

Comment Distribution in Electronic Poolwriting and Gallery Writing Meetings

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ABSTRACT

Two types of electronic brainwriting are used typically in Group Support Systems research: poolwriting and gallery writing. While a large number of academic studies have used the former technique, the latter is more efficient and effective, but has been used less frequently. This paper describes these two group idea generation techniques and discusses prior comparison studies. An experiment using the two brainwriting techniques shows that subjects were more satisfied with and preferred gallery writing. In addition, subjects using poolwriting were able to see only about 50% of the comments generated in the electronic meeting, while gallery writing subjects were able to view all comments.

INTRODUCTION

Much research has shown how groups in electronic meetings can participate more, save more time, and be more satisfied than groups in traditional, verbal meetings (McLeod, 1992). A major factor often not addressed in studies of Group Support Systems (GSS), however, is the nature of the technology used (Benbasat & Lim, 1993). A different electronic meeting technique or an improvement in the computer technology itself can change experimental results. For example, researchers found in a comparison of two GSS tools that subjects using one produced better quality solutions, but subjects using the other produced more unique alternatives (Easton, et al., 1990).

Many studies of GSS have been based upon "electronic brainstorming" using electronic poolwriting (Pervan, 1998), and leading GSS researchers have published electronic poolwriting studies in highly-respected journals (e.g., Dennis, et al., 1999; Dennis & Valacich, 1993; Dennis, et al., 1997; Dennis, et al., 1996; Kahai, et al., 1998; Reinig, et al., 1998). Several million people in more than 1,500 organizations have used GSS in meetings throughout the world (Briggs, et al., 1998), and electronic poolwriting has been used in many of these meetings. However, a superior technique called electronic gallery

writing is used less often. This paper shows how groups can experience greater efficiency, effectiveness, and satisfaction using this alternative.

The objective of this paper is to compare two, competing electronic brainwriting techniques. The paper describes poolwriting and gallery writing, reviews prior comparison studies, and presents a new experiment that assessed group members' opinions of the two group idea generation tools and tracked the number of comments available for viewing by each participant. The outcomes support prior studies' results that showed electronic gallery writing is superior in the opinion of meeting participants (Aiken, 1997; Aiken, et al., 1997, Aiken & Vanjani, 1996). Further, the experiment shows that for a group of six people using electronic poolwriting for 10 minutes, only about half of the comments written were available for viewing by each, on average, while all were available to group members using electronic gallery writing, a wide divergence in comment distributions.

BACKGROUND

Electronic Poolwriting

In the brainwriting pool or individual poolwriting technique, group members individually (Geschka, 1980; Geschka, et al., 1981; VanGundy, 1992):

1. Write down ideas about the problem on a sheet of paper.
2. Place their sheets in the center of the table (a pool of papers) and exchange it for another one.
3. Read the ideas on the new sheet and use them to stimulate new ideas.
4. Write down any new ideas on the sheet and exchange it for a new sheet from the pool when they need additional stimulation.
5. Continue writing down ideas and exchanging sheets for the duration of the meeting.

Since the comments on the papers are not signed, much anonymity is preserved, reducing participants' inhibitions. All group members can write comments at the same time on their individual papers, and all ideas are permanently recorded.

Electronic individual poolwriting, or simply, electronic poolwriting (EPW), is based upon the manual technique. The electronic version of the technique simply substitutes disk files for pieces of paper. A group of N people at computer terminals exchange typed comments on N+1 files. Comments are almost totally anonymous, ideas are recorded, and the group can communicate in parallel.

GroupSystems[™], a product of Ventana Corporation (recently renamed GroupSystems.com), is used by many corporations and universities throughout the world for electronic meetings. One of the programs in this suite of tools, *Electronic Brainstorming* (EBS), is used frequently in GSS research and is based upon electronic poolwriting (Gallupe & Cooper,

1993; Kahai, et al., 1997; Martz, et al., 1992; TeamFocus, 1993). Although called electronic brainstorming, the technique is actually a type of brainwriting, as brainstorming is used to refer to oral generation of ideas by a group, and brainwriting refers to group methods that generate ideas in writing or typing (VanGundy, 1992).

