asked to evaluate these digressions in terms of whether they enlivened/deadened, disrupted, or improved/reduced the meaningfulness of the session. Most respondents were concerned about the level of distraction created by the GSS. Thirteen indicated that they were occasionally side-tracked by the GSS, while ten felt distracted to some degree. Of the people who were distracted, seven indicated that this was a problem. Where the on-line discussions digressed from the topic being presented by the speaker, eight thought that this might be disruptive, while eight thought it was not. Five thought that this improved the meaningfulness of the sessions, and five thought it did not. Eight people thought the session was enlivened by the digressions.

These figures indicate substantial variations in the impressions of participants with regard to the degree and importance of the distraction introduced by the GSS. Further research will be required to create less distracting support processes, and to overcome concerns that the system might be distracting others.

The participants were particularly concerned that the system might be distracting for speakers. They reported concerns that the speakers might feel that people who were typing were not paying attention, or worse, were concentrating on a topic that had little bearing on the paper being presented. One survey respondent argued,

"To me the purpose of the presentation is to listen to the argument being presented by the speaker. If one becomes distracted then the flow of the presentation (and the argument) is lost".

Interviews with all eight speakers, however, revealed that the presenters had quite a different perception. One reported that he was concerned that his talk wasn't interesting until he provoked a flurry of keystrokes. Then he felt he had tangible evidence that he had engaged the audience. It is an interesting side note that the presentation that received the People's Choice best-paper award for the conference also received the most on-line discussion.

Even the presenter whose speech led to the most tangential discussion felt the on-line discussions provoked by his piece were interesting and worthwhile. He reported that he planned to incorporate those issues into his next version of the paper.

There was insufficient time for speakers to respond to every comment or thread. Further, the anonymous nature of the communication also impeded any direct follow-up between speaker and questioning participant unless the participant chose to break anonymity. The discussions also had an *ad hoc* quality. Some participants suggested, and we concur, that other group support tools might have been used to improve the focus of the discussion for the benefit of the participants and the speaker. Further research must be conducted to investigate how best to structure the interactions.

Three of the speakers actively chose to stimulate discussion by asking for feedback on specific issues relating to their presentation. It may well be that if all speakers took this approach the audience members might be less concerned about the propriety of typing during the presentation. This, too must be the subject of further investigation.

Some participants suggested that the facilitator could take on a more prominent, even provocative, role. This could involve tighter monitoring of the on-line discussion process or adopting a more involved facilitation style, perhaps so as to shut off the on-line discussion if it was felt that it was becoming too intrusive. A great deal remains to be learned about how and when to use the technology in ways that do not violate social norms and do not cause too high a cognitive load for presenters and participants.

Willingness to Participate

Observation confirmed that the GSS did indeed increase the degree to which people were willing and able to participate in the session, but we felt it was important to determine how the system affected the participants' perceptions and attitudes about participation. Fifteen of 21 survey respondents reported that they had made on-line contributions during the sessions. This self-report was consistent with our field observations that at least six or seven people at any one presentation chose to sit at the back of the room and declined to join the group at the tables where the computers were available. When the room was filled there were only half as many computers as there were people, but pairs of participants tended to share a machine.

In the survey instrument, three items relate to willingness-to-participate. Three quarters of the respondents said that they thought the GSS encouraged participation. Slightly more than half said that they were more willing to participate because of the technology, and a third said the presence of technology did not affect their willingness to participate. While the participants said the system generally increased their willingness to participate, it is interesting to note that more than half said the system did not affect their willingness to contribute questions and answers. The question of whether GSS affects the participant's willingness to participate bears more detailed investigation.

Effect of GSS on the Perceived Value of the Sessions

Our survey instrument included 11 items addressing participant perceptions about the value of the sessions they attended. Three quarters of the respondents thought the GSS was valuable to the speaker, while 70% thought that it was valuable to the other participants. A majority of respondents found the GSS to promote positive features in the discussion process. Two items in particular stand out. Eighty-five percent of respondents found that the GSS supported sessions were both more stimulating and of higher quality than comparable sessions which did not have the GSS support. Furthermore, no respondents felt that the use of the GSS impoverished the sessions or made them less stimulating.

The item that produced the most variance related to whether or not participants learned more in the GSS supported sessions or not. While 56.3% thought that they did learn more, 37.5% were undecided. This is a critical piece of feedback, since the core motivation for introducing GSS in the sessions was to increase learning for the participants and the presenters.

