Empirical Comparison of the Effectiveness of Six Meeting Venues on Bottom Line and Organizational Constructs

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The effectiveness of six meeting venues on validated bottom line and organizational factors was empirically studied. When the goal of a meeting is to achieve bottom line advantages, the most effective venue choice, according to facilitators and participants, is face to face with Electronic Meeting Systems (EMS). This venue trades off increased costs to achieve high participant satisfaction, high quality ideas and effective meeting results.   Facilitators and participants reported web conferencing with audio and video capability with EMS to be an effective second choice to achieve bottom line results. Although asynchronous text messaging with EMS was rated to be the most effective to reduce labor costs, it was rated significantly less effective than the other venues to achieve quality meeting results and high participant satisfaction. The results suggested that when the goal of a meeting is to achieve effectiveness at geographically dispersed sites, audio and video with EMS (web cam) was perceived by participants and facilitators as the most effective meeting mode. Based on the factors studied, all EMS-enhanced venues were perceived as effective in global environments; however, meeting observers perceived audio with EMS and audio and video with EMS as the most effective venues across time zones.

INTRODUCTION

Several studies report Electronic Meeting Systems (EMS), also called groupware, group decision support systems, or collaborative systems, can improve the effectiveness of meetings, support information access, and improve group dynamics via communication (Nunamaker et al., in Coleman, 1995; Nunamaker et al. 1997). In comparison to traditional face to face meetings, advantages of EMS include accomplishment of more in less time, imposition of effective structure, increased participation, and automatic comment and vote recording. Meetings enhanced with EMS improve group satisfaction and enable larger groups to meet, thereby enhancing decision making (Aiken & Govindarajulu, 1995). Burdett (2000) concluded EMS has the potential to overcome barriers to women's equal participation in mixed gender meetings, thereby increasing satisfaction and effectiveness for women.

Previous research by McAlister-Kizzier (2002, 2004, 2006) extracted six constructs from EMS literature. In constructing the table, the author relied heavily, but not exclusively, upon the results from over 150 research studies conducted over a 12 year period at the University of

Arizona. (Nunamaker et al., in Coleman, 1995; Nunamaker et al, 1997). The McAlister-Kizzier constructs are illustrated in Figure 1.

FIGURE 1
LESSONS LEARNED FROM EMS RESEARCH

Construct 1: Problem solving/decision making *EMS can--*
- structure and focus problem solving efforts
- produce unique ideas of higher quality
- increase the amount of ideas generated during divergent process

Construct 2: Group processes *EMS can--*
- establish and maintain alignment between personal and group goals
- help role clarification
- minimize gender inequities
- achieve equal participation due to anonymity and parallel input
- increase energy and group focus due to active participation
- encourage more objective idea evaluation due to anonymity as continuous rather than discrete variable

Construct 3: Leadership/Commitment *EMS can--*
- increase the likelihood of "buy in" to the final results
- make a poorly planned meeting worse if leadership is ineffective
- be effectively used with diverse leadership styles, situations and organizational cultures
- help resolve counterproductive conflicts between leadership styles

Construct 4: Bottom line issues *EMS can--*
- reduce labor costs by 50% and project time by up to 90%
- improve the quality of ideas through anonymous constructive criticism
- lead to improved quality of results
- lead to higher participant satisfaction

Construct 5: Situational issues *EMS can--*
- successfully support multi-language meetings
- display different levels of satisfaction implementation in multicultural settings
- display behavioral differences across cultures in convergent activities, with high power distance cultures being more resistant
- be used effectively in the classroom
- be used effectively in Business Process Re-Engineering projects

Construct 6: Organizational Issues
To enhance the success of GSS--
- individuals must have incentives to contribute to the group effort
- organizational incentives should be aligned with EMS
- maintain EMS competence in the organization
- consider successful use of EMS at geographical dispersed sites

The model used to guide the current study is grounded in adaptive structuration theory (DeSanctis & Poole, 1993; Poole & DeSanctis, 1990), social presence theory (Short, Williams & Christie, 1976), and social information processing theory (Fulk, Schmitz & Steinfield, 1990).

These theories suggest the following variables can effect group decisions: group tasks, presence of a strong leader, group norms, and the quality of inter-member relationships. To further ground this study, the researcher used a theory-based heuristic model, called the Groupware Grid, useful for assessing the contribution of groupware technology to team productivity (Nunamaker et al., 1997).

Figure 2 displays the Groupware Grid. The horizontal axis of the Groupware Grid includes three cognitive processes (communication, deliberation and information access) that, according to the Team Theory of Group Productivity (Briggs, 1994), interfere with each other during group processes, thereby limiting group productivity. Within the communication construct, people attend to choosing words, artifacts, images, facts and behaviors to convey a message through a medium to team members. Within deliberation, team members use problem-solving activities to form intentions to achieve goals. Within the information access construct, group members find, store, process and retrieve information to support deliberations. According to the Team Theory of Group Productivity, the key function of information is to increase the chances of expected outcomes by choosing the best course of action.

FIGURE 2
NUNAMAKER ET AL. GROUPWARE GRID

	Communication Support	**Deliberation Support**	**Information Access Support**
Concerted/Group Dynamics Level	Anonymity Parallel Contribution	Structured & Focused Processes	Session Transcripts Automatic Concept Classification
Coordinated Level	Asynchronous Communication	Schedule matching Automated workflow Project Management	Shared Data Stores
Individual Level	Preparing Communication Stimuli	Modeling Simulation	Information Filtering Local Data Stores

Team Theory posits the cognitive effort needed to achieve communication, deliberation and information access is motivated by the degree to which interests of individuals are in congruence with the group goal. Given this assumption, the horizontal axis of the Groupware Grid addresses the potential for the technology to affect the cognitive costs of joint effort. Thus, EMS (or groupware) may become less productive if the demand needed to achieve communication, deliberation or information access become too high. Conversely, groupware may improve productivity if it reduces the attention costs of these three processes.

The horizontal axis of the Groupware Grid describes three levels of group work. Level one is the individual work level, which means individual efforts that require no coordination. Level two is the coordinated work level, in which the work requires careful coordination between otherwise independent individual efforts. Finally, the concerted, or group dynamics, work level requires continuous concerted effort. Current EMS, or groupware, technology can support all three levels in the Groupware Grid.

Nunamaker et al. (1995) identified why teamwork can be challenging. Poor teamwork can be influenced by such factors as waiting to speak, fear of speaking, domination, misunderstanding, inattention, lack of focus, inadequate criteria, premature decisions, missing information,

distractions, digressions, groupthink, ignored alternatives, poor grasp of the problem, poor planning, lack of consensus, hidden agendas, inadequate resources, conflict, poorly defined goals and selecting the wrong people for the group. A properly designed facilitation session strives to eliminate or minimize these counter-productive factors.