The advantage of EPW is that a large number of comments can be written over the course of the meeting because each participant is required to write a comment in his or her file before exchanging it with the spare file. The disadvantage is that group members are unable to see all of the comments over the course of meeting, although they may see a complete, printed transcript afterwards (Herniter & Gargeya, 1995). Researchers have noted this problem in several EBS meetings (Vogel & Nunamaker, 1990):

Experience with use of electronic brainstorming, including monitoring of file use, suggests that periods of extreme non-randomness can occur in file interchange between group members. As such, a group member may not see all of the files during a session and/or may see a small group of files an abnormally high percentage of the time.

Another disadvantage is that, at any one time, each group member sees a completely different subset of comments in his or her file. If someone starts laughing or remarks orally about a comment, nobody else in the group knows what the person is looking at, leading to some frustration.

One way to mitigate the limitations of EPW is to show comments as they are generated on a projection screen at the front of the room. However, participants may be too busy looking at their screens or typing new comments to notice what is being shown on the projection screen (thus, missing the comment). In addition, participants have no control over what is shown on the screen -- only the facilitator has control over what comments are shown. Some group members may wish to review earlier comments, but are unable to. Further, some electronic meeting rooms may not be equipped with a projection screen, preventing showing group members the comments as they are generated.

One argument offered for the use of EPW is that participants may be overwhelmed by many comments appearing on their computer screens. If the comments are broken up into unique subsets, the group members do not have as many to view at any one time. However, most participants can scan comments quickly and are better able to get a feel for what the group is thinking when the comments are not separated. That is, the disadvantage of "information overload" is outweighed by the advantage of seeing everything written by the group.

Gallery Writing

Another brainwriting technique called gallery writing may be superior to poolwriting. In gallery writing:

1. Large sheets of paper are attached to the walls of a room (or flip charts on stands are placed around the sides of a room).
2. Group members silently write down their ideas on the sheets of paper.

3. Group members wander around the room, read others' ideas, and write additional comments on the sheets of paper.

Thus, instead of moving papers around, people move around in the gallery writing method. The electronic version of gallery writing substitutes one file for the many sheets of paper posted on the wall in the manual version. However, electronic gallery writing (EGW) preserves anonymity, unlike the manual version. Participants submit typed, anonymous comments and can view all other members' comments at any time.

Since all information is shared in electronic gallery writing, group members may spend more time reading others' comments (not writing new comments) than when using electronic poolwriting. In one study (Aiken & Vanjani, 1996), group members using EGW spent on average only 39.9% of the total meeting time typing new comments while subjects using EPW spent 52.6% of the time typing new comments. Participants using EPW have fewer comments on their screens (especially in very short meetings) and are forced to write something to get a new screen of comments. Therefore, they spend more time composing new ideas than reading others' opinions.

An important function of a GSS is to give a group ready access to information generated by participants (Briggs, et al., 1997). Only EGW gives group members complete and immediate access to group information; EPW does not.

Study:	[Aiken and Vanjani 1996]	[Aljumaih et al. 1995]	[Aiken et al. 1996]	[Aiken et al. 1997b]	[Aiken 1997]	[Aiken and Sloan 1996]	[Aiken et al. 1997a]	[Aiken and Rebman 2000]
Number of subjects	114	138	88	74	91	22	140	160
Group size	~8	44,45,49	~10	8,13,16,18,19	45, 46	22	35	10
Subjects	Business UG	Business UG	Business UG	Teachers, parents, students	Business UG	Oil change shop customers	Business UG	Business UG
Topic	Campus parking	Campus parking, local tourism, campus security	Campus parking, campus security	Private school strategic plan	Campus parking, local tourism	6 topics about what customers desire in oil change services	Campus parking, campus security, curriculum, local tourism	Campus parking
Time	10 mins	10 mins	10 mins	Unlimited	10 mins	10 mins	10 mins	10 mins
Want to view comments simultaneously	Yes	Yes	Yes	Yes	Yes			Yes
Want to view all comments during the meeting	Yes	Yes	Yes	Yes	Yes			Yes
Number of raw	EGW<EPW	EGW<EPW	EGW<EPW				EGW<EPW	EGW<EPW

