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The Temporal Dimension of Electronic Meetings: A Study of Synchronous and Asynchronous Idea Generation

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ABSTRACT

Electronic meeting systems can increase the efficiency and effectiveness of group discussions, but relatively little research has investigated use of the technology in asynchronous environments. In this study, five groups of 10 students participated in synchronous legislative sessions and five groups of 10 met in asynchronous settings. Results showed that there were no differences in meeting process satisfaction, production blocking, evaluation apprehension, and total and relevant comments generated, but synchronous groups believed there was more participation and were more satisfied with the comments. Although there could be less feeling of social presence, use of asynchronous, distributed meetings might become more prevalent as groups seek to reduce travel.

INTRODUCTION

Some have estimated that managers spend over 60% of their working hours participating in meetings (Tobia & Becker, 1990), and the purpose of these sessions is often accomplished only 50% of the time (LaPlante, 1993). Electronic meeting systems (EMS), otherwise known as group support systems (GSS), can improve the productivity of many meetings involving large groups sharing information (Travica, 2005), and studies have shown that meeting time can be reduced up to 56% of (Grohowski et al., 1990) and overall project time by up to 71% (Martz, et al., 1992).

However, prior GSS research has been conducted mostly on synchronous, face-to-face groups, and other meeting environments have been generally overlooked (Baltes et al., 2002). For example, from 1982 to 1996, 60% of 164 studies were conducted using a face-to-face decision room environment, while less than 20% focused on geographically-dispersed, asynchronous meetings (Fjermestad & Hiltz, 1997). In addition, globalization has increased the need for meetings that can span time-zones and geographic distance (Bandow, 2001; Gibson et al., 2008). Distributed, asynchronous electronic meetings allow participants to share information and make decisions irrespective of physical and time barriers (Berge, 1997; Hung et al., 2008; Kraut, 1994), and organizations could be wasting huge amounts of money on travel and accommodations for face-to-face meetings that could be conducted asynchronously (Dowling & St. Louis, 2000).

The purpose of this study is to investigate the possible differences between synchronous and asynchronous meetings. First, we discuss prior research on non-synchronous electronic

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environments and then present the results of an experiment comparing the two settings. Results show that asynchronous meetings might be able to replace more typical decision-room discussions in many situations.

SYNCHRONOUS AND ASYNCHRONOUS COMPARISON STUDIES

In a study comparing traditional, face-to-face, oral with asynchronous, electronic groups (Ocker, et al., 1996), the latter reported less social pressure and greater participation equality. With less social pressure and more participation equality, asynchronous participants were able to produce more total comments and more quality comments. Further, asynchronous technologies can reduce the need for an individual to be "sociable" in order to meet and correspond in a meaningful way with other users, and this can increase productivity (Pendergast & Hayne, 1999). Asynchronous, electronic groups can also provide a higher quality of resolution (Benbunan-Fich & Hiltz, 1999) and present a more complete summary report of the meeting (Benbunan-Fich et al., 2002). However, another study (Warkentin et al., 2007) found that asynchronous groups did not outperform face-to-face teams under otherwise comparable circumstances, and face-to-face groups reported higher levels of satisfaction.

Comparisons between synchronous and asynchronous electronic meetings have also had conflicting results. One study (Shirani, et al., 1999) found that asynchronous groups performed a deeper problem analysis, but the synchronous participants generated more comments. Asynchronous groups might make decisions more slowly (Gallupe & McKeen, 1990), but in many other respects (e.g., cohesiveness, participation, and process satisfaction), no differences were found (Burke & Chidambaram, 1995; Smith & Vanecek, 1990; Watson, et al., 1988). However, it is not clear which environment provides more ideas, greater member satisfaction, or better final decisions (Lowry, 2002; Ngwenya & Keim, 2001; Ocker & Morand, 2002; Sedbrook, 2010; Tung & 1998).

THEORETICAL MODEL AND HYPOTHESES

Prior research has had some conflicting results, and a wide variety of technologies were used (e.g., electronic mail, bulletin boards, and chat rooms) for the asynchronous treatment. In addition, tasks varied in complexity, and some group sizes fell below the minimum where most electronic meeting benefits arise (Adrianson & Hjelmquist, 1999; Dennis & Williams, 2008). Therefore, we prepared a test of the two temporal environments.