SIGNIFICANCE

Previous research studied primarily same-time, same-place meetings using face to face facilitation. Developments in EMS/groupware meeting technology have enabled different-place, different-time electronic meetings to take place; however, given new developments in EMS delivery systems, facilitators are struggling with how to achieve optimum meeting effectiveness across the globe.

Expected outcomes from this research are four fold. First, the results will help practitioners choose the most effective and cost-effective meeting modes for global meetings. Second, the results will help practioners conduct more effective meetings across time zones using emerging technology. Third, the results will enhance decision research related to EMS; and fourth, the information can be applied in business classrooms to educate future global meeting facilitators.

RESEARCH METHODS

The broader study from which this study emerged uses a mixed methodology, incorporating quantitative and qualitative methods to triangulate results. Although mixed methods have been practiced since the 1950s, they are being recognized as a legitimate third paradigm, standing credibly with quantitative and qualitative methods (Becker, 2003; Ragin, 2003; Johnson & Christenson, 2005; Creswell, 2009; Flick, 2006). Collier, Seawright and Brady (2003) identified the power of bridging (p. 73) which uses "nested analysis" to combine thick analysis with statistical tests, thereby enhancing all research traditions. Collier et al. (2003, p.74) posit that by combining qualitative and quantitative methods in creative ways, better research can result.

The current research focuses on empirical analysis and discussion of the data analyzed for two of the six contructs examined in the larger, more comprehensive study. The constructs addressed for this study are bottom line and organizational. To date, quantitative data from validated surveys have been analyzed from 487 participants, 124 facilitators & 126 observers (see Table 1).

Each meeting included 15-20 participants, 2-4 facilitators, and 3-5 observers. The agenda and time format was controlled across meetings. To simulate reality and keep meeting discussions fresh, study participants were varied for each meeting. Before meetings took place, participants were trained in the technology and facilitation techniques. Facilitators had the freedom to infuse personality within the time and agenda controls in the study. Each meeting used brainstorming and rating methods to conduct a 30 minute modified SWOT (strengths, weaknesses, opportunities and threat) analysis of an environment with which all participants and facilitators had several years of experience. The meeting addressed all elements of the SWOT analysis

TABLE 1
STUDY PARTICIPANTS
FACILITATION MODE BY PARTICIPANT TYPE, (N = 737)

	Face to Face without EMS	Face to Face with EMS	Teleconference (audio) with EMS	Web Cam (audio and video) with EMS	Asynchronous Web With EMS	Synchronous Web With EMS	Total
Participants	173	116	14	53	47	84	487
Facilitators	29	38	12	11	19	15	124
Observers	35	40	5	16	15	15	126
Total	237	194	31	80	81	114	737

except threats; threats were not addressed because it was determined threats would be the most difficult to discuss realistically in a simulated environment. The meetings were all conducted in the same model meeting laboratory. Participants, observers and facilitators were College of Business seniors. Facilitate.com, a rich groupware product, was used for all studies; however, the features used for this study are available in most EMS products found on the market.

Validated online survey instruments were administered in a core senior-level business course as part of a learning activity. The quantitative data was analyzed using ANOVA with Tukey and Bonferroni post hocs, Pearson, Crosstabs, and Factor Analyses with varimax rotation. The final stage of this study will triangulate quantitative and qualitative findings; the end result will be a model to inform future research and to help practitioners design effective meetings.

The larger study, of which the current study is one component, empirically analyzed 26 validated factors clustered under 6 constructs to compare the effectiveness of six meeting venues: face to face without Electronic Meeting Systems (EMS); face to face with EMS; audio with EMS; audio and video with EMS; asynchronous text with EMS and synchronous text with EMS. The primary theoretical underpinning for the study is based on McAlister-Kizzier et al. constructs (2002, 2004, 2006) and Briggs Groupware Grid (1994). Literature review and data collection began Spring, 2004 and continues indefinitely. To inform the larger study, approximately 600 research studies have been consulted thus far.

RESEARCH QUESTIONS

The larger, comprehensive study addressed the following research questions: What are the perceptions of meeting participants and facilitators toward each construct/factor? Does a significant difference exist in perception toward each factor/construct among the meeting venues? What quantity and quality of ideas are generated for each of the meeting venues? Does a significant difference in quantity/quality exist among meeting venues? What are the perceptions of session observers toward six constructs (containing multiple factors) across meeting venues? Does a significant difference exist for observer factors among the meeting venues? Figure 3 summarizes the constructs and factors addressed in the study reported in this paper.The current research focused on the following three empirical research questions:

1. What are the perceptions of meeting participants and facilitators toward each bottom line and organizational construct and factor?

2. Does a significant difference exist in perception toward each bottom line and organizational construct and factor among the meeting venues?
3. What are the perceptions of session observers toward the organizational factor across meeting venues? Does a significant difference exist in observer perceptions for organizational factor among the meeting venues?

FIGURE 3
BOTTOM LINE AND ORGANIZATIONAL FACTORS

Bottom Line Factors
- Could reduce labor costs through such factors as productivity increases, travel time savings, etc.
- Could improve the quality of ideas through anonymous constructive criticism
- Contributed to improved quality of meeting results
- Lead to higher participant satisfaction

Organizational Factor
- Could be used successfully at geographically dispersed sites

RESULTS AND DISCUSSION

The results and discussion section summarizes the results of the quantitative analysis conducted for the bottom line and organizational constructs and factors.

Bottom Line Issues

As illustrated in Figure 3, the bottom line (BL) construct contained four factors. As illustrated in Table 2, facilitators and participants perceived the most effective facilitation mode to achieve the bottom line construct was face to face with EMS (4.1970). Following in descending order of effectiveness were audio and video with EMS (3.9127), asynchronous text web with EMS (3.6099), and synchronous text web with EMS (3.5615). The least effective modes for the BL construct were audio only with EMS (3.5789) and face to face without EMS (3.2269).

Pearson and ANOVA were conducted, with appropriate follow up tests, to determine if and where significant differences in mean scores were detected based on facilitation mode for the bottom line construct. Although Pearson (Table 3) suggested no significant difference among facilitation venues based on the bottom line construct, ANOVA (Table 4) found significance (.000), suggesting post hoc analysis to discern where significant differences lie.

