Learning From Group Support System Use: Potential Changes in Subsequent Meeting Behavior

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ABSTRACT
This study utilized a cross-sectional survey design to compare the differences between Group Support System(GSS)-influenced manual meetings and non-GSS manual meetings. The research employed a quasi-experimental field study. The responses of GSS participants of a TeamFocus facility were compared to a control group who had not been exposed to the technology. Perceptual quantitative data on five composite meeting behaviors and other moderator and control variables were collected through surveys. Individual interviews were held to triangulate the survey data and add depth to the assessment of group differences. Measures of meeting behaviors were based on individual-level recall and attitudinal data. The data was used to test five hypotheses about GSS applied behaviors. Results showed that the two groups were different and that the GSS group rated their subsequent non-GSS meetings as more productive and satisfying than those of the control group.

1.0 Introduction
Group meetings are intended to accelerate decision processes by creating situations where the rate of information exchange among the participants is higher than that which occurs among the individuals outside the meeting. Yet most conventional meetings are not as productive or effective as they could be [5]. Meeting requirements are changing to adapt to new organizational structures. Individuals must apply new techniques and learn new collaboration behaviors for the organizational changes to be effective. Group Support Systems (GSSs) may provide a unique basis to apply systems that can proactively change not only the nature of meetings but the overall organizational design.

The intent of this research is to examine in what ways and to what degrees do exposures to GSSs affect subsequent manual meetings of the exposed group. Do participants "learn" meeting planning and participation behaviors from the structure and process contributed by GSSs and do they apply these behaviors in subsequent non-GSS meetings? Because meetings occupy a significant amount of organizational resources yet are perceived to be mostly unproductive, it would seem that improving the effectiveness of meetings and elevating the threshold of individual and organizational learning would lead to positive and lasting organizational productivity gains.

2.0 Prior Research
A GSS meeting represents a unique opportunity to study both behavior modification and organizational productivity. As a potential group process intervention technique, a GSS meeting provides structure, memory, and feedback elements not typically associated with traditional meetings. As a learning environment, a GSS meeting provides for an intensive group experience, where information exchange is taking place using a highly visual medium and the participants are cognitively engaged. These two areas will be briefly reviewed below.

2.1 Group Process
Meetings can be viewed as an application of group development and process. Groups have long been used as behavior-modification and learning devices in social psychology [38]. GSSs, by their very nature, change the traditional meeting process.

Important elements in small group research and learning theory through intervention are the concepts of feedback and reinforcement. The term feedback was originally coined by the physicist, Weiner [49], who defined it as the alteration of a system's input via its own output, by means of a closed system feedback loop. Weiner conceptualized learning itself as primarily a feedback phenomenon. The impact or nature of the feedback provided in a GSS meeting could be included in the theoretical mechanism identified as "process support" that facilitates communication among members [19].

While most meetings are predominantly verbal communication processes, GSSs add the visual and cognitive stimuli not typically associated with day-to-day meetings. According to Bandura's[2] social learning theory, learners must be "mindful" during the learning process, that is, they must be motivated to take the
opportunities presented to them and to be cognitively engaged. Traditional or conventional meetings (non-GSS) do not lend themselves as particularly effective learning environments. Traditional meetings are typically highly verbal and make it difficult for the participants to become "cognitively engaged". Bandura proposes that attention, feedback, memory, motoric reproduction, and reinforcement are basic requirements to behavior change and learning.

2.2 Learning

This study focuses on GSSs as agents or enablers of the learning process. Huber [34] states:

An entity learns if, through its processing of information, the range of its potential behaviors is changed. (p. 89)

The use of GSSs in meetings may ultimately lead to a wider range of potential behaviors. An organization benefits or becomes more intelligent if any of its units or members acquires knowledge that it recognizes as potentially useful to the organization [34].