comments								
Number of unique, relevant comments	EGW=EPW		EGW=EPW				EGW=EPW	EGW=EPW
Evaluation apprehension	EGW=EPW						EGW=EPW	EGW=EPW
Production blocking		EGW<EPW					EGW<EPW	EGW=EPW
Process satisfaction		EGW>EPW	EGW>EPW			EGW>EPW	EGW>EPW	EGW>EPW
Preference		EGW		EGW	EGW			
Group cohesion				EGW>EPW	EGW>EPW	EGW=EPW		
Ease-of-use					EGW>EPW			
Stimulation / synergy							EGW=EPW	
Quality of comments								EGW>EPW

Table 1: Studies Comparing EPW with EGW

Prior Research on EPW and EGW

Over 140 studies have been conducted on GSS (Fjermestad & Hiltz, 1997), and nine have compared electronic poolwriting and electronic gallery writing (Table 1). The results are summarized below:

1. Meeting participants want to be able to view all comments written by group members at any given time.
2. Meeting participants want to be able to view all comments written by group members over the course of the meeting.
3. Group members write more comments using EPW than when using EGW.
4. Group members write roughly the same number of unique, relevant comments using both EPW and EGW. That is, many comments written with EPW are redundant or off-topic.

5. Group members have the same evaluation apprehension using EPW and EGW. Both techniques give participants a high degree of anonymity, and thus, they are less likely to be afraid of others criticizing the comments they write.
6. Group members experience less production blocking, in general, when using EGW than when using EPW. It is easier for participants to share information using EGW.
7. Group members are more satisfied with the meeting process when using EGW than when using EPW.
8. Group members prefer using EGW than EPW for electronic meetings.
9. Group members, in general, experience more group cohesion when using EGW than when using EPW. That is, they feel more "a part of the group."
10. Group members believe EGW is easier to use, even though the user interface is exactly the same.
11. Group members experience roughly the same stimulation and synergy using both EGW and EPW.
12. Group members perceive the quality of comments to be higher when using EGW than when using EPW.

The results are remarkably consistent and show that for a variety of subjects, topics, and group sizes, EGW is superior to EPW. However, most of the meetings have been relatively short and have used inexperienced subjects, unfamiliar with a GSS. Further, the results do not show how many comments the subjects were able to view during the meetings, a significant difference in the two idea generation techniques.

A new study was designed to repeat some of the prior measures of users' perceptions, and in addition, to track the files and comments presented to each group member (participants may or may not read the comments, however). Based upon these prior studies, the following hypotheses were formulated:

- H₁. Subjects want to view all comments simultaneously.
- H₂. Subjects are able to view all comments simultaneously using EPW.
- H₃. Subjects are able to view all comments simultaneously using EGW.
- H₄. Subjects want to view all comments over the course of the meeting.
- H₅. Subjects are able to view all comments over the course of the meeting using EPW.

H₆. Subjects are able to view all comments over the course of the meeting using EGW.

H₇. Subjects believe EPW is easy to use.

H₈. Subjects believe EGW is easy to use.

H₉. Subjects prefer using EGW.

H₁₀. Subjects generate more comments using EPW.

A COMPARISON EXPERIMENT

Subjects

Students from a graduate-level MIS seminar were used as subjects in an experiment to compare EPW and EGW as part of a class assignment. The students had studied GSS research for several weeks, but had never participated in an electronic meeting. However, the subjects were much more familiar with the strengths and weaknesses of each technique prior to the experiment than subjects in earlier experiments. Students can be used as subjects as long as they exhibit characteristics of the target population (Gordon, et al., 1987). There is no reason to believe that business students in these meetings behave any differently than people in other organizations. Students have been used as subjects in the past in similar published research (e.g., Jessup, et al., 1990; Dennis & Valacich, 1993).