TABLE 2
PARTICIPANT AND FACILITATOR PERCEPTIONS
BOTTOM LINE CONSTRUCT AND FACTORS
MEAN COMPARISION BY FACILITATION MODE, (N=607)

Facilitation Mode *Highly effective = 5* *Least effective = 1*		1- Face to Face without EMS	2- Face to Face with EMS	3 Audio only (speaker phone) with EMS	4 Audio and video (webcam) with EMS	5- Synchro- nous text messagin g with EMS	6-Asynch- ronous text messaging with EMS
Bottom line issues construct N = 584	*Mean* *SD* *N*	3.2269 .96730 195	4.1970 .60042 151	3.5789 .68238 19	3.9127 .85095 63	3.5615 .91540 65	3.6099 .88287 91
To what extent do you feel this medium . . .							
Could reduce labor costs through such factors as productivity increases, travel time savings, and the like? BL1 N=600	*Mean* *SD* *N*	2.9663 1.29429 208	3.9216 1.10935 153	3.7895 .91766 19	4.0317 .96667 63	3.8154 1.07372 65	4.0870 1.03406 92
Could improve the quality of ideas through anonymous constructive criticism? BL2 N= 593	*Mean* *SD* *N*	2.9950 1.35461 201	4.3046 .89438 151	3.7895 .91766 19	3.7895 1.06113 64	3.5538 .93593 65	3.9892 .94977 93
Contributed to improved quality of meeting results? BL3 N = 606	*Mean* *SD* *N*	3.5421 .96687 214	4.2368 .68799 152	3.3684 1.11607 19	3.9375 .97386 64	3.4000 1.23491 65	3.1522 1.20379 92
Lead to higher participant satisfaction? BL4 N= 607	*Mean* *SD* *N*	3.5093 1.08225 214	4.3421 .76431 152	3.3158 1.00292 19	3.9063 1.09427 64	3.4154 1.28565 65	3.2796 1.33812 93

TABLE 3
PARTICIPANT AND FACILITATOR PERCEPTIONS
PEARSON CORRELATION
FACILITATION MODE (FACMODE) WITH
BOTTOM LINE CONSTRUCT (BLCONSTR)

N = 584		BLCONSTR
FACMODE	Pearson Correlation	.076
	Sig. (2-tailed)	.066

TABLE 4
PARTICIPANT AND FACILITATOR PERCEPTIONS, ANOVA
BOTTOM LINE CONSTRUCT (BLCONSTR) BY FACILITATION MODE

N = 584	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	85.127	5	17.025	23.847	.000
Within Groups	412.654	578	.714		
Total	497.780	583			

The results of the post hoc Tukey HSD and Bonferroni tests are displayed in Table 5. Face to face without EMS was found significantly less effective than face to face with EMS, web cam (audio and video) with EMS, and asynchronous text messaging with EMS. Face to face with EMS, web cam (audio and video) with EMS, and asynchronous text messaging with EMS were all significantly more effective for the bottom line construct than face to face without EMS. Face to face with EMS was also significantly more effective for this construct than audio (speakerphone) with EMS and both text messaging modes with EMS (synchronous and asynchronous).

Homogeneous groups based on Tukey HSD analysis are displayed in Table 6. Face to face and web cam, both with EMS, stand out as the most recommended mediums; not recommended to achieve this effectiveness goal is face to face without EMS.

To understand the relationships in more depth, each factor in the bottom line construct was examined individually. These results are discussed next.

Bottom Line Factor 1: Reduction of labor costs
The first BL factor assessed the effectiveness with which the facilitation venues could reduce labor costs through such factors as productivity increases, travel times savings and the like. As illustrated in Table 2, the most effective venue for this factor was asynchronous text web with EMS (4.087), followed in order of effectiveness by web cam (audio and video) with EMS (4.0317), and face to face with EMS (3.92). Less effective modes for this factor were synchronous text web with EMS (3.8154) and audio only (speaker phone) with EMS (3.7895). The least effective mode to achieve the labor cost bottom line factor was face to face without EMS, with a mean score of 2.9663.

As illustrated in Tables 7 and 8, both Pearson (.000) and ANOVA (.000) found significant differences for the first BL factor, labor cost reduction, based on facilitation venue. Having found significance in ANOVA, Tukey HSD post hoc analysis pinpointed where the differences

exist. As illustrated in Tables 9 and 10, all venues studied were significantly more effective to achieve labor cost reduction than face to face without EMS.

TABLE 5
PARTICIPANT AND FACILITATOR PERCEPTIONS
ANOVA POST HOC TUKEY HSD AND BONFERRONI
BOTTOM LINE CONSTRUCT (BLCONSTR) BY FACILITATION MODE, (N = 584)

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	Mean Difference	Std. Error	TukeyHSD/Bonferroni Sig. (.05)
1–2	-.97010(*)	.09159	.000/.000
1–3	-.35202	.20307	.510/1.000
1-4	-.68578(*)	.12245	.000/.000
1-5	-.33462	.12102	.065/.088
1-6	-.38297(*)	.10727	.005/.006
2-3	.61807(*)	.20568	.033/.042
2-4	.28432	.12673	.220/.379
2-5	.63548(*)	.12535	.000/.000
2-6	.58713(*)	.11213	.000/.000
3-4	-.33375	.22115	.659/1.000
3-5	.01741	.22036	1.000/1.000
3-6	-.03094	.21312	1.000/1.000
4-5	.35116	.14938	.176/.286
4-6	.30281	.13848	.246/.438
5-6	-.04835	.13722	.999/1.000

*The mean difference is significant at the .05 level.

Bottom Line Factor 2: improve quality of ideas through anonymous constructive criticism
   The second factor addressed in the BL construct was the effectiveness of how each venue could improve the quality of ideas through anonymous constructive criticism. As illustrated in Table 2, the most effective facilitation venue for the second BL factor is face to face with EMS (4.3046), followed in effectiveness by asynchronous text web with EMS (3.9892). Tied for the next most effective mode to achieve quality of ideas through anonymous constructive criticism were audio (speakerphone) with EMS and web cam (audio and video) with EMS (3.7895). The least effective methods to achieve this factor in descending order of effectiveness were synchronous text web with EMS (3.5538) and face to face without EMS (2.995).

TABLE 6
PARTICIPANT AND FACILITATOR PERCEPTIONS
TUKEY HSD (a,b) MEANS FOR GROUPS IN HOMOGENEOUS SUBSETS
BOTTOM LINE CONSTRUCT BY FACILITATION MODE

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	N	Subset for alpha = .05		
N = 584		**1**	**2**	**3**
1	195	3.2269		
5	65	3.5615	3.5615	
3	19	3.5789	3.5789	
6	91	3.6099	3.6099	
4	63		3.9127	3.9127
2	151			4.1970
Sig.		.156	.237	.476

a Uses Harmonic Mean Sample Size = 56.270.
b The group sizes are unequal. The harmonic mean of the group sizes is used.
Type I error levels are not guaranteed.

TABLE 7
PARTICIPANT AND FACILITATOR PERCEPTIONS, PEARSON
CORRELATION,FACILITATION MODE (FACMODE) WITH BLDREDCLC
"COULD REDUCE LABOR COSTS THROUGH SUCH FACTORS AS PRODUCTIVITY INREASES,
TRAVEL TIME SAVINGS, AND THE LIKE?"