3.0 Research Model

The theoretical basis of this study, that productive use of a GSS can lead to behavior changes that improve subsequent meetings, is drawn from Huber's general theory of the effects of computer-assisted communication and decision-aiding technologies on organizational design, intelligence, and decision making [33]. Huber's general theory of the effects of advanced information technology is applied to the context of GSS to develop a conceptual theory of the effects of Group Support Systems on an organization's nature and decisions [35]. The conceptual diagram of the revised GSS effects theory is shown in Figure 1. The hypotheses for this study are indicated by circles and are applied to the appropriate concept. The following discussion will apply the GSS effects theory to the specific context of this research. The discussion draws heavily from the Huber, Valacich, and Jessup presentation of the GSS effects theory [35], Huber's description of the more general information technology effects theory [33], and the Nunamaker et al. presentation of the concept of process gains and losses [42].

3.1 The Hypotheses

Process structure has been used for two decades by non-GSS groups to reduce process losses, although many
researchers have reported that groups do not follow the process structuring rules properly [32,36]. Process structuring may be global to the meeting, such as developing and following an agenda, thereby reducing process losses due to coordination problems and meeting digression. Most organizational members have probably had little or no training in the area of meeting planning, participation, intervention, or group development. This observation is shared by Watson et al. [48] and Bostrom et al. [4].

A variety of group dynamics interventions using procedural structures to make meeting processes more effective have been investigated. Brainstorming, nominal group and the delphi techniques are popular and effective procedural approaches. Bostrom et al. [4] reviewed several studies that utilized a variety of intervention techniques. They concluded that applying structured procedures produces better results than normal group interaction and that more-structured interventions are generally superior to less-structured or naturally occurring group interaction. However, the results from seven studies of structure are somewhat mixed.

The GSS medium itself offers extended input/output capabilities to the individual which provides for a better and more equitable method of participation. The systems, or through the aid of a facilitator, emphasize the structure and format of a meeting, establish a sense of discipline which encourage participants to "get something accomplished" and "stay on track", and move the group toward closure [37,40]. The GSS features which add memory, accessibility, and processing functions increase structure awareness and may contribute positively to overall structure support. The information processing functions can be used to reduce the process loss caused so frequently by digression and lack of focus. The system also creates an electronic record of meeting communications, decisions and data exchanges. This leads to the first hypothesis:

**H1. Individuals who have participated in a GSS meeting will report their subsequent meetings to have more structure than individuals who have not used a GSS.**

Giving naturally reticent individuals an opportunity to participate can neutralize dominating meeting participants who exercise undue influence or monopolize the group's time in an unproductive manner. In addition, the use of a GSS may reduce the process loss associated with conformance resulting from fear of reprisal or politeness. Increased involvement and understanding provides a stronger base for participation in subsequent meetings. This leads to the second hypothesis:

**H2. Individuals who have attended a GSS meeting will report that attendees participate more effectively in subsequent meetings than individuals who have not used a GSS.**

Evaluation apprehension may cause traditional meeting participants to withhold their ideas in fear of negative evaluation or later consequence [22]. The electronic channel may provide some degree of protection for these individuals. Anonymity may reduce the pressure to conform and evaluation apprehension, but may also increase free riding or cognitive loafing [1]. Anonymity may contribute to a more objective evaluation by exposing new issues, encouraging electronic debate and exploring issues in more detail [9,31,46,53]. A number of studies indicate that GSS enable face-to-face participants to communicate more effectively [18,26,44].