The theoretical model shown in Figure 1 borrows from earlier research (Dennis, et al., 1988) and includes the total number of comments, the number of relevant comments, satisfaction with the system, satisfaction with the comments, the perception of comment anonymity, the perception of evaluation apprehension, and the perception of participation as dependent variables, all of which have been used in many previous studies (Dennis & Wixom, 2001; Fjermestad & Hiltz, 2001).

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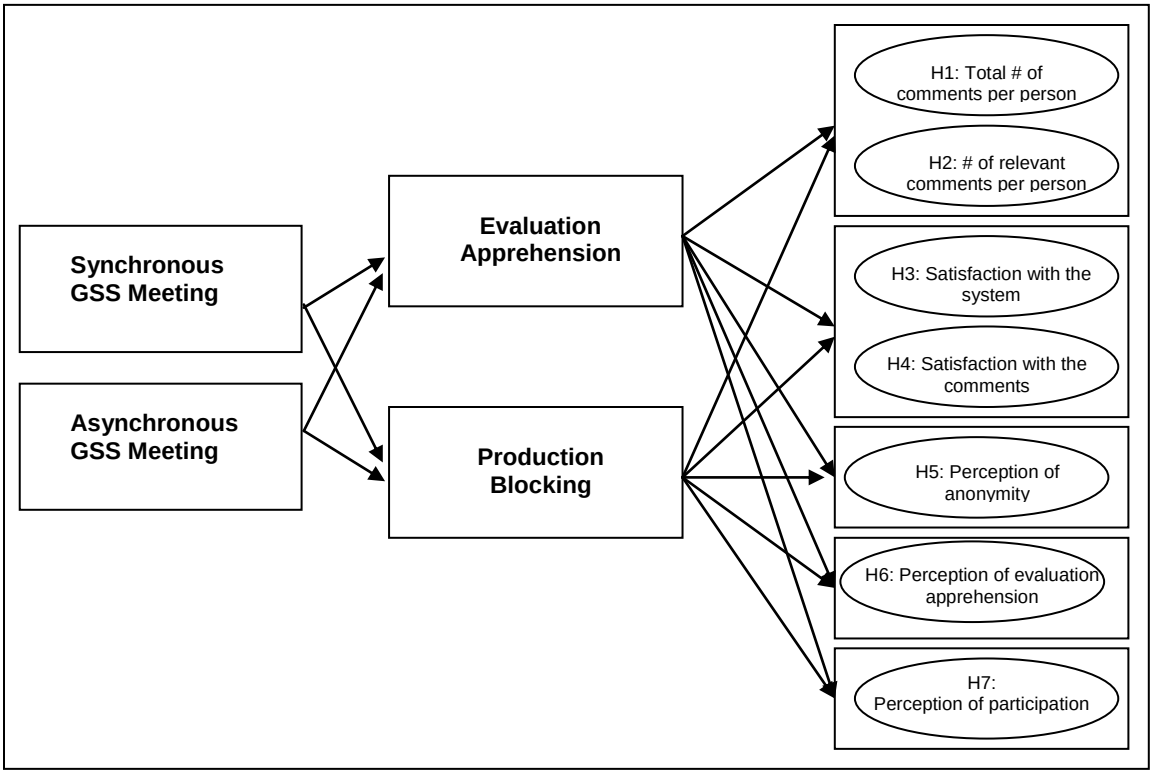
Figure 1: Theoretical Model with Hypotheses.



Number of comments generated

In general, more, varied ideas without restrictions are preferred in an electronic meeting (Ocker, et al., 1996), and computer-based groups tend to generate more comments than traditional, oral groups (Fan, et al., 2007). A synchronous meeting provides parallel communication, and participants might be more apt to contribute comments if they see others in the group submitting ideas. On the other hand, asynchronous group members sitting alone might want to type comments simply for something to do.

H1: There will be no difference between synchronous and asynchronous groups in *the number of raw comments (total comments) generated*.

H2: There will be no difference between synchronous and asynchronous groups in *the number of relevant comments generated*.

Satisfaction with the system

Although a synchronous meeting provides more social presence (Hiltz et al., 1986), the software is exactly the same in each treatment. The only difference is that asynchronous participants do not see others' comments when they are generated.

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H3: There will be no difference between synchronous and asynchronous groups in *satisfaction with the meeting technology.*

Satisfaction with the comments generated

Asynchronous participants have little or no social interaction, and therefore, they might be less satisfied with the meeting and subsequently, the comments. On the other hand, they might be more committed to the task without the distraction of other group members nearby, affecting the quality of the comments generated.