N = 600		**BLDREDCLC**
FACMODE	Pearson Correlation	.291(**)
	Sig. (2-tailed)	.000

**Correlation Is significant at the 0.01 level (2-tailed)

TABLE 8
PARTICIPANT AND FACILITATOR PERCEPTIONS, ANOVA
BOTTOM LINE FACTOR 1 (BLREDCLC)
"COULD REDUCE LABOR COSTS THROUGH SUCH FACTORS AS PRODUCTIVITY INREASES,
TRAVEL TIME SAVINGS, AND THE LIKE?"

N = 600	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	136.512	5	27.302	20.845	.000
Within Groups	778.007	594	1.310		
Total	914.518	599			

TABLE 9
PARTICIPANT AND FACILITATOR PERCEPTIONS
ANOVA POST HOC HSD AND BONFERRONI
COULD REDUCE LABOR COSTS THROUGH SUCH FACTORS AS PRODUCTIVITY
INCREASES, TRAVEL TIME SAVINGS, AND THE LIKE?
(BLREDCLC), (N = 600)

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	Mean Difference	Std. Error	Tukey HSD/Bonferroni Sig. (.05)
1–3	-.82313(*)	.27429	.033/.042
1-4	-1.06540(*)	.16458	.000/.000
1-5	-.84904(*)	.16263	.000/.000
1-6	-1.12061(*)	.14330	.000/.000
2-3	.13209	.27838	.997/1.000
2-4	-.11018	.17132	.988/1.000
2-5	.10618	.16944	.989/1.000
2-6	-.16539	.15099	.883/1.000
3-4	-.24227	.29954	.966/1.000
3-5	-.02591	.29847	1.000/1.000
3-6	-.29748	.28840	.907/1.000
4-5	.21636	.20234	.893/1.000
4-6	-.05521	.18715	1.000/1.000
5-6	-.27157	.18544	.687/1.000

* The mean difference is significant at the .05 level.

TABLE 10
PARTICIPANT AND FACILITATOR PERCEPTIONS
TUKEY HSD (a,b) MEANS FOR GROUPS IN HOMOGENEOUS SUBSETS
FACILITATION MODE BY BLREDCLE
BOTTOM LINE FACTORS 1: REDUCTION IN LABOR

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	N	Subset for alpha = .05		
N = 600		1	2	3
1	208	2.9663		
3	19		3.7895	
5	65		3.8154	
2	153		3.9216	
4	63		4.0317	
6	92		4.0870	
Sig.		1.000	.738	

a Uses Harmonic Mean Sample Size = 56.549.
b The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Pearson Correlation (Table 11) and ANOVA (Table 12) revealed significant differences among facilitation modes and the idea quality factor. As illustrated in Tables 13 and 14, Tukey HSD and Bonferroni post hoc analyses revealed face to face without EMS was significantly less effective than all other venues studied. Face to face with EMS was found significantly more effective than web cam and synchronous text messaging, both with EMS. These results recommend face to face with EMS to achieve idea quality through anonymous constructive criticism; face to face without EMS is not recommended to achieve this effectiveness goal. Table 14 illustrates homogeneous subsets based on Tukey HSD follow up; these results illustrate statistical clustering based on the mean scores for each venue for the idea quality factor.

TABLE 11
PARTICIPANT AND FACILITATOR PERCEPTIONS
PEARSON CORRELATION
FACILITATION MODE (FACMODE) WITH BLIMIDQL
"COULD IMPROVE THE QUALITY OF IDEAS THROUGH ANONYMOUS CONSTRUCTIVE CRITICISM?"

N = 593		BLIMIDQL
FACMODE	Pearson Correlation	.188(**)
	Sig. (2-tailed)	.000

**Correlation is significant at the 0.01 level (2-tailed).

TABLE 12
PARTICIPANT AND FACILITATOR PERCEPTIONS, ANOVA
BOTTOM LINE FACTOR 2 (BLIMIDQL) BY FACILITATON MODE
"COULD IMPROVE THE QUALITY OF IDEAS THROUGH ANONYMOUS CONSTRUCTIVE CRITICISM?"

N = 593	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	163.693	5	32.739	26.986	.000
Within Groups	712.128	587	1.213		
Total	875.821	592			

Bottom Line Factor 3: Quality of meeting results

The third BL factor measured was the effectiveness of how each venue contributed to the improved quality of meeting results. Mean values reported in Table 2 illustrate facilitators and participants identified the most effective facilitation venue for this bottom line factor as face to face with EMS (4.2368), followed in descending order of effectiveness by the following modes: web cam (audio and video) with EMS (3.9375), face to face without EMS (3.5421), synchronous text web with EMS (3.4), audio only (speakerphone) with EMS (3.3684), and asynchronous text web with EMS (3.1522).

Pearson analysis found significant differences among venues based on the meeting quality bottom line factor at the .01 level; see Table 15. ANOVA verified significant differences among venues based on the meeting quality bottom line factor (.000), ANOVA results are illustrated in Table 16. Given the results of Pearson and ANOVA, post hoc Tukey HSD and Bonferroni were calculated to locate significant differences among modes.

TABLE 13
PARTICIPANT AND FACILITATOR PERCEPTIONS
ANOVA POST HOC TUKEY HSD AND BONFERRONI
BOTTOM LINE FACTOR 2: BLIMIDQL
COULD IMPROVE THE QUALITY OF IDEAS THROUGH ANONYMOUS
CONSTRUCTIVE CRITICISM?, (N = 593)

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	Mean Difference	Std. Error	Tukey HSD/Bonferroni Sig. (.05)
1–2	-1.30961(*)	.11862	.000/.000
1–3	-.79445(*)	.26436	.033/.042
1-4	-.78623(*)	.15809	.000/.000
1-5	-.55882(*)	.15716	.005/.006
1-6	-.99422(*)	.13813	.000/.000
2-3	.51516	.26811	.390/.827
2-4	.52339(*)	.16429	.019/.023
2-5	.75079(*)	.16340	.000/.000
2-6	.31539	.14519	.252/.453
3-4	.00822	.28776	1.000/1.000
3-5	.23563	.28725	.964/1.000
3-6	-.19977	.27730	.979/1.000
4-5	.22740	.19396	.850/1.000
4-6	-.20800	.17889	.854/1.000
5-6	-.43540	.17807	.143/.222

*The mean difference is significant at the .05 level

Tables 17 and 18 report the results of the ANOVA post hoc analyses. The most effective venue for this BL factor, face to face with EMS, was found significantly more effective to achieve quality meeting results than face to face without EMS, audio only (speakerphone) with EMS, and synchronous and asynchronous text messaging with EMS. The next most effective venue for this BL factor, web cam (audio and video) with EMS was found significantly more effective than both text messaging with EMS modes (asynchronous and synchronous). Face to face without EMS was significantly more effective than the least effective EMS mode, asynchronous text messaging with EMS, to achieve quality meeting results. Mean clustering generated with the post hoc ANOVA tests are illustrated in Table 18.