The anonymity feature may contribute to more open communication during the GSS meeting process. However, much of the research indicates that the perceived effectiveness of GSSs is technology-dependent and the number of negative effects of GSS use are as numerous as positive effects [28,45]. Without the technology available, it may be impossible to capture and apply the same concepts in a manual meeting. In the Grohowski study, one manager concluded that the meeting could not have been conducted manually and that anonymity allowed the meeting to be conducted productively [31, p.377]. This leads to the third hypothesis:

**H3. Individuals who have participated in a GSS meeting will not score significantly differently on the openness of communications in subsequent meetings than individuals who have not attended a GSS meeting.**

Huber et al. argue that GSS use leads to more effective information sharing within meetings [35]. This suggests that individual GSS-supported meetings would be shorter, fewer meetings would be required to deal with any particular issue, or the meetings would be more productive. They posit that a GSS facilitates rapid identification of problems and opportunities, potentially fewer intermediate nodes in the organizational network, and fewer levels involved in authorizing proposed organizational actions. It follows that GSS use may result in less time being absorbed by decision-related meetings.

The ineffective use of time within meetings has much to do with the serial nature of oral communications. Production blocking occurs when only one participant can communicate at once [15].

The GSS studies of parallelism and its affect on production blocking have been consistent. Most suggest that the ability to work in parallel is a significant benefit that accounts for much of the success of GSS technology [15,17]. This is supported by evidence from field observations [24,25]. Assuming that participants in
subsequent manual meetings can adapt or develop mechanisms to reduce the effects of production blocking, this leads to the fourth hypothesis:

**H4. Individuals who have participated in a GSS meeting will report that subsequent meetings have less production blocking than those reported by individuals who have not used a GSS.**

There has been a significant amount of empirical research that indicates that GSS meetings are considered more effective and more satisfying to the participants [11,24,39,48]. It has been shown that GSSs can accelerate the consensus process [52]. The GSS session is also different from the traditional meeting environment. The change alone from the typical meeting setting and environment should change the way the participants feel about the meeting. GSS use may lead to a higher quality decision making process which is more satisfying to the participants.

While experimental research results in the GSS area can be described as "mixed," empirical field research to date has concluded that GSS and non-GSS meetings are different and that GSS meetings are probably more satisfying to the participants [11,13,16,27,51]. High satisfaction levels with the GSS meeting may also lead to continued or future GSS use. This leads to the final hypothesis:

**H5. Individuals who have participated in a GSS meeting will report they are more satisfied with subsequent meetings than those reported by individuals who have not used a GSS.**

Meeting outcomes are contingent upon the balance of process gains and losses [9]. Situational characteristics such as group, task, size, and context establish an initial balance, which the group may alter by using a GSS. Assuming that a traditional (non-GSS) meeting is the standard, the overall net effect of applying a GSS to the meeting process should be positive.

In general, most of the field studies reported that use of a GSS improved group performance, enhanced satisfaction, and had a positive impact on group behavior [12,20,47]. These field studies, and other GSS experimental research, consistently reveal that four general features of the systems helped achieve these results: 1) group memory, 2) anonymity, 3) parallelism, and 4) media effects [8,14,42,43]. These features contribute positively to the meeting process by either increasing a process gain or reducing a process loss.

Extracting the constructs associated with each of the stated hypotheses and considering the net effect of the process gains and losses associated with those constructs yields the research model for this study. The model, depicted in Figure 2, shows the relative impact of the GSS process on each of the five constructs. The primary variables of interest in this study include participation, communication, structure, production blocking, and satisfaction. In subsequent meetings, structure, participation, and satisfaction should benefit from GSS-imposed process gains. Communication may be difficult to enhance without the technology and production blocking should be reduced by the GSS.

![Figure 2: The Research Model](image)

### 4.0 Research Methodology

This field study utilized a quasi-experimental, cross-sectional survey design to compare the perceived attitudinal differences between non-GSS meetings from two different groups, one which has been exposed to GSSs for meetings and one which has not. Campbell and Stanley refer to this type of quasi-experimental technique as a "static-group comparison" [6]. The study will test the perceived productivity of and satisfaction with the non-GSS meetings of both groups. The GSS exposure for the GSS group is, in effect, the treatment condition.