H4: There will be no difference between synchronous and asynchronous groups in *satisfaction with the comments generated*.

Perception of anonymity

Most GSS software allows group members to enter comments anonymously, but in a face-to-face meeting, some group members sitting nearby might be able to see what others are typing (Er & Ng, 1995). In addition, some group members might be known to have particular opinions or compose sentences in unique way (e.g., frequent capitalization), thereby reducing the anonymity. Separating the face-to-face participants who are relatively unknown to each other minimizes this threat, however.

H5: There will be no difference between synchronous and asynchronous groups in *their perception of comment anonymity*.

Perception of evaluation apprehension

A major cause of productivity loss in a traditional, oral meeting is "evaluation apprehension" that occurs when participants are hesitant to express their true opinion because of the unpopularity of the idea, the presence of higher-status individuals in the meeting, or for some other reason (Diehl & Stroebe, 1987; Gallupe, et al., 1992). Evaluation apprehension can be reduced in an electronic meeting that provides anonymous entry of comments, and as a result, participants can concentrate more on the discussion (Chidambaram, 1996) and generate more uninhibited text (Kiesler, et al., 1984; Kiesler, et al., 1985). During an electronic meeting, criticism shifts more toward the ideas generated rather than to the person who wrote the comments. Because anonymity is expected to be equal with both treatments, evaluation apprehension should likewise be the same.

H6: There will be no difference between synchronous and asynchronous groups in *their perception of evaluation apprehension*.

3.6 Perception of participation

Because all can participate anonymously and simultaneously in a face-to-face electronic meeting, status effects are reduced (Dubrovsky et al., 1991). With less evaluation apprehension, these group members can submit comments more freely and produce better results, while oral groups

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tend to be led by one or a few dominant members who can monopolize "air time" (Dennis et al., 1997; Jain & Solomon, 2000; Thatcher & De La Cour, 2003; Tyran & Shepherd, 2001). Although synchronous group members might have an idea whether or not others are participating based upon the sounds of clicking on keyboards and the appearance of new comments on the screen, asynchronous members have no external cues, but rely on faith that others will contribute (Michinov & Primois, 2005). If asynchronous group members meet in "relay" mode in which each subsequent person builds upon comments written by earlier participants (De Vreede et al., 2000), participation can be gauged more accurately. But, actual participation could be less in a synchronous meeting if members simply read comments and do not contribute, and more in an asynchronous meeting if members have nothing else to do except type new text.

H7: There will be no difference between synchronous and asynchronous groups in *their self-perceived participation*.

EXPERIMENTAL STUDY

Subjects, Task, and Treatment

Five groups of 10 students each participated in synchronous meetings and another five groups of 10 were in the asynchronous treatment. This sample achieved a statistical power of 0.99, and thus, there was a 0.01 probability of falsely accepting a null hypothesis.

The groups were asked to provide solutions for the parking problem on campus, a creative, idea generation task that has been used in several prior studies (e.g., Jessup et al., 1990). The subjects were believed to have a high involvement with this issue, but they have no decision-making authority, possibly limiting the external validity (Gu et al., 2007). However, the students have a significant stake in the issue, and some studies suggest that students could be surrogates for business personnel in similar meeting situations (Briggs et al., 1996; Fjermestad & Hiltz, 1998).

A locally developed, Web-based electronic meeting system implementing Gallery Writing (Aiken et al., 1997; Coskun, 2005; VanGundy, 1984) was used, and thus, students could contribute and read all comments anonymously. Asynchronous participants met in "relay" mode in which each subsequent group member built upon prior comments, and synchronous subjects met in a face-to-face decision room, thus implementing asynchronous or synchronous legislative sessions (Aiken & Vanjani, 1997). All subjects were monitored by a meeting facilitator.

All meetings lasted 10 minutes, as one study found the optimum duration for generating solutions for the parking problem is about nine minutes (Wong & Aiken, 2006). Also, in a meeting under "time pressure," participants might focus on the topic (Kelly & Karau, 1999), and fewer irrelevant comments are likely to be generated (Kelly & Loving, 2004). After each meeting, the students completed the questionnaire shown in the Appendix.