These analyses suggest if the goal of a meeting is to achieve quality meeting results, facilitators and participants recommend face to face with EMS as the most effective mode, followed by web (audio and video) with EMS. Audio online (speaker phone) with EMS and synchronous text messaging with EMS are among the least effective venues to achieve high quality meeting results. Asynchronous text messaging with EMS should especially be avoided if the meeting goal is to achieve quality results.

TABLE 14
PARTICIPANT AND FACILITATOR PERCEPTIONS
TUKEY HSD (a,b) MEANS FOR GROUPS IN HOMOGENEOUS SUBSETS
FACILITATION MODE BY BOTTOM LINE FACTOR 2:
IMPROVE QUALITY OF IDEAS THROUGH ANONYMOUS CONSTRUCTIVE
CRITICISM

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	N	Subset for alpha = .05		
N = 593		**1**	**2**	**3**
1	201	2.9950		
5	65	3.5538	3.5538	
4	64		3.7813	3.7813
3	19		3.7895	3.7895
6	93		3.9892	3.9892
2	151			4.3046
Sig.		.077	.287	.118

a Uses Harmonic Mean Sample Size = 56.608
b The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

TABLE 15
PARTICIPANT AND FACILITATOR PERCEPTIONS
PEARSON CORRELATION
FACILITATION MODE (FACMODE) WITH BLIMRESL
"CONTRIBUTED TO IMPROVED QUALITY OF MEETING RESULTS?"

N = 606		BLIMRESL
FACMODE	Pearson Correlation	-.160(**)
	Sig. (2-tailed)	.000

*Correlation is significant at the 0.01 level (2-tailed)

TABLE 16
PARTICIPANT AND FACILITATOR PERCEPTIONS, ANOVA
BOTTOM LINE FACTOR 3 (BLIMRESL)
". . . CONTRIBUTED TO IMPROVED QUALITY OF MEETING RESULTS?"

N = 606	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	88.017	5	17.603	18.140	.000
Within Groups	582.236	600	.970		
Total	670.252	605			

Bottom Line Factor 4: Lead to Higher Participant Satisfaction

The fourth and final BL factor assessed the effectiveness of each facilitation venue to discern to what extent the venue lead to higher participant satisfaction. Mean scores by venue displayed in Table 2 indicate for this BL factor, the most effective venue is face to face with EMS (4.3421), followed in effectiveness by web cam (audio and video) with EMS (3.9063), face to face without EMS (3.5093), synchronous text messaging with EMS (3.4154), and audio only (speakerphone) with EMS (3.3158). The least effective method to achieve participant satisfaction, according to participants and facilitators, was asynchronous text messaging with EMS (3.2796). Facilitators and participants rated all facilitation venues as above average in effectiveness for this factor.

Both Pearson (Table 19) and ANOVA (Table 20) revealed significant correlation between facilitation mode and the level of satisfaction of participants. Given these results post hoc ANOVA Tukey and Bonferroni analyses were conducted. These post hoc tests revealed significance for this factor among several meeting venues, illustrated in Tables 21 and 22. The most effective mode, face to face without EMS, was found significantly more effective than all modes except web cam (audio and video) with EMS. The second most effective venue, web cam (audio and video) with EMS was found significantly more effective than the least effective meeting venue, asynchronous text messaging with EMS.

These composite results suggest the best venue to achieve participant satisfaction is face to face with EMS. Web cam (audio and video) with EMS is also effective for this factor. However, if participant satisfaction is a goal of the meeting, both audio (speakerphone) with EMS and asynchronous text messaging with EMS should be avoided.

Organizational Issues

One organizational issue was assessed for the current study; that is, the perceived effectiveness of the venues to be used successfully at geographically dispersed sites. This issue was assessed by participants, facilitators and observers. The observers did not participant in the meetings; rather, they observed the meetings, focusing upon meeting effectiveness issues, while responding to open and closed ended questions online in real time. To enhance their knowledge of effective meetings, the observers received the same training on the technology and meeting facilitation as the facilitators. In this section, first, composite participant and facilitator perceptions regarding organizational issues are discussed, followed by a discussion of observer perceptions.

TABLE 17
PARTICIPANT AND FACILITATOR PERCEPTIONS
ANOVA POST HOC TUKEY HSD AND BONFERRONI
CONTRIBUTED TO IMPROVED QUALITY OF MEETING RESULTS? BLIMRESL
(N = 606)

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	Mean Difference	Std. Error	Sig. (.05)
1–2	-.69479(*)	.10449	.000/.000
1–3	.17364	.23581	.977/1.000
1-4	-.39544	.14035	.056/.075
1-5	.14206	.13951	.912/1.000
1-6	.38988(*)	.12281	.020/.024
2-3	.86842(*)	.23970	.004/.005
2-4	.29934	.14679	.321/.628
2-5	.83684(*)	.14599	.000/.000
2-6	1.08467(*)	.13012	.000/.000
3-4	-.56908	.25736	.234/.411
3-5	-.03158	.25691	1.000/1.000
3-6	.21625	.24824	.953/1.000
4-5	.53750(*)	.17347	.025/.031
4-6	.78533(*)	.16034	.000/.000
5-6	.24783	.15961	.6301.000

* The mean difference is significant at the .05 level

Participant and facilitator perceptions

As illustrated in Table 23, participants and facilitators perceived the most effective for this factor to be audio and video (web cam) with EMS (4.2188), followed in descending order of effectiveness by asynchronous text messaging with EMS (4.0645), face to face with EMS

(4.0066), synchronous text messaging with EMS (3.7846), and speakerphone (audio only) with EMS (3.7368). The least effective method was face to face without EMS; this mode scored below average in effectiveness for this organizational factor (2.7233).

As illustrated in Tables 24, 25, 26, and 27, based on Pearson as well as ANOVA with post hoc Tukey and Bonferroni analyses, significant differences were found among facilitation venues based on the geographic factor. Significant differences were found between face to face without EMS and each of the other five venues studied for this factor.

According to participants and facilitators, face to face without EMS was the least effective mode when the meeting goals is to serve geographically dispersed sites. Although all other venues were assessed as effective, the most effective mode to meet this objective was reported to be web cam (audio and video) with EMS. It is unclear how face to face with EMS was determined to be effective; perhaps respondents, who were exposed to all meeting venues in this study, were envisioning creative ways to include geographically dispersed sites using sophisticated audio and video technology, or perhaps the higher score was a result of a halo effect because of the high assessment of this venue on most factors.