#### 4.1 Variables

GSS-meeting participants were compared on five composite variables with a similar control group. The composite dependent variables include structure, participation, communication, production blocking, and satisfaction. Attitudinal quantitative data on meeting behaviors and other moderator and control variables were collected through surveys. Individual interviews were held to triangulate the survey data, to provide control data, and to add depth to the assessment of behavior change. Measures of meeting behaviors were based on individual-level recall and attitudinal data. This study is concerned primarily with behaviors which may be changed to
improve the process and satisfaction of subsequent meetings. Variables that have been used in other GSS studies, such as task, technology and group size [3] were controlled or moderated.

4.2 Sample and Sample Procedures
A clustered, convenience sample (the GSS group) of the population of Boulder TeamFocus attendees was used in this study. The survey was distributed to the selected participants of six companies on behalf of the TeamFocus Director and the University of Colorado as a joint research program. The survey was anonymously returned to a single contact within the organization who then returned the completed surveys to the Director.

The control group was identified based on the need to have similar characteristics to the GSS group with the exception of exposure to GSSs (the independent variable). The control group was identified through personal contacts by the author and the final sample population represented four companies. The sample group consisted of participants who had not used GSS technology for their meetings or decision processes. It was also important that the control group not have a great deal of experience with electronic support for group processes. The control group also represented a clustered, convenience sample rather than a pure random sample, but companies and individuals were enlisted who were similar to the GSS group in size, location and demographics. A total of 270 surveys were distributed. GSS group surveys were sent to 170 TeamFocus participants under the administration of the Director of the TeamFocus facility. Control group surveys were distributed to 100 individuals from four different companies. An overall study response rate of 56% was attained. Because the survey was administered by Tascor it was difficult to track non-response.

4.3 Instrumentation
The variables were operationalized in an instrument derived from several instruments used within GSS research on organizational impacts and the comparison of GSS to manual groups [7,15,21,29,30,48]. In particular, the constructs of satisfaction, production blocking, free riding, and evaluation apprehension were used by Dennis and Valacich [15]. The production blocking measure was used earlier in Diehl and Strobe [22]. The instrument was pre-tested with three different groups in several phases for content clarity, construct validity and face validity. The control group survey was the same as that used for the test group. GSS use and meeting experience data were used to moderate or control the responses.

To assess the accuracy of variable category groupings within the instrument, exploratory factor analysis was used. A five-factor solution produced the best results and verified the initial factor loadings. The initial categorical variables produced adequate reliability scores. The final reliability measures are presented in Table 1.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Variables</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>A2,5,9,19,26,32</td>
<td>.73</td>
</tr>
<tr>
<td>Participation</td>
<td>A1,4,13,16,22,33,34</td>
<td>.71</td>
</tr>
<tr>
<td>Communication</td>
<td>A6,10,21,24,25,27,30,35</td>
<td>.80</td>
</tr>
<tr>
<td>Production</td>
<td>A3,11,12,14,17,20,29</td>
<td>.78</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>A7,8,15,18,23,28,31</td>
<td>.84</td>
</tr>
</tbody>
</table>

5.0 Results
The survey requested information from the participants regarding their employment history, meeting experiences and computer skills. The GSS and control groups were similar in that the participants in both groups have substantial lengths of service with their respective organizations and little knowledge of formal group process (Comparing the two groups on length of service showed a statistically significant difference (t=-2.6, p<0.05). The difference between the two groups on the formal group process knowledge variable is statistically significant (t=-3.9, p < 0.001)). Each of these differences however, was considered to be minor considering the high average length of service and the relative lack of formal group process for each of the groups. Participants in both groups attend meetings at least weekly, are similarly skilled with computers, have virtually no experience with (or don't use) any type of formal group technique, and do not use a GSS routinely.

The survey also requested information from the GSS participants about their GSS experience. The majority have used the system minimally, within the last year and attended as a participant rather than as an initiator or a planner. The majority felt they had adequate skills to use the system and felt that the pre-session training was sufficient. The sessions were used by the GSS participants primarily for decision-making and idea-generating tasks [41].

