Collaborative Systems Effectiveness Studies at Morehead State

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Introduction

For the last seven years, Dr. Donna McAlister Kizzier, a professor at Morehead State University, has been conducting a comprehensive study to guide decision making regarding the effective use of Collaborative Systems (CS). Collaborative systems are also called electronic meeting systems, groupware, group support systems, or group decision support systems.

Research on collaborative systems during the last two decades has concluded that the use of collaborative systems 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 CS include accomplishment of more in less time, imposition of effective structure, increased participation, and automatic comment and vote recording. Meetings enhanced with CS improve group satisfaction and enable larger groups to meet, thereby enhancing decision making (Aiken & Govindarajulu, 1995). Burdett (2000) concluded CS has the potential to overcome barriers to women's equal participation in mixed gender meetings and to equalize power and diversity issues, thereby increasing satisfaction and effectiveness for diverse groups.

Previous research by McAlister-Kizzier (2002, 2004, 2006) extracted six constructs from CS 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.

The model used to guide the long term studies being conducted by Dr. Kizzier at Morehead State University 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 1

LESSONS LEARNED FROM COLLABORATIVE SYSTEMS RESEARCH

Construct 1: Problem solving/decision making *CS 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 *CS 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 C*S 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 C*S 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 *CS 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 in Business Process Re-engineering projects.

Construct 6: Organizational Issues
To enhance the success of CS –

- 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 geographically dispersed sites

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, CS (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, reflecting individual efforts that require no coordination. Level two is the coordinated work level, reflecting work that requires careful coordination between otherwise independent individual efforts. Finally, the concerted, or group dynamics, work level requires continuous concerted effort. Current CS, 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 factors such as waiting to speak, domination, fear of speaking, misunderstanding, inattention, lack of focus, inadequate criteria, premature decisions, missing information, digressions, distractions, groupthink, ignored alternatives, poor problem understanding, poor planning, lack of consensus, hidden agendas, conflict, inadequate resources, 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 same-time, same-place meetings using face to face facilitation. Developments in CS/groupware meeting technology (especially web-based CS) have enabled different-place, different-time electronic meetings to take place. Facilitators must continually learn how to achieve optimum meeting effectiveness across the globe with diverse work teams located in different time zones. A creative facilitator can tap many new collaborative tools to help achieve highly effective collaborative meeting outcomes. 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. It is hopeful this blog can enhance communications between researchers and practitioners to help improve meetings worldwide.

Research Methods

The study results to be shared in future blogs form Dr Kizzier will in highly condensed form with clear reference to the journal articles in which the work has been published. This research used a mixed methodology, incorporating quantitative and qualitative methods to triangulate results. The research methods used for this study are powerful and use the latest methods and tools. Among other research methods experts, Collier et al. (2003, p.74) posit that by combining qualitative and quantitative methods in creative ways, better research can result. Data is continually collected and analyzed in this study. As of this date, quantitative and qualitative data have been analyzed from 487 participants, 124 facilitators & 126 observers.

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 and creativity 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. Table 1 summarizes the facilitation modes studied to date. More meeting modes will be added as technology advances and creative combinations are discovered.

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

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. In addition, qualitative input was collected from each facilitator, participant and observer, based on the validated factors and constructs. 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 across the globe using technology.

TABLE 1

STUDY PARTICIPANTS SUMMARY

COLLABORATIVE SYSTEMS (CS) RESEARCH
FACILITATION MODE BY PARTICIPANT TYPE
(N = 737, 9/09)

	Face to Face without CS	Face to Face with CS	Telecon-ference (audio) with CS	Web Cam (audio and video) with CS	Asynch-ronous Web With CS	Synch-ronous Web With CS	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

The study empirically analyzed 26 validated factors clustered under 6 constructs to compare the effectiveness of the six meeting venues found in Table 1: face to face without Collaborative Systems (CS), face to face with CS; audio with CS; audio and video with CS; asynchronous text with CS and synchronous text with CS. The primary theoretical underpinning for the study is based on McAlister-Kizzier et al. constructs (2002, 2004, 2006) and Briggs Groupware Grid (1994). The qualitative comments are concurrently being analyzed. 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, with additional literature review conducted continuously.

Research Questions

The 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?

Expected Outcomes

Conversations with practicing facilitators via this blog and at national and international forums will help inform the development and refinement of the model, designed to help facilitators conduct the most effective meetings possible, whether in the same room or scattered across the globe in different time zones. This research was partially supported by Morehead State University via a research fellowship and a research sabbatical; the research is being conducted independent from support by any organization who sells the technology being studied. Dr. Kizzier can be reached at kizzier1234@earthlink.net or d.kizzier@moreheadstate.edu.

Selected 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, Federated Business Disciplines/Organizational Systems Research Association Proceedings, 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, Refereed research track proceedings, 23rd Annual Organizational Systems Research Association (OSRA) Conference, 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, Refereed Research Track Proceedings, 21st Annual Organizational Systems Research Association Conference, 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.). Organization and Communication Technology. Sage: Newbury Park, CA Sage. 173-193.

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

Short, J. E., Williams, E., & Christie, B. (1976). The Social Psychology of Communications. London:

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