Comment analysis

Two evaluators independently categorized each comment generated by meeting participants as either "relevant" or "not relevant" to the topic, and there was 82% agreement on the 254

synchronous comments (76.0% relevant) and 92% agreement on the 226 asynchronous comments (91.6% relevant). To avoid the possibility of overestimation of agreement (Straub, et al., 2004), Cohen's coefficient Kappa (Gwet, 2002; Jones, et al., 1983) was calculated with a result of 0.419 for the synchronous group and 0.428 for the asynchronous, within the range between 0.41 and 0.60 considered to be "moderate agreement" (Sim & Wright, 2005). Further, the raters showed significant agreement at $\alpha = 0.05$. Table 1 shows that more comments were generated by the synchronous groups, but these had fewer relevant comments. There was no significant difference in the number of total comments ($F= 0.863$ $p= 0.355$) or relevant comments ($F= 0.313$, $p= 0.577$), so we cannot reject H1 and H2.

Table 1: Number of Comments Generated per Person.

Group Type	Total comments (mean / std dev)	Relevant comments (mean / std dev)
Synchronous	5.08/2.98	3.86/2.06
Asynchronous	4.52/3.05	4.14/2.88

Questionnaire summary

Table 2 shows that all participants were satisfied with the meeting technology, satisfied with the comments generated, believed the comments were relatively anonymous, had little comment evaluation apprehension, and thought many in their groups participated. Table 3 shows that although results were favorable in both types of meetings, students in the synchronous groups were more satisfied with the system and perceived there was more participation. Thus, we reject H4 and H7, but we cannot reject H3, H5, and H6.

Table 2: Summary of Questionnaire Variables.

	All		**Synchronous**		**Asynchronous**	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Satisfaction with the system	6.03*	1.07	6.02*	1.11	6.04*	1.05
Satisfaction with the comments	5.71*	1.08	6.00*	0.91	5.42*	1.16
Comment anonymity	6.64*	0.97	6.73*	0.57	6.54*	1.25
Evaluation apprehension	1.63*	1.02	1.65*	0.90	1.60*	1.12
Perceived participation	6.05*	1.00	6.41*	0.70	5.70*	1.13

(* Significantly different from neutral value of 4.00 at alpha=0.05.)

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Table 3: Summary of the Findings.

	ANOVA		Kruskal-Wallis	Findings
	F	Pr > F	Asymp. Sig	
H1: Number of total comments per person	0.863	.355	.338	no difference
H2: Number of relevant comments per person	0.313	.577	.917	no difference
H3: Satisfaction with the system	0.008	.928	.991	no difference
H4: Satisfaction with the comments	7.605	***.007***	***.014***	***synchronous better***
H5: Comment anonymity	0.989	.322	.798	no difference
H6: Evaluation apprehension	0.067	.797	.289	no difference
H7: Perceived participation	13.944	***<.001***	***.001***	***synchronous better***

Comment distribution and correlation analysis

With the exception of group 3 within the synchronous treatment, the other nine comment distributions were determined to fit the uniform distribution based on the Kolmogov-Smirnov D statistic. Thus, the students contributed about the same number of comments without one or two dominating the discussion, confirming students' perceptions that there was high participation among group members.

A correlation analysis showed the same significant relationships (at $\alpha = 0.05$) among the variables for both the synchronous and asynchronous sessions, with the exception that there was a significant correlation between anonymity and system satisfaction ($R= -0.333$, $p = 0.019$) only within the synchronous treatment. As expected, the total comments were correlated with the relevant comments (synchronous: $R = 0.835$, $p < 0.001$; asynchronous: $R = 0.977$, $p < 0.001$). Satisfaction with system was correlated with comment satisfaction (synchronous: $R = 0.435$, $p < 0.002$; asynchronous: $R = 0.433$, $p = 0.002$) and perceived participation (synchronous: $R = 0.569$, $p < 0.001$; asynchronous: $R = 0.339$, $p = 0.016$), and satisfaction with the comments was correlated with perceived participation (synchronous: $R = 0.514$, $p < 0.001$; asynchronous: $R = 0.644$, $p < 0.001$).

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CONCLUSION

Summary

In a study of synchronous and asynchronous electronic meetings, the former were found to be significantly better in comment satisfaction and perceptions of participation, but otherwise, there were no differences between the two environments. In both treatments, satisfaction and participation were high and evaluation apprehension was low. Thus, we believe that groups can meet in asynchronous, distributed settings and enjoy the same benefits as those experienced in the more traditional face-to-face, decision room.