5.1 Tests of Hypotheses to Group Means
The following section presents the results of the statistical analyses related to group means. A table of results for all hypotheses is shown in Table 2. T-tests were used to test the differences between the pooled means of the two groups. Two basic assumptions underlying use of t-tests are the same as for ANOVA, i.e., normal distribution of population scores and equality of population variances [23]. The sampling procedures and sample sizes make these two assumptions reasonable for this study. The t-test results determined that the variances were not unequal so the assumptions for ANOVA were
met. The mean scores are based on a 7-point Likert scale where 1=low (strongly disagree with the statement) and 7=high (strongly agree with the statement). The F statistic, which compares the variances, was run for each t-test. The results are shown with each hypothesis and illustrated in Table 2.

**Hypothesis Related to Meeting Structure (H1)**

The t-test results for H1 (t-value = -2.21 (dof = 148) one-tail prob. = .014) determined that the pooled variance estimate was found to be significant (p < 0.05). This indicates that the GSS group participants perceive there to be more structure in their meetings (non-GSS) than the control group and the perceived difference is statistically significant. This finding is consistent with the stated hypothesis. There are several contributing explanations for this finding. First, use of the system requires pre-planning and forces the meeting initiator to develop a meeting plan and an agenda, to consider who should attend and to get those parties involved in the process. Second, the GSS preserves the group intellectual process through group memory. This, together with proper facilitation, helps keep the meeting on track and pushes the group toward closure. Third, the majority of the control group participants in this study stated that they had either never heard of or do not use any formal structured group technique; consider themselves to be below average in their knowledge of meeting procedures; and consider themselves to be below average meeting managers. While the GSS group scored only slightly higher in these categories, maybe the exposure to the structured environment that a GSS imposes had enough of an impact to elevate their awareness of the importance of meeting structure.

**Hypothesis Related to Meeting Participation (H2)**

The t-test results for H2 (t-value = -5.82 (dof = 148) one-tail prob. = .000) determined that the pooled variance estimate was found to be significant (p < 0.001). This indicates that the GSS group participants perceive that meeting attendees participate more effectively than the control group participants and the perceived difference is statistically significant. This finding is consistent with the stated hypothesis. The results of this test indicate that there was indeed a net process gain by utilizing the GSS. The support of this hypothesis can possibly be attributed to the participation skills attained during the GSS meeting. The quantitative data analysis indicated and the interviews confirmed that individuals can "learn" participation skills. Neither group indicated strongly that one participant can communicate at once. It can occur for a variety of reasons including but not limited to channel domination, idea suppression, insufficient time, evaluation apprehension, cognitive loafing, or information overload.

**Hypothesis Related to Meeting Communication (H3)**

The t-test results for H3 (t-value = -6.40 (dof = 148) one-tail prob. = .000) determined that the pooled variance estimate was found to be significant (p < 0.001). This indicates that the GSS group participants perceive that meeting attendees communicate more effectively than the control group participants and the perceived difference is statistically significant. This finding is consistent with the stated hypothesis. The GSS group rated the openness of communication in their non-GSS meeting higher than their control group counterparts. The results were surprising from two standpoints; the mean score for the communication construct was the highest of all five dependent composite variables and the difference between the two groups on the communication measure was the largest of all five comparisons. Based on the process gains and losses analysis, a GSS meeting should provide for a net process gain for the communication elements of a GSS meeting. However, the hypothesis that the GSS group would not score significantly different than the control group was based on the fact that there would be a certain dependency on the capabilities of the system that enable anonymous and parallel communication, and that these capabilities would be difficult to replicate in a manual meeting [31]. What was not anticipated was the apparent impact that this capability has on people's abilities to express themselves and the cohesion of the group.