Procedure

Subjects were split randomly into eight groups of six. One set of four groups used EGW for 10 minutes to discuss ways of solving the parking problem on campus, and then used EPW for 10 minutes to discuss methods of increasing tourism in the city. The other set of four groups used EGW to discuss tourism first, and then used EPW to discuss parking. Both "campus parking" (e.g., Jessup, et al., 1990) and "local tourism" (e.g., Dennis & Valacich, 1993; Gallupe, et al., 1992) have been used in other experiments and by other researchers. Further, experience with groups using these topics indicates that 10 minutes generally is adequate and allows sufficient time for most participants to express their opinions.

Software

The user interface for the EGW and EPW programs was exactly the same. Some research has indicated even minor variations can cause large differences in outcomes. For example, the addition of one horizontal line in a program interface increased the number of comments by 23% in one study (Shepherd, et al., 1995-96).

The only difference between the two programs was the method of exchanging comments among participants. Using EGW, new comments appeared in the public window (if any had been written) after the participant submitted a new comment or pressed a key to only read. Using EPW, a new file of comments appeared only if a new comment was submitted by the participant. In addition, the programs tracked the comments written by each individual, and stored the results in a separate file with the member number, group number, and the time written. However, comments were anonymous to group members. Finally, the EPW program tracked the number of comments viewed (presented on the screen) by each participant during the course of the meeting. If a file had been viewed before, only the new comments in the file were added to the running total. The total comments from each file presented to each user were stored automatically in a separate file at the conclusion of the meeting.

After the meeting, the subjects completed the questionnaire shown in the Appendix.

Variable	Mean	Std Dev
Q1	6.700**	0.791
Q2	2.575**	1.890
Q3	6.150**	1.511
Q4	6.725**	0.751
Q5	2.250**	1.765
Q6	6.075**	1.607
Q7	2.900**	1.919
Q8	6.375**	1.102
Q9	6.250**	1.822
EPW comments	11.688	5.211
EGW comments	9.650	5.480

N = 40

** Significantly different from median=4 at $\alpha=0.001$

(See Appendix 1 for an explanation of the variables.)

Table 2: Summary Statistics (All groups)

Variable	Mean	Std Dev
Q1	6.792**	0.509
Q2	2.667*	1.993
Q3	6.125**	1.424
Q4	6.875**	0.338
Q5	2.375**	1.996
Q6	6.125**	1.513
Q7	2.917*	2.041
Q8	6.333**	1.308
Q9	6.375**	1.715
EPW comments	10.042	3.793
EGW comments	8.000	4.032

N = 24

* Significantly different from median=4 at $\alpha=0.05$

** Significantly different from median=4 at $\alpha=0.001$

Table 3: Summary Statistics (EGW-parking; EPW-tourism)

Variable	Mean	Std Dev
Q1	6.563	1.094
Q2	2.438*	1.788
Q3	6.188**	1.682

Q4	6.500**	1.095
Q5	2.063**	1.389
Q6	6.000**	1.789
Q7	2.875*	1.784
Q8	6.438**	0.727
Q9	6.063*	2.016
EPW comments	13.333	5.954
EGW comments	12.125	6.500

N=24

* Significantly different from median=4 at $\alpha=0.05$

** Significantly different from median=4 at $\alpha=0.001$

Table 4: Summary Statistics (EGW-tourism; EPW-parking)

Results

Table 2 shows means and standard deviations for the dependent variables for all groups, and Tables 3 and 4 show the results for each set of four groups. Difference-of-means T tests were conducted on the participants' ratings and the median value of 4 in the Likert scale, and significant differences were found. The subjects wanted to see all comments during the course of the meeting, so H_1 cannot be rejected. The subjects wanted to see all comments at any particular time, so H_4 cannot be rejected.

Subjects did not think the EPW program was easy to use, but they thought EGW was easy to use. Finally, the subjects preferred using the EGW program. Thus, H_7 is rejected, but H_8 and H_9 cannot be rejected.