Limitations

However, the study suffers from several limitations. First, the use of somewhat homogeneous groups of students as experimental subjects hinders generalizing the results to business situations. Second, a relatively non-controversial topic was used in the discussions: the parking problem on campus. More controversial or complex topics could affect group members' satisfaction and participation (Gu, et al., 2007). Third, subjects who self-report might not accurately reflect their attitudes (Bertrand & Mullainathan, 2001; Spector, 1994). For example, the subjects might answer a questionnaire in a way that they perceive would be more pleasing toward the survey conductor (Bovinet & McVay, 2005).

Future research

One possible reason that asynchronous group members contributed a statistically equal number of comments is that they were monitored by a researcher. Future research should duplicate the experiment with no supervision of group members in this setting. Left alone, subjects might be more likely to read, surf the Web, or perform some other task. However, use of monitoring software might mitigate any potential free-riding by non-face-to-face participants (Aiken, et al., 1991).

REFERENCES

Adrianson, L., & Hjelmquist, E. (1999). Group processes in solving two problems: Face-to-face and computer-mediated communication. *Behaviour & Information Technology,* 18(3), 179-198.

Aiken, M., Liu Sheng, O., & Vogel, D. (1991). Integrating expert systems with group decision support systems. *ACM Transactions on Information Systems*, 9(1), 75-95.

Aiken, M., Sloan, H., Paolillo, J., & Motiwalla, L. (1997). The use of two electronic idea generation techniques in strategy planning meetings. *The Journal of Business Communication*, 34(4), 370-382.

Aiken, M., & Vanjani, M. (1997). A comparison of synchronous and virtual legislative session groups faced with an idea generation task. *Information & Management*, 33(1), 25-31.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Aiken, M., Vanjani, M., & Paolillo, J. (1996). A comparison of two electronic idea generation techniques. *Information & Management*, 30(2), 91-99.

Bandow, D. (2001). Time to create sound teamwork. *Journal for Quality and Participation*, 24(2), 41-47.

Benbunan-Fich, R., & Hiltz, S. (1999). Impacts of asynchronous learning networks on individual and group problem solving: a field experiment. *Group Decision and Negotiation*, 8(5), 409-426.

Benbunan-Fich, R., Hiltz, S., & Turoff, M. (2002). A comparative content analysis of face-to-face vs. asynchronous group decision making. *Decision Support Systems*, 34(4), 457-469.

Bertrand, M., & Mullainathan, S. (2001). Do people mean what they say? Implications for subjective survey data. *Economics and Social Behavior*, 91(2), 67-72.

Bovinet, J., & McVay, G. (2005). Adding an accounting component to a computer-based interdisciplinary exercise: Descriptive results. *Academy of Educational Leadership Journal*, 9(1), 15-36.

Briggs, R., Balthazard, P., & Dennis, A. (1996). Graduate business students as surrogates for executives in the evaluation of technology. *Journal of End-User Computing*, 8(4), 11-17.

Burke, K., & Chidambaram, L. (1995). Developmental differences between distributed and face-to-face groups in electronically supported meeting environments: An exploratory investigation. *Group Decision and Negotiation*, 4(3), 213-233.

Chidambaram, L. (1996). Relational development in computer-supported groups. *MIS Quarterly*, 20(2), 143-165.

Coskun, H. (2005). Cognitive stimulation with convergent and divergent thinking exercises in brainwriting. *Small Group Research*, 36(4), 466-498.

de Vreede, G., Van Duin, R., Enserink, B., & Briggs, R. (2000). Athletics in electronic brainstorming: Asynchronous electronic brainstorming in very large groups. *Hawaii International Conference on System Sciences*, 1, Maui, Hawaii, January 04-January 07.

DeLuca, D., Gasson, S., & Nock, N. (2008). Virtual teams adapt to simple e-collaboration technologies. Nock, N. (ed). *Encyclopedia of E-Collaboration, Information Science Reference*: Hershey, New York

Dennis A., George J., Jessup L., Nunamaker J., & Vogel, D. (1988). Information technology to support electronic meetings. *MIS Quarterly*, 12(4), 591-615.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Dennis, A., Hilmer, K., & Taylor, N. (1997). Information exchange and use in GSS and verbal group decision making: Effects of minority influence. *Journal of Management Information Systems,* 14(3), 61-88.

Dennis, A., & Williams, M. (2008). Group size effects in electronic brainstorming. Nock, N. (ed). *Encyclopedia of E-Collaboration, Information Science Reference*: Hershey, New York.