**Hypothesis Related to Production Blocking (H4)**

The t-test results for H4 (t-value = -2.55 (dof = 148) one-tail prob. = .006) determined that the pooled variance estimate was found to be significant (p < 0.01). This indicates that the GSS group participants perceive that meeting attendees have reduced production blocking than the control group participants and the perceived difference is statistically significant. This finding is consistent with the stated hypothesis.

Production blocking occurs in meetings when only one participant can communicate at once. It can occur for a variety of reasons including but not limited to channel domination, idea suppression, insufficient time, evaluation apprehension, cognitive loafing, or information overload.
Table 2: Group Differences For All Hypotheses

<table>
<thead>
<tr>
<th>Hypothesis Related to Meeting Structure.</th>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>STD DEV</th>
<th>STD Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Hypothesis related to meeting structure. (t-val. = -2.21, df = 148; one-tail prob. = .014)**</td>
<td>GSS</td>
<td>80</td>
<td>3.75</td>
<td>.99</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>70</td>
<td>3.40</td>
<td>.93</td>
<td>.11</td>
</tr>
<tr>
<td>H2: Hypothesis related to meeting participation. (t-val. = 3.58, df = 148; one-tail prob. = .000)**</td>
<td>GSS</td>
<td>80</td>
<td>3.55</td>
<td>.79</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>70</td>
<td>2.80</td>
<td>.77</td>
<td>.09</td>
</tr>
<tr>
<td>H3: Hypothesis related to meeting communication. (t-val. = -6.40, df = 148; one-tail prob. = .000)**</td>
<td>GSS</td>
<td>80</td>
<td>4.62</td>
<td>.82</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>70</td>
<td>3.70</td>
<td>.94</td>
<td>.11</td>
</tr>
<tr>
<td>H4: Hypothesis related to production blocking. (t-val. = -3.55, df = 148; one-tail prob. = .006)**</td>
<td>GSS</td>
<td>80</td>
<td>3.96</td>
<td>.87</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>70</td>
<td>3.58</td>
<td>.98</td>
<td>.12</td>
</tr>
<tr>
<td>H5: Hypothesis related to meeting satisfaction. (t-val. = 3.98, df = 148; one-tail prob. = .000)**</td>
<td>GSS</td>
<td>80</td>
<td>3.33</td>
<td>.97</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>70</td>
<td>3.31</td>
<td>.97</td>
<td>.12</td>
</tr>
</tbody>
</table>

** p < 0.05, *** p < 0.01

Individuals who are interacting with others in meetings divide their attention among a number of activities. At times individuals become mentally diverted or attend primarily to the responses which they themselves are emitting; at other times individuals are attending to the responses of others. Either the participant does not get a chance or does not take the chance to speak. When this happens, almost every process gain and loss is impacted. There is very little feedback, ideas are not generated, discussed, or refined, and there is less information for the group to work with. Once again, the GSS participants experienced the process gain associated with the parallel communication and group memory aspects of the GSS technology. An indirect benefit was noted that this also created a situation where the meetings took less time. This supports Huber et al.'s proposition that GSSs will reduce the amount of time spent in meetings or make the time spent more productive [35].

Hypothesis Related to Meeting Satisfaction (H5)

The t-test results for H5 (t-value = -3.98 (df = 148) one-tail prob. = .000) determined that the pooled variance estimate was found to be significant (p < 0.001). This indicates that the GSS participants perceive that meeting attendees are more satisfied with the meeting process than the control group participants and the perceived difference is statistically significant. This finding is consistent with the stated hypothesis. The GSS group was more satisfied with their manual meetings than the members of the test group. The potential process losses of free riding and depersonalization are far outweighed by the GSS contributions to overall satisfaction. This supports other field research which has concluded that GSS and non-GSS meetings are different and that GSS meetings are probably more satisfying to the participants [16]. In addition, the interview process revealed several specific reasons for the higher level of satisfaction. One individual stated that the process fit his personality style better. He was more satisfied with the experience because he felt that he had a say in the outcome. Another mentioned that it was a good reminder of how effective and productive the group could be. A third indicated that the group was more committed to the outcome because he felt there was more "buy-in" to the group consensus. The satisfaction score was also influenced by the cohesion and communication elements discussed earlier.