	Q1	Q2	Q4	Q3	Q5	Q6	Q7	Q8	Q9	EPW	EGW
Q1	1.000	-0.070	-0.026	0.203	-0.055	0.018	-0.088	-0.044	-0.142	-0.045	-0.315
		0.667	0.875	0.209	0.736	0.912	0.590	0.787	0.381	0.782	0.048
Q2		1.000	0.237	0.150	0.754	-0.259	0.574	-0.155	-0.281	-0.043	0.030
			0.141	0.355	<0.001	0.107	<0.001	0.339	0.080	0.792	0.855
Q3			1.000	0.10509	-0.332	0.882	-0.446	0.519	0.479	0.119	0.081
				0.5187	0.037	<0.001	0.004	<0.001	0.002	0.464	0.620
Q4				1.000	0.131	0.400	0.141	-0.027	-0.117	0.008	-0.099
					0.421	0.011	0.387	0.868	0.472	0.962	0.544
Q5					1.000	-0.413	0.697	-0.418	-0.618	-0.227	0.098
						0.008	<0.001	0.007	<0.001	0.160	0.839
Q6						1.000	-0.438	0.577	0.475	0.098	0.029
							0.005	<0.001	0.002	0.548	0.858
Q7							1.000	-0.406	-0.601	-0.171	-0.116
								0.009	<0.001	0.291	0.478
Q8								1.000	0.680	-0.014	-0.131
									<0.001	0.932	0.422
Q9									1.000	0.274	-0.032
										0.867	0.844
EPW										1.000	0.767
											<0.001

Correlation/p-value

Table 5: Pearson Correlation Analysis (All groups)

Table 5 shows a Pearson correlation analysis of the variables. Significant correlations were found between the desire to view comments simultaneously and during the

course of the meeting and the ease-of-use for EPW and EGW, indicating that these two factors played a major role in the subjects' perceptions. In addition, the number of comments written with EGW was significantly and highly positively correlated with the number of comments written with EPW, indicating that subjects who wrote many comments using one technique, tended to write many comments with the other technique, also.

File#	0	1	2	3	4	5	6	Total Coms	% of all	EPW	EGW	
User#	Viewing Frequency							Read	comments	Coms	Coms	
1	1	1	1	2	1	2	2	10	27	50.94%	10	9
2	3	2	1	4	2	1	0	13	32	60.38%	13	9
3	2	1	0	1	1	0	1	6	19	35.85%	6	1
4	1	2	1	0	2	0	1	7	20	37.74%	7	7
5	0	1	2	3	1	1	0	8	24	45.28%	8	6
6	2	0	1	3	2	0	1	9	25	47.17%	9	7
avg	2	1	1	2	2	1	1	8.83	24.50	46.23%	8.83	6.50
total											53	39
1	2	2	1	3	1	0	2	11	40	53.33%	11	8
2	2	3	2	3	4	1	4	19	48	64.00%	19	17
3	1	2	1	1	2	0	3	10	45	60.00%	10	6
4	4	3	2	0	3	0	2	14	44	58.67%	14	16
5	2	1	1	1	1	1	0	7	35	46.67%	7	9
6	0	1	3	2	3	2	3	14	47	62.67%	14	7
avg	2	2	2	2	2	1	2	12.50	43.17	57.56%	12.50	10.50
total											75	63
1	0	2	2	1	3	2	0	10	29	52.73%	12	13
2	1	3	2	0	2	0	3	11	31	56.36%	11	8
3	3	3	2	3	0	1	2	14	34	61.82%	14	15
4	2	1	1	0	1	2	0	7	23	41.82%	7	8

5	0	1	1	1	2	1	0	6	19	34.55%	6	5
6	0	1	0	1	1	1	1	5	18	32.73%	5	6
avg	1	2	1	1	2	1	1	8.83	25.67	46.67%	9.17	9.17
total											55	55
1	0	1	1	3	0	1	0	6	21	39.62%	6	4
2	3	1	1	0	2	0	3	10	28	52.83%	10	7
3	1	0	1	1	1	0	2	6	24	45.28%	6	2
4	1	2	0	0	1	1	1	6	19	35.85%	6	5
5	1	2	3	1	3	2	3	15	32	60.38%	15	8
6	2	3	2	1	2	2	3	15	34	64.15%	15	11
avg	1	2	1	1	2	1	2	9.67	26.33	49.69%	9.67	6.17
total											58	37
Average	1	2	1	1	2	1	2	9.96	27.07	50.03%	10.04	8.08

Table 6: File viewing frequencies for topic: How can we increase tourism in the city?