TABLE 18
PARTICIPANT AND FACILITATOR PERCEPTIONS
TUKEY HSD (a,b) MEANS FOR GROUPS IN HOMOGENEOUS SUBSETS
FACILITATION MODE BY BLIMRESL
BOTTOM LINE FACTOR 3: QUALITY OF MEETING RESULTS

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	N	Subset for alpha = .05		
N = 606		1	2	3
6	92	3.1522		
3	19	3.3684		
5	65	3.4000		
1	214	3.5421	3.5421	
4	64		3.9375	3.9375
2	152			4.2368
Sig.		.284	.269	.587

a Uses Harmonic Mean Sample Size = 56.731
b The group sizes are unequal. The harmonic mean of the
group sizes is used. Type I error levels are not guaranteed.

Observer perceptions

Meeting observers also assessed the success with which facilitators of each facilitation mode could use the modes at geographically dispersed sites. The cross tabulation results (Table 28) suggest observers found audio only (speakerphone) with EMS to have the highest success at

geographically dispersed sites, followed in decreasing order of perceived success by face to face with EMS, audio and video (web cam) with EMS, synchronous text messaging with EMS, and asynchronous text messaging with EMS. Not surprisingly, the one mode that did not incorporate EMS had the lowest perceived success mean (face to face without EMS). The high success rating for face to face with EMS (requiring everyone to be in the same room) was, again, as with participants and observers, counter intuitive. Observers may have misunderstood the intent of the item, thereby invalidating these results, or perhaps a halo effect or creative thinking occurred.

TABLE 19
PARTICIPANT AND FACILITATOR PERCEPTIONS
PEARSON CORRELATION
BOTTOM LINE FACTOR 4 (BLIMSATI)
FACILITATION MODE (FACMODE) WITH BLIMSATI
"... LEADS TO HIGHER PARTICIPANT SATISFACTION?"

N = 607		BLIMSATI
FACMODE	Pearson Correlation	-.119(**)
	Sig. (2-tailed)	.003

**Correlation is significant at the 0.01 level (2-tailed).

TABLE 20
PARTICIPANT AND FACILITATOR PERCEPTIONS, ANOVA
BOTTOM LINE FACTOR 4 (BLIMSATI)
"... LEADS TO HIGHER PARTICIPANT SATISFACTION?"

N = 607	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	97.637	5	19.527	16.724	.000
Within Groups	701.750	601	1.168		
Total	799.387	606			

Pearson (Table 29) and ANOVA (Table 30) were conducted to determine if a significant difference was found for this factor based on facilitation venue. Pearson did not suggest significant differences by venue for this factor; however, ANOVA found significance, prompting Tukey and Bonferroni followup (Table 31) to pinpoint significant differences among venue means. These follow up results indicate that the lowest scoring venue (face to face without EMS) had a significantly lower mean score than face to face with EMS, audio only (speakerphone) with EMS, and audio and video (web cam) with EMS. Homogeneous mean score clusters are illustrated in Table 32.

SUMMARY AND CONCLUSIONS

Summary and conclusions for the research questions addressed in this study follow:
1. As illustrated in Table 33, when the goal of a meeting is to achieve bottom line advantages, the most effective venue choice, from facilitator and participant perspectives, is the face to face with EMS mode. This venue trades off increased labor costs (travel

costs, for example) to achieve high participant satisfaction and the best idea and meeting results quality of all venues studied. To achieve bottom line advantages, facilitators and participants reported web conferencing with audio and video capability (web cam) and EMS capability to be a close second choice. The web cam choice also rated high in reduction of labor costs. Although the asynchronous text messaging mode was rated to be the most effective to reduce labor costs, it came with a large trade off in meeting quality and participant satisfaction. Asynchronous text messaging was rated as significantly less effective than other venues to achieve both quality meeting results and participant satisfaction.

2. As illustrated in Table 33, when the goal of a meeting is to achieve effectiveness at geographically dispersed sites, audio and video (web cam) with EMS is perceived by participants and facilitators as the most effective. All EMS venues were perceived as effective to achieve this goal. Meeting observers, however, perceived audio only with EMS and audio and video with web cam as effective venues. Curiously, this group also identified face to face with EMS as effective across geography; this enigmatic conclusion may be the result of a lower "N" and therefore less validity, creative thinking or perhaps the result of a halo effect among study participants who preferred this strategy. Not surprisingly, face to face without EMS was not judged effective to achieve this goal.

3. The results suggest if the budget allows, face to face meetings using the benefits of EMS are the most effective venue to achieve bottom line and organizational benefits.. However, investment in an inexpensive web cam can achieve significant benefits for meetings that use EMS capability across time zones. The results strongly suggest that investment in EMS pays for all bottom line and organizational factors studied.

RECOMMENDATIONS FOR FUTURE RESEARCH

Four recommendations for future research are offered.
1. The effectiveness of all factors and constructs identified in Figure 1 should be studied from facilitator, participant and observer perspectives using quantitative, qualitative and mixed methods of inquiry.
2. Additional meeting venues should be incorporated into the analysis as they become available, for example, asynchronous and synchronous video and audio capability, the use of hand-held devices and other emerging technologies.
3. Continue to add data sets to assess using qualitative and quantitative methods of inquiry, to enhance the power of the analysis and the resulting conclusions.
4. Statistical modeling can be used to enhance understanding of the interaction among the variables studied.

TABLE 21
PARTICIPANT AND FACILITATOR PERCEPTIONS
ANOVA POST HOC TUKEY HSD AND BONFERRONI
BL FACTOR 4: BLIMSATl
LEAD TO HIGHER PARTICIPANT SATISFACTION?
(N = 607)

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	Mean Difference	Std. Error	Tukey HSD/Bonferroni Sig. (.05)
1–2	-.83276(*)	.11462	.000/.000
1–3	.19356	.25867	.976/1.000
1-4	-.39690	.15395	.104/.153
1-5	.09396	.15304	.990/1.000
1-6	.22978	.13421	.524/1.000
2-3	1.02632(*)	.26294	.001/.002
2-4	.43586	.16102	.075/1.05
2-5	.92672(*)	.16014	.000/.000
2-6	1.06254(*)	.14226	.000/.000
3-4	-.59046	.28231	.293/.553
3-5	-.09960	.28181	.999/1.000
3-6	.03622	.27205	1.000/1.000
4-5	.49087	.19028	.104/.152
4-6	.62668(*)	.17550	.005/.006
5-6	.13581	.17470	.971/1.000

*The mean difference is significant at the .05 level

TABLE 22
PARTICIPANT AND FACILITATOR PERCEPTIONS
TUKEY HSD (a,b) MEANS FOR GROUPS IN HOMOGENEOUS SUBSETS
FACILITATION MODE BY BLIMSATI
BOTTOM LINE FACTOR 4: HIGHER PARTICIPANT SATISFACTION