However, the satisfaction levels seem to be highly dependent on a variable not specifically tested in this study. Several interviewees mentioned that their (within-group) meetings had improved but many organizational meetings had not. Meetings that the participants knew in advance would be a waste of team generally were associated with leadership. Several suggested that it was because not everyone had been through a TeamFocus meeting and if they had, the meetings would improve.

5.2 Within-group Comparisons

While the descriptive statistics on the control variables indicated that the two sample groups (GSS and control) were similar, a within-group analysis was performed on the five dependent variables. The analysis on the groups indicates a relatively high degree of homogeneity within each group and similarity between the groups on other than the dependent variables.

6.0 Discussion of Results

The research results indicate that the two groups are indeed different and that the GSS group rated their subsequent day-to-day meetings higher than the control group on all dependent composite measures. These results were not surprising based on theoretical and empirical research support. However, the manual meetings were still not seen as particularly effective or satisfying to the participants. The highest mean score for any of the dependent variables - structure, participation,
communication, production, or satisfaction - was that of communication at 4.62 on a 7-point scale. However, it does appear that the GSS experience had a positive impact on the GSS group and that the group applied behaviors and skills during their subsequent meetings that could be attributed to the GSS session(s).

6.2 Limitations
The results of this research have indicated that the GSS group rated their manual meetings higher than the control group. While these differences could be attributed to other unknown exogenous variables, an attempt was made to control for many of the known variables. If the results can be attributed to the GSS experience, then it is reasonable to also assume that the GSS experience was a net process gain and an appropriate setting to facilitate learning new meeting behaviors.

A quasi-experiment using field survey techniques has several disadvantages associated with it. Threats to internal validity, a lack of control, minimal randomization, and greater noise may limit overall generalizability. In addition, a static-group comparison makes it difficult to support equivalence between the groups. However, even in light of these obstacles, field research plays an important role in both theory testing and building [50,51].

This research specifically dealt with the GSS technology promoted by TeamFocus. There are other GSSs available that use different approaches to meeting support. It is important to note that, as more is learned about the effects of GSSs and groupware, it may be found that differences among technologies can result in important differences in their effects. The experience of participants who have used other GSS technologies was outside the scope of this research. GSSs and groupware are evolving rapidly. A portable system applied to the meeting setting on-site may yield completely different results.

6.2 Implications
The concept of the preservation of group memory is an important element to the GSS as an agent of change. Cognitive deficiencies of human memory, personnel turnover, information overload, lack of knowledge of the existence of or location of data, and other such factors are often suggested as limiting the effectiveness of group memories [10]. When organizational members, due to such limitations or specialization of duties, "do not know what they know" [34], organizational and individual learning is retarded. Thus for any organization and its members, learning is a primary goal to more effectively process information, and group memory is a primary tool for such learning.

The research provided an early test of the applicability of GSS effects theory in an organizational context. This research was one of the first quasi-experimental field studies to evaluate post-GSS impacts. While the intent was not to investigate the motivation of GSS meeting participants per se, the very fact that a GSS meeting is an information intensive activity constitutes a good opportunity for learning. The results of this study seem to indicate that the GSS sessions provided an environment which allowed the participants to practice overt behaviors which were somehow reinforced. This series of learning activities may lead to relatively permanent change. It may prove that the proactive application of GSSs in particular and other technologies in general, even on a limited or temporary basis could be prescriptive mechanisms for behavior change. Even small gains in meeting productivity would pay large dividends for most organizations.

REFERENCES


[9] Connolly, T., L. Jessup, and J. Valacich, "Effects of Anonymity and Evaluative Tone on Idea Generation in