File#	0	1	2	3	4	5	6	Total	Coms	% of all	EPW	EGW
User#								Read	coms	Coms	Coms	
1	1	1	2	2	1	1	2	10	33	41.77%	10	9
2	4	2	2	3	4	2	2	19	54	68.35%	19	24
3	2	1	1	2	5	0	3	14	46	58.23%	14	13
4	1	2	1	3	2	1	2	12	36	45.57%	12	0
5	0	1	2	3	2	1	1	10	34	43.04%	10	0
6	2	1	0	3	4	3	1	14	38	48.10%	14	5

avg	2	1	1	3	3	1	2	13.17	40.17	50.84%	13.17	8.50
total											79	51
1	3	2	1	3	0	1	2	12	35	37.23%	12	6
2	0	1	1	1	2	0	1	6	20	21.28%	6	0
3	1	1	0	2	1	1	1	7	25	26.60%	7	0
4	3	6	4	6	5	5	3	32	68	72.34%	32	20
5	2	2	2	1	3	1	3	14	40	42.55%	14	13
6	4	2	5	3	4	3	2	23	51	54.26%	23	16
avg	2	2	2	3	3	2	2	15.67	39.83	42.38%	15.67	9.17
total											94	55
1	0	2	3	5	3	1	0	14	37	51.39%	14	7
2	1	0	3	0	2	1	2	9	26	36.11%	9	11
3	3	3	2	2	4	1	3	18	41	56.94%	18	9
4	1	4	1	2	3	2	0	13	34	47.22%	13	0
5	3	1	0	2	3	1	1	11	31	43.06%	11	0
6	1	1	3	1	0	0	1	7	22	30.56%	7	0
avg	2	2	2	2	3	1	1	12.00	31.83	44.21%	12.00	4.50
total											72	27
1	3	4	3	4	2	3	2	21	52	69.33%	21	27
2	1	2	1	1	0	0	1	6	28	37.33%	6	7
3	2	3	1	2	1	3	1	13	44	58.67%	13	10
4	1	2	0	2	1	2	1	9	33	44.00%	9	8
5	1	2	1	2	3	2	3	14	45	60.00%	14	9
6	0	3	1	2	2	2	2	12	42	56.00%	12	0
avg	1	3	1	2	2	2	2	12.50	40.67	54.22%	12.50	10.17
total											75	61

Average 2 2 2 2 2 2 2 13.33 38.125 47.91% 13.33 8.08

Table 7: File viewing frequencies for topic: How can we improve parking on campus?

Table 6 shows EPW file viewing frequencies for the topic of increasing tourism. For example, group member 1 in group 1 saw file 0 (the initial swap file) once and saw file 3 twice. The group member wrote 10 comments and 27 unique, public comments were shown with EPW, about 51% of all EPW comments written by the group on the topic. Several files of comments were not viewed by all group members, and on average, only 50% of all comments were viewed by the 24 participants in the four groups using EPW for the topic. Similarly, Table 7 shows the file viewing frequencies, comments viewed, and comments written by the groups discussing the parking problem. Only about 48% of the comments written by subjects using EPW were viewed by the group members. Participants who wrote more comments than the group average using EPW were able to view more public comments, while those who wrote less viewed less in a rough, linear relationship.

The last column of each table shows the number of comments written by users in the groups using EGW for the topics. The numbers of raw EPW and EGW comments for each topic were compared using a difference-of-means T test. There was no significant difference between the numbers of comments for the parking problem ($T=-1.035$, $p=0.159$), but subjects wrote significantly more comments about tourism when using EPW ($T=4.778$, $p < 0.001$). Thus, we reject H_{10} for one topic, but we cannot reject it for the other.