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	N	Subset for alpha = .05		
N = 607		1	2	3
6	93	3.2796		
3	19	3.3158		
5	65	3.4154	3.4154	
1	214	3.5093	3.5093	
4	64		3.9063	3.9063
2	152			4.3421
Sig.		.867	.151	.263

a Uses Harmonic Mean Sample Size = 56.794
b The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

TABLE 23
ORGANIZATIONAL ISSUES
PARTICIPANT AND FACILITATOR PERCEPTIONS
MEAN COMPARISON BY FACILITATION MODE

Highly effective = 5; Least effective = 1

Facilitation Mode		Face to Face without EMS	Face to Face with EMS	Audio only (speaker phone) with EMS	Audio and video (web cam) with EMS	Synchro-nous text web with EMS	Asynch-ronous text web with EMS
To what extent do you feel this medium . . .							
N = 599		2.7233 1.30893 206	4.0066 1.08266 152	3.7368 .87191 19	4.2188 .89918 64	3.7846 1.12489 65	4.0645 1.00873 93

TABLE 24
PARTICIPANT AND FACILITATOR PERCEPTIONS PEARSON CORRELATION FACILITATION MODE (FACMODE) WITH ORGGEOGR "COULD BE USED SUCCESSFULLY AT GEOGRAPHICALLY DISPERSED SITES?

N = 599		ORGGEOGR
FACMODE	Pearson Correlation	.336(**)
	Sig. (2-tailed)	.000

**Correlation is significant at the 0.01 level (2-tailed)

TABLE 25
PARTICIPANT AND FACILITATOR PERCEPTIONS, ANOVA ORGANIZATIONAL ISSUE FACTOR 1 (ORGGEOGR)
"COULD BE USED SUCCESSFULLY AT GEOGRAPHICALLY DISPERSED SITES?"\

N = 599	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	229.835	5	45.967	35.519	.000
Within Groups	767.441	593	1.294		
Total	997.275	598			

TABLE 26
PARTICIPANT AND FACILITATOR PERCEPTIONS
ANOVA POST HOC TUKEY AND BONFERRONI
DEPENDENT VARIABLE: ORGGEOGR
"COULD BE USED SUCCESSFULLY AT GEOGRAPHICALLY DISPERSED SITES?"
(N= 599)

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	Mean Difference	Std. Error	Tukey HSD/Bonferroni Sig. (.05)
1–2	-1.28328(*)	.12164	.000/.000
1–3	-1.01354(*)	.27276	.003/.003
1-4	-1.49545(*)	.16280	.000/.000
1-5	-1.06131(*)	.16184	.000/.000
1-6	-1.34122(*)	.14212	.000/.000
2-3	.26974	.27682	.926/1.000
2-4	-.21217	.16952	.811/1.000
2-5	.22196	.16860	.776/1.000
2-6	-.05794	.14977	.999/1.000

3-4	-.48191	.29721	.58/1.000
3-5	-.04777	.29669	1.000/1.000
3-6	-.32767	.28641	.863/1.000
4-5	.43413	.20033	.255/.459
4-6	.15423	.18476	.961/1.000
5-6	-.27990	.18392	.650/1.000

* The mean difference is significant at the .05 level.

TABLE 27
PARTICIPANT AND FACILITATOR PERCEPTIONS
TUKEY HSD (a,b) MEANS FOR GROUPS IN HOMOGENEOUS SUBSETS
FACILITATION MODE BY ORGEOGR: SUCCESS AT GEOGRAPHICALLY
DISPERSED SITES
(N = 599)

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	N	Subset for alpha = .05		
		1	2	3
1	206	2.7233		
3	19		3.7368	
5	65		3.7846	
2	152		4.0066	
6	93		4.0645	
4	64		4.2188	

a Uses Harmonic Mean Sample Size = 56.696
b The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

TABLE 28
OBSERVER PERCEPTIONS, CROSS TABS
EXTENT TO WHICH COMPETENT FACILITATORS COULD SUCCESSFULLY USE
VENUES AT GEOGRAPHICALLY DISPERSED SITES, *(N = 136)*

1 = low success; 5 = high success

Facilitation Mode		Face to Face without EMS	Face to Face with EMS	Audio only (speaker phone) with EMS	Audio and video (web cam) with EMS	Synchro-nous text messaging with EMS	Asynchro-nous text messaging with EMS
Success with which able facilitator could use at geographically dispersed sites	M S.D N	3.05714 1.413025 35	4.40000 .810191 40	4.80000 .447214 5	4.37500 .619139 16	3.80000 1.207122 15	3.64000 1.150362 25

TABLE 29
OBSERVER PERCEPTIONS, PEARSON CORRELATION
FACILITATION MODE (FACMODE) WITH SUCGEOG "TO WHAT EXTENT DO
YOU FEEL THIS MEDIUM COULD BE USED SUCCESSFULLY BY AN ABLE
FACILITATOR AT GEOGRAPHICALLY DISPERSED SITES?"

N = 136		SUCGEOG
FACMODE	Pearson Correlation	.080
	Sig. (2-tailed)	.355

TABLE 30
OBSERVER PERCEPTIONS, ANOVA
SUCCESS WITH WHICH ABLE FACILITATOR COULD USE AT
GEOGRAPHICALLY DISPERSED SITES
SUCGEOG BY FACILITATION VENUE

N = 136	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	44.150	5	8.830	7.542	.000
Within Groups	152.196	130	1.171		
Total	196.346	135			

TABLE 31
OBSERVER PERCEPTIONS
ANOVA POSTHOC TUKEY AND BONFERRONI
SUCCESS WITH WHICH ABLE FACILITATOR COULD USE AT
GEOGRAPHICALLY DISPERSED SITES
SUCGEOG BY FACILITATION VENUE, (N = 136)

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	Mean Difference	Std. Error	Tukey/Bonferroni (Sig .05)
1–2	-1.342857(*)	.250436	.000/.000
1–3	-1.742857(*)	.517298	.012/.015
1-4	-1.317857(*)	.326528	.001/.001
1-5	-.742857	.333914	.234/.417
1-6	-.582857	.283336	.316/.625
2-3	-.400000	.513240	.971/1.000
2-4	.025000	.320062	1.000/1.000
2-5	.600000	.327593	.449/1.000
2-6	.760000	.275858	.072/.101
3-4	.425000	.554363	.973/1.000
3-5	1.000000	.558745	.476/1.000
3-6	1.160000	.530072	.250/.456
4-5	.575000	.388870	.678/1.000
4-6	.735000	.346411	.283/.536
5-6	.160000	.353382	.998/1.000

* The mean difference is significant at the .05 level.