Dennis, A., & Wixom, B. (2001)**.** Investigating the moderators of the group support systems use with meta-analysis. *Journal of Management Information Systems*, 18(3), 235-257.

Diehl, M., & Stroebe, W. (1987). Productivity loss in brainstorming groups: Toward the solution of a riddle. *Journal of Personality and Social Psychology*, 53(3), 497-509.

Dowling, K., & St. Louis, R. (2000). Asynchronous implementation of the nominal group technique: Is it effective? *Decision Support Systems,* 29(3), 229-248.

Dubrovsky, V., Kiesler, S., & Sethna, B. (1991). The equalization phenomenon: Status effects in computer-mediated and face-to-face decision-making groups. *Human-Computer Interaction,* 6(2), 119-146.

Er, M., & Ng, A. (1995). The anonymity and proximity factors in group decision support systems. *Decision Support Systems*, 14(1), 75-83.

Fan, S., Shen, Q., & Lin, G. (2007). Comparative study of idea generation between traditional value management workshops and GDSS-supported workshops. *Journal of Construction Engineering and Management*, 133(10), 816-825.

Fjermestad, J., & Hiltz, S. (1998). An assessment of group support systems experimental research: Methodology and results. *Journal of Management Information Systems*, 15(3), 7-149.

Fjermestad, J., & Hiltz, S. (1997). Experimental studies of group decision support systems: An assessment of variables studied and methodology. *Proceedings of the 30th Hawaii International Conference on Systems Sciences: Information Systems Track – Collaboration Systems and Technology*, Volume 2, Hawaii.

Fjermestad, J., & Hiltz, S. (2001). Group support systems: A descriptive evaluation of case and field studies**.** *Journal of Management Information Systems***,** 17(3), 115-160.

Gallupe, R., Dennis, A., Cooper, W., Valacich, J., Bastianutti, L., & Nunamaker, J. (1992). Electronic brainstorming and group size. *The Academy of Management Journal,* 35(2), 350-369.

Gallupe, R., & McKeen, J. (1990). Enhancing computer mediated communication: An experimental investigation into the use of a group decision support system for face-to-face versus remote meetings. *Information & Management*, 18, 1–13.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Gibson, M., Buche, M., & Waite, J. (2008). Technology support for the classroom: Technology alternatives to the traditional classroom, *Journal of International Technology and Information Management*, 17(1), 55-74.

Grohowski, R., McGoff, C., Vogel, D., Martz, B., & Nunamaker, J. (1990). Implementing electronic meeting systems at IBM: Lessons learned and success factors. *MIS Quarterly*, 14(4), 369-383.

Gu, L., Aiken, M., & Wang, J. (2007). Topic effects on process gains and losses in an electronic meeting. *Information Resources Management Journal*, 20(4), 1-11.

Hung, S., Tang, K., & Shu, T. (2008) Expanding group support system capabilities from the knowledge management perspective, *Journal of International Technology and Information Management*, 17(1), 21-42.

Jain, B., & Solomon, J. (2000). The effect of task complexity and conflict handling styles on computer-supported negotiations. *Information & Management,* 37(4), 161-168.

Jessup, L., Connolly, T., & Galegher, J. (1990). The effects of anonymity on GDSS group process with an idea-generating task. *MIS Quarterly*, 14(3), 313-321.

Jones, A., Johnson, L., Butler, M., & Main, D. (1983). Apples and oranges: An empirical comparison of commonly used indices of inter-rater agreement. *The Academy of Management Journal*, 26(3), 507-519.

Kelly, J., & Karau, S. (1999). Group decision making: The effects of initial preferences and time pressure. *Society for Personality and Social Psychology*, 25(11), 1342-1354.

Kelly, J., & Loving, T. (2004). Time pressure and group performance: Exploring underlying processes in the attentional focus model. *Journal of Experimental Social Psychology*, 40(2), 185-198.

Kiesler, S., Siegel, J., & McGuire, T. (1984). Social psychological aspects of computer-mediated communication. *American Psychologist*, 39(10), 1123-1134.

Kiesler, S., Zubrow, D., & Moses, A. (1985). Affect in computer-mediated communication: An experiment in synchronous terminal-to-terminal discussion. *Human-Computer Interaction*, 1(1), 77-104.

Kraut, R. (1994). Computer-mediated communication for intellectual teamwork: An experiment in group work. *Information Systems Research,* 5(2), 110-138.