Tables 2, 3, and 4 show that using EPW, subjects believed they were not able to see all comments simultaneously and over the course of the meeting, but using EGW, they believed they were able to see all comments. Tables 6 and 7 show that these perceptions were true. By definition of the technique, EPW does not allow participants to view all comments simultaneously. Each participant views a unique subset at any on time. Subjects using EGW had access to all comments at all times, but subjects using EPW were able to view only about half of all comments written over the course of the meeting. Thus, H_2 and H_5 are rejected, but H_3 and H_6 cannot be rejected.

Discussion

Subjects’ perceptions of EPW and EGW were consistent with prior experiments comparing the two techniques. That is, electronic meeting participants want to view all comments at the same time and over the course of the meeting. In addition, the subjects thought EGW was easier to use, and it was the preferred technique.

The experiment is the first to show EPW file swapping and comment viewing by group members, and thus adds to the growing body of literature on the two techniques. Groups of six people discussing these two topics for 10 minutes were able to view only about half of

the comments written. Further, each participant had no idea which comments he or she was missing. Although group members could read a printed transcript of all comments after the meeting, they could not build upon the unseen ideas during the discussion, and they could have a feeling of “missing out” on much of the group activity.

Different group sizes and different meeting times will probably affect the number of comments viewed in an EPW meeting. The percentage of comments viewed can be expected to increase for smaller groups and longer meetings. However, the portion of comments viewed will never reach 100%. In addition, group meetings generally benefit from more participants as more people can add more, unique insights to the topic (Dennis & Valacich, 1993), and extending the meeting solely for increased swapping of files is likely to cause greater boredom and more off-topic comments (Reinig, et al., 1998).

Subjects wrote significantly more comments using EPW for one topic, but there was no significant difference for the other. No attempt was made to identify the uniqueness, relevancy, or quality of the comments, however. Other experiments have consistently shown that more comments usually are written when using EPW, but these are often redundant or do not pertain to the topic, increasing the amount of work necessary in a following, idea organization stage of a group meeting (Aiken & Carlisle, 1992).

CONCLUSION

The experiment presented here supports earlier results comparing electronic poolwriting and gallery writing. Group members want to see all comments simultaneously and over the course of the meeting, a capability EPW does not allow. Therefore, most people using the two idea generation techniques prefer EGW. In addition, the study is the first to show empirically that people using EPW are not able to read all group members’ comments during a meeting. Eight groups of six participants each using EPW for 10 minutes to discuss tourism and parking were able to view only about half of all comments written. Subjects using EGW were able to view all comments and shared information more efficiently.

APPENDIX

Post-Experiment Questionnaire

Please circle your responses below:

1. I want to see all comments during the course of the meeting.

1	2	3	4	5	6
	7				
Disagree			Neutral		
	Agree				

2. I was able to see all comments during the EPW meeting.

1	2	3	4	5	6
7					
Disagree			Neutral		
Agree					

3. I was able to see all comments during the EGW meeting.

1	2	3	4	5	6
7					
Disagree			Neutral		
Agree					

4. I want to see all comments at any particular time.

1	2	3	4	5	6
7					
Disagree			Neutral		
Agree					

5. At any given time, I was able to see all comments during the EPW meeting.

1	2	3	4	5	6
7					
Disagree			Neutral		
Agree					

6. At any given time, I was able to see all comments during the EGW meeting.

1	2	3	4	5	6
7					
Disagree			Neutral		
Agree					

7. It was easy to communicate with the EPW program.

- Briggs, R., Nunamaker, J., and Sprague, R. (1998). "1001 Unanswered Research Questions in GSS," *Journal of Management Information Systems*, 14(3), 3-21.
- Dennis, A., Aronson, J., Heninger, W., and Walker, E. (1999). "Structuring Time and Task in Electronic Brainstorming," *MIS Quarterly*, 23(1), 95-108.
- Dennis, A., and Valacich, J. (1993). "Computer Brainstorms: More Heads Are Better Than One," *Journal of Applied Psychology*, 78(4), 531-537.
- Dennis, A., Valacich, J., Carte, T., Garfield, M., Haley, B., and Aronson, J. (1997). "The Effectiveness of Multiple Dialogues in Electronic Brainstorming," *Information Systems Research*, 8(2), 203-211.
- Dennis, A., Valacich, J., Connolly, T., and Wynne, B. (1996). "Process Structuring in Group Brainstorming," *Information Systems Research*, 7, 268-277.
- Easton, G., George, J., Nunamaker, J., and Pendergast, M. (1990). "Using Two Different Electronic Meeting System Tools for the Same Task: An Experimental Comparison," *Journal of Management Information Systems*, 7, 85-100.
- Fjermestad, J., and Hiltz, S. (1997). "Experimental Studies of Group Decision Support Systems: An Assessment of Variables Studied and Methodology," *Proceedings of the Thirtieth Hawaii International Conference on System Sciences*, 2, 45-53.
- Gallupe, R., and Cooper, W. (1993). "Brainstorming Electronically," *Sloan Management Review* Fall, 27-33.
- Gallupe, R., Dennis, A., Cooper, W., Valacich, J., Bastianutti, L., and Nunamaker, J. (1992). "Electronic Brainstorming and Group Size," *The Academy of Management Journal*, 35, 350-369.
- Geschka, H. (1980). "Perspectives On Using Various Creativity Techniques," in Gryskiewicz, S., *Proceedings Creativity Week II* Center for Creative Leadership, Greensboro, North Carolina.
- Geschka, H., Von Reibnitz, U., and Storvik, K. (1981). *Idea Generation Methods: Creative Solutions to Business and Technical Problems*, Battelle Memorial Institute, Columbus, Ohio.
- Gordon, M., Slade, L., and Schmitt, N. (1987). "Student Guinea Pigs: Porcine Predictors and Particularistic Phenomena," *Academy of Management Review*, 12(1), 160-163.
- Herniter, B., and Gargeya, V. (1995). "System Dynamics of Electronic Brainstorming: A Simulation," *Northeast Decision Sciences Institute Proceedings*, March 22-24, Providence, Rhode Island, 265-269.
- Jessup, L., Connolly, T., and Galegher, J. (1990). "The Effects of Anonymity on GDSS Group Process with an Idea-Generating Task," *MIS Quarterly*, 14, 313-321.
- Kahai, S., Avolio, B., and Sosik, J. (1998). "Effects of Source and Participant Anonymity and Difference in Initial Opinions in an EMS Context," *Decision Science*, 29(2), 427-460.
- Kahai, S., Sosik, J., and Avolio, B. (1997). "Effects of Leadership Style and Problem Structure on Work Group Process and Outcomes in an Electronic Meeting System Environment," *Personnel Psychology*, 50, 121-146.
- Martz, W., Vogel, D., and Nunamaker, J. (1992). "Electronic Meeting Systems: Results from the Field," *Decision Support Systems*, 8(2), 141-158.

- McLeod, P. (1992). "An Assessment of the Experimental Literature on Electronic Support of Group Work: Results of a Meta-Analysis," *Human Computer Interaction*, 7, 257-280.
- Pervan, G. (1998). "A Review of Research in Group Support Systems: Leaders Approaches and Directions," *Decision Support Systems*, 23, 149-159.
- Reinig, B., Briggs, R., and Nunamaker, J. (1998). "Flaming in the Electronic Classroom," *Journal of Management Information Systems*, 14(3), 45-59.
- Shepherd, M., Briggs, R., Reinig, B., Yen, J., and Nunamaker, J. (1995-96). "Invoking Social Comparison to Improve Electronic Brainstorming: Beyond Anonymity," *Journal of Management Information Systems*, 12(3), 155-170.
- Teamfocus Facilitation with Groupsystems V Basic Tools*. (1993). Course Number TENT730C, IBM Corporation, 1993.
- Vangundy, A. (1992). *Idea Power: Techniques and Resources to Unleash the Creativity in your Organization*, American Management Association, New York, New York.
- Vogel, D., and Nunamaker, J. (1990). "Group Decision Support System Impact: A Multi-Methodological Exploration," *Information and Management*, 18, 15-28.