TABLE 32
OBSERVER PERCEPTIONS
TUKEY HSD (a,b) MEANS FOR GROUPS IN HOMOGENEOUS SUBSETS
FACILITATION MODE BY SUCCESS WITH WHICH ABLE FACILIATOR COULD
USE AT GEOGRAPHICALLY DISPERSED SITES (SUCGEOG)

1 = Face to Face without EMS
2 = Face to Face with EMS
3 = Audio only (speaker phone) with EMS
4 = Audio and video (web cam) with EMS
5 = Synchronous text messaging with EMS
6 = Asynchronous text messaging with EMS

Facilitation Mode	N	Subset for alpha = .05		
N = 136		1	2	3
1	35	3.05714		
6	25	3.64000	3.64000	
5	15	3.80000	3.80000	
4	16		4.37500	
2	40		4.40000	
3	5		4.80000	
Sig.		.451	.055	

a Uses Harmonic Mean Sample Size = 14.193
b The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

TABLE 33
FACILITATOR, PARTICIPANT AND OBSERVER COMPOSITE RESULTS BOTTOM LINE AND ORGANIZATIONAL FACTOR EFFECTIVENESS BY MEETING VENUE

Constructs and Factors	Meeting Venue					
	Face to Face without EMS	With EMS				
1 = most effective 6 = least effective		Face to Face	Audio	Audio & Video	Synch Text	Asynch Text
Bottom line construct	6**	1*	5	2*	4	3
BL 1: Ability to reduce labor costs	6**	3	5	2	4	1
BL 2: Improved idea quality	5**	1*	3 (tie)	3 (tie)	4	2
BL 3: Improved meeting results quality	3	1*	5**	2*	4**	6**
BL 4: Higher participant satisfaction	3	1*	5**	2*	4	6**
Org 1: Geographically dispersed effectiveness (Participant and Observer)	6**	3	5	1	4	2
Org 1: Geographically dispersed effectiveness (Observer)	6**	2*	1*	3*	4	5

*significantly more effective for this factor/construct
**significantly less effective for this factor/construct

REFERENCES

Aiken, M. (1992) Using a Group Decision Support Systems as an Instructional Aid. An Exploratory Study. International Journal of Instructional Media. 19(4), 7-14.

Aiken, M., Martin, J. & Paolillo, J. (1994). Requisite Skills of Business School Graduates as Perceived by Senior Corporate Executives. Journal of Education for Business. 69(3).

Aiken, M. & C. B. Govindarajulu (Spring, 1995). Using a Group Support System for School-Based Decision Making. Education. 115(3), 420.

Becker, H. S. (2004). (2004). The Problems of Analysis. In Ragin, C. C., Nagel, J., White, P., Workshop on Scientific Foundations of Qualitative Research, National Science Foundation, p. 45-47.

Briggs, R. O. The Team Theory of Group Productivity and its Application to the Development and Testing of Electronic Group Support Technology. Unpublished Doctoral Dissertation, MIS Department, University of Arizona, Tucson, 1994.

Burdett, Jane. Changing Channels. Using the Electronic Meeting System to Increase Equity in Decision Making. (Fall, 2000). Information Technology, Learning and Performance Journal, 18(2).

Coleman D. & Channa R., ed. (1995) Groupware: Technologies and Applications. Chapter 6: Electronic Meeting Systems: Ten Years of Lessons Learned, by Nunamaker J., Briggs, R. and Mittleman, D. Prentice Hall Publishing, Upper Saddle River, NJ, 149-193.

Collier, D., Seawright, J. and Brady H. E. (2004). Qualitative Versus Quantitative: What Might this Distinction Mean? In Ragin, C. C., Nagel, J., White, P., Workshop on Scientific Foundations of Qualitative Research, National Science Foundation, pp. 71-76.

Creswell, J. W. (2009), Research Design Qualitative, Quantitative, and Mixed Methods Approaches, 3rd edition, Sage: Thousand Oaks.

Dennis, A. R., George, J. R; Jessup, L. M.: Nunamaker, J. F. & Vogel, D. R. (1988) Information Technology to Support Electronic Meetings, MIS Quarterly, 12(4), 591-624.

DeSanctis, G. & Gallupe, R. B. (1987), A foundation for the Study of Group Decision Support Systems, Management Science, 33(5), 589-609.

DeSanctis, G., & Poole, M. S. (1993), Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. Organizational Science.

Flick, U. (2006). An Introduction to Qualitative Research, 3rd ed. Sage: Thousand Oaks.

Fulk, J., Schmitz, J. & Steinfield, C. (1990). A Social Influence Model of Technology Use. In J. Fulk & C. Steinfield (Eds.). Organizations and Communication Technology. Sage: Newbury Park, CA. 117-140.

Johnson, R. B. & Christenson, L. (2005) Educational Research: Quantitative, Qualitative, and Mixed Methods; www.southalabama.edu/coe/bset/johnson/dr_johnson/2textbook.htm

Kraemer, K. L. & King, J. L. (1988). Computer-Based Systems for Cooperative Work and Group Decision Making. ACM Computing Surveys. 20(2), 115-146.

McAlister Kizzier, D.L. Effectiveness of Six Electronic Meeting Systems: Perspectives from Qualitative Methods of Inquiry, refereed track, <u>Federated Business Disciplines/Organizational Systems Research Association Proceedings</u>, Oklahoma City, March, 2006, at www.osra.org

McAlister Kizzier, D.L. Empirical Comparison of the Effectiveness of Face-to-Face, Teleconferenced and Web-Facilitated Meetings, <u>Refereed research track proceedings, 23rd Annual Organizational Systems Research Association (OSRA) Conference</u>, Pittsburgh, Pennsylvania, February 4, 2004, at www.osra.org

McAlister Kizzier, D.L., Hunt, C.S. & Regan, E.A. Using Collaborative Technologies for Graduate Information Systems Program Planning, <u>Refereed Research Track Proceedings, 21st Annual Organizational Systems Research Association Conference</u>, St. Louis, Missouri, February 22, 2002, at www.osra.org

Nunamaker, Jay F., Jr., Roger O. Briggs, Daniel D. Mittleman, Douglas R. Vogel (1997), Lessons from a Dozen Years of Group Support Systems Research: a discussion of lab and field findings. http://mies.cs.depaul.edu/research/JMIS.html

Poole, M. S. & DeSanctis, G. (1990). Understanding the use of group decision support systems: the theory of adaptive structuration. In J. Fulk & C. Steinfield (Eds.). <u>Organization and Communication Technology</u>. Sage: Newbury Park, CA Sage. 173-193.

Ragin, C. (2004). Combining qualitative and quantitative research. In Ragin, C. C., Nagel, J., White, P., <u>Workshop on Scientific Foundations of Qualitative Research, National Science Foundation</u>, p. 109-115.

Short, J. E., Williams, E., & Christie, B. (1976). <u>The Social Psychology of Communications</u>. London: Wiley.