One participant, in a positive vein typical of many other comments, observed:

"I was able to present, develop and argue my own points in the electronic discussion in much more depth than I would have in the traditional forum. I would have lost the floor before the argument was finished without the technology."

Another frequently opined value of the technology was that it permitted the simultaneous generation of ideas which could be useful to the presenters. The GSS eliminated the need for audience members to wait their turn to talk. Other interesting impressions submitted by participants:

"I like the ease with which the system allows people to voice comments that they wouldn't otherwise voice. However, it also invites criticisms of the research that people probably wouldn't voice out loud. Some speakers are going to be put off by this".

"I would have left after the morning sessions if it weren't for the opportunity to input ideas with others in the groups. Listening to talks is boring. Interacting with others is very enlightening";

"I daydream far more without the technology. This way at least I am thinking something academic".

Ability to Use Technology

At the beginning of the final session we did not spend much time introducing the technology to the group. They began their on-line interactions after no more than 20 seconds of oral instruction. This did not keep them from contributing, but it did cause some discomfort for some participants. One user commented,

"You assumed a level of expertise with GroupSystems that was not there. I puzzled over the meaning of all the numbers and red exclamation marks, and so forth. It might be nice to spend a few minutes in the first session going over the interface."

Another user suggested that training be given at the start of each paper presented, as some people attend only part of a session. Such a move would have been possible because participants often use the tools with less than 30 seconds of verbal instructions. We learned the hard way that those thirty seconds are important, and should not have been neglected.

In the survey, a third of the respondents found the GSS hard to use, while a third also said the software did not help them communicate effectively. Perhaps a small investment in user instructions would have helped those who found it difficult.

Acceptability of the Technology

The data presented above show that participants did use the GSS, and most reported it to be a positive experience, although perhaps a third reported some level of dissatisfaction. Our instrument included 5 questions

about whether the participants found GSS acceptable in the presentation style meeting. Three quarters of the respondents were positive or neutral about using the system for their own presentations in the future, but a quarter said they would not want it. This suggests that it will be important to ask presenters before hand whether they want the technology used as they speak.

Table 4. Lessons Learned about GSS for Presentation-Style Meetings

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1. GSS is not disruptive, but conferees worry about appearing rude to the presenter.
 2. Careful, brief instructions about the GSS can reduce some anxiety.
 3. A warm-up exercise helps overcome reluctance to type during a presentation
 4. Remind participants to type at the beginning of each presentation
 5. Allow participants a brief interval at the end a presentation to enter their final thoughts.
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At this conference the presenters had only one day's notice that the GSS would be used. Several wished they had been given more time to prepare for the use of the technology. They felt that with better planning they might have derived more benefit for the experience. Since the contributions were anonymous, some authors felt it a loss that they could not follow-up to get more details about a comment. Another participant expressed a slightly different concern about the costs of anonymous input:

"One of the things I like about a conference is that I can figure out who is a sharp cookie, and who is a blow-hard. I get to know my colleagues by the way they handle themselves in the discussion time. This time I couldn't really tell."

In general, the participants were in favor of using the GSS again for future conferences, but they believed, and we concur, that the technology could be handled better another time. Further investigation is required to determine when anonymity is best used in presentation-style meetings. Participant instructions must be clarified, and presenters must be given time to think about if and how they want to use the technology.

Future Directions

Our field-use of GSS to support presentation-style meetings has been a qualified success. Participant interactions have been spirited although not always directly focused on the paper being presented. Participant satisfaction and willingness to use the technology has been generally positive, but a notable minority of participants were displeased with the process. A great deal of work

remains to develop appropriate structures for effective use of GSS in this learning environment.

Perhaps the most salient lesson we learned from our field investigation is that the leader must explicitly address the widely-held concern that typing will offend the speakers. We learned that we had to reinforce the message that typing was acceptable and desirable before each speaker. Further, we had to tell the participants before each paper that they would have a one-minute interval at the end of the presentation expressly for typing responses. It may well be that the speakers themselves should initiate GSS interactions (rather than a facilitator) to alleviate concerns of the audience.

Both the presentation of a paper and the understanding of its content may be enhanced through GSS support. We must improve our use of the technology to better serve the interests of the whole audience base. We must develop guidelines to shape our use of the technology. Currently our data are as scanty as our experience, yet the reactions of the participants on-line and in the survey suggest that the effort is worth continuing.

We must develop measures for the various impacts that the technology has on participants, and work with a diversity of groups in a variety of conference settings to advance understanding of how GSS can be used to facilitate conference presentations more effectively.

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