LaPlante, A. (1993). Brainstorming 90s style. *Forbes ASAP*, October 25, 44-61.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Martz, B., Vogel, D., & Nunamaker, J. (1992). Electronic meeting systems: Results from the field. *Decision Support Systems*, 8(2), 141-158.

Michinov, N., & Primois. (2005). Improving productivity and creativity in online groups through social comparison process: New evidence for asynchronous electronic brainstorming. *Computers in Human Behavior*, 21(1), 11-28.

Ocker, R., Hiltz, S., Turoff, M., & Fjermestad, J. (1996). The effects of distributed group support and process structuring on software requirements development teams: Results on creativity and quality. *Journal of Management Information Systems*, 12(3), 127-153.

Ocker, R., & Morand, D. (2002). Exploring the mediating effect of group development on satisfaction in virtual and mixed-mode environments. *E-Service Journal*, 1(3), 25-41.

Pendergast, M., & Hayne, S. (1999). Groupware and social networks: Will life ever be the same again? *Information and Software Technology*, 41(6), 311-318.

Sedbrook, T. (2010), Maintaining enterprise knowledge with a REA-EO driven semantic wiki, *Journal of International Technology and Information Management*, 19(1), 1-9.

Shirani, A., Tafti, M., & Affisco, J. (1999). Task and technology fit: A comparison of two technologies for synchronous and asynchronous group communication. *Information & Management*, 36(3), 139-150.

Sim, J., & Wright, C. (2005). The Kappa statistic in reliability studies: Use, interpretation, and sample size requirements. *Physical Therapy*, 85(3), 257-268.

Smith, J., & Vanecek, M. (1990). Dispersed group decision making using non-simultaneous computer conferencing: a report of research. *Journal of Management Information Systems*, 7(2), 71–92.

Spector, P. (1994). Using self-report questionnaires in OB research: A comment on the use of a controversial method. *Journal of Organizational Behavior*, 15, 385-392.

Straub, D., Boudreau, M., & Gefen, D. (2004). Validation guidelines for IS positivist research. *Communications of the Association for Information Systems*, 13, 380-427.

Thatcher, A., & De La Cour, A. (2003). Small group decision-making in face-to-face and computer-mediated environment: The role of personality. *Behaviour & Information Technology*, 22(3), 203-218.

Tobia, P., & Beker, M. (1990). Making the most of meeting time. *Training and Development Journal*, 44(8), 34-38.

Travica, B. (2005). Information view of organization. *Journal of International Technology and Information Management*, 14(3), 1-20.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Tunga, L., & Turban, E. (1998). A proposed research framework for distributed group support systems. *Decision Support Systems*, 23(2), 175-188.

Tyran, C., & Shepherd, M. (2001). Collaborative technology in the classroom: A review of the GSS research and a research framework. *Information Technology and Management*, 2(4), 395-418.

VanGundy, A. (1984). Brain writing for new product ideas: An alternative to brainstorming. *Journal of Consumer Marketing*, 1(2), 67-74.

Vanjani, M., Aiken, M., & Paolillo, J. (1997). A comparison of performance and satisfaction between two types of group decision support systems. *Journal of International Information Management*, 6(2), 31-40.

Warkentin, M., Sayeed, L., & Hightower, R. (2007). Virtual teams versus face-to-face teams: An exploratory study of a Web-based conference system. *Decision Sciences*, 28(4), 975-996.

Watson, R., DeSanctis, G., & Poole, M. (1988). Using a GDSS to facilitate group consensus: Some intended and unintended consequences. *MIS Quarterly*, 12(3), 463–478.

Wong, Z., & Aiken, M. (2006). The effects of time on computer-mediated communication group meetings: An exploratory study using an evaluation task. *International Journal of Information Systems and Change Management*, 1(2), 138-158.

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APPENDIX
Post-session Questionnaire

1. Do you believe the comments were anonymous?

1	2	3	4	5	6	7
Very anonymous			Neutral			Not anonymous

2. How do you feel about the computer system used to discuss this problem?

1	2	3	4	5	6	7
Very dissatisfied			Neutral			Not satisfied

3. How do you feel about the comments your group submitted?

1	2	3	4	5	6	7
Very dissatisfied			Neutral			Not satisfied

4. What was the level of participation in your group?

1	2	3	4	5	6	7
Very dissatisfied			Neutral			Not satisfied

5. I was afraid others would criticize my comments.

1	2	3	4	5	6	7
Strongly disagree			Neutral			Strongly agree

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