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An Investigation of the Effects of Using a LISTSERV Discussion Group After Traditional Workshops to Sustain Staff Development: Training K-12 Teachers to Use Internet Resources

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Abstract

Three staff development workshops were conducted with 25 teachers in a rural school district in the Southeast. Participants were randomly assigned to either the experimental or control group and asked to complete a pre-survey measuring their Internet usage, confidence, and self-efficacy. Participants in the experimental group kept in daily contact with the researcher/workshop trainer via the LISTSERV. During the last workshop, a post-survey was administered to determine if changes in teachers' behavior, confidence, or self-efficacy occurred. In addition, interviews were conducted with six of the participants from the experimental group. Results of the statistical analysis indicated that, although there were significant gains in Internet usage for both groups, there was no statistical difference between the experimental and control group on the post-survey with regard to Internet usage, confidence, or self-efficacy. However, teachers in the control group reported in qualitative interviews that they benefited from the sustained interaction, convenience, and teacher collaboration and they reported higher levels of confidence as a result of participating in the LISTSERV. In addition, teacher created lesson plans indicated that the participants were able to use the Internet to plan or enhance lessons.

The Internet is brimming with possibilities for educators. One of the biggest advantages for teachers is the abundance of curricular resources available to help with lesson planning. With the increase in the percentage of schools now connected to the World Wide Web teachers should find it easier to access these resources. Despite the fact that many schools are now connected to the Internet, many teachers are not taking advantage of these resources. Research results indicate that one reason why teachers are not taking advantage of the resource is that they do not have adequate training.

LISTSERV technology may be effective in providing sustained interaction with teachers for the purpose of staff development without demanding too much of their time. LISTSERVs can allow staff development coordinators to keep in constant communication with participants while at the same time allowing teachers to collaborate with one another and share useful information.

Review of Related Literature

The review of literature on the current state of technology in today's schools indicates that technology has become an important part of education (Umbach, 1998). As our society becomes increasingly dependent on technology, information and computer literacy become more important (Ross & Bailey, 1994). Schools are beginning to increase the number of computers in classrooms across the country (Umbach, 1998), however, many teachers are not using the technology to teach (Mathews, 1996).

The Internet is a valuable resource for educators (Lemon, 1997). Teachers can take advantage of the increase in Internet access by using the Internet to collaborate with other professionals, access information for lessons, and allow students to conduct research, among many other activities (Wilson & Marsh, 1995). However, technology integration will not be achieved in today's schools without appropriate staff development (Glenn & Carrier, 1986).

The literature indicates that introducing technology into schools is not an easy process. Glenn and Carrier (1986) attributed the lack of computer use by teachers to the lack of quality training. Research has identified several training practices that are not effective for technology training. These practices include providing only introductory training (Chopra, 1994; Glenn & Carrier, 1986; Marshall, 1988), and offering one-shot workshops with no follow-up (Bitter & Yohe, 1989; Browne & Ritchie, 1991; Glenn & Carrier, 1986; Umbach, 1997). Practices that are effective for technology training include providing hands-on workshops (Umbach, 1997), providing modeling and coaching for trainees (Browne & Ritchie, 1991), and promoting collaboration among teachers (Boe, 1989; Brand, 1998; Sturdivant, 1989). LISTSERV technology may aid in coaching for trainees and promoting collaboration among teachers.

There are many advantages to using LISTSERVs with teachers. One advantage of using LISTSERVs with teachers is that they do not require that all participants be present at one time in order to discuss a topic (Alexander & Newsom, 1998; Loiselle, St-Louis, & Dupey-Walker, 1998). Users can log onto the Internet at their convenience to access their mail. Another major advantage of LISTSERV discussion groups is that they allow teachers to overcome the isolation that is part of the school organization (Loiselle, St-Louis, & Dupey-Walker, 1998; Russett, 1994). Teachers rarely have time to collaborate with their colleagues during the regular school day. Subscribing to a discussion group would allow teachers to discuss topics of interests on their own time. LISTSERVs may also serve to "level the playing field for diverse students thereby diminishing sources of intolerance and mistrust" (McLellan, 1997, p. 13). Individuals who may not participate in traditional classroom settings may be more comfortable with this type of discussion group. In a study with elementary education majors, Teeter (1997) found that teaching courses on the Internet using a LISTSERV had many benefits. These benefits include higher student motivation, exposure to extended resources, and improved quality of discussions and written assignments. According to Alexander and Newsom (1998), LISTSERVs and computer-mediated communications have many advantages. They stated:

> They do not require the simultaneous presence of people; they provide enhanced opportunities for dialogue, debate, and conversational learning; they allow for

> using the tutorial function between teacher and student; they may give a sense of community and affiliation; they facilitate thinking through writing; they support the emergence and cooperative construction of knowledge and comprehension while providing less pressure to generate impromptu answers; and they can provide self-documentation (p. 63).

Several studies have used LISTSERVs to support staff development and extend staff meetings (Pilburn & Middleton, 1997; Strenski, 1995). LISTSERVs have also been used to support a forum for open communication between students and instructors (Bennett & Pye, 1998). Electronic discussion groups have also been found to facilitate reflection and collaboration with preservice teachers (Mathew, Barufaldi, & Bethel, 1998). Yet another use of LISTSERVs involves the use of electronic communications in place of reflective journals (Pilburn & Middleton, 1997).

Purpose of the Study

The purpose of this study was to investigate the effects of traditional staff development workshops coupled with a LISTSERV discussion group on teachers' use of curricular resources available on the Internet.. The traditional staff development workshops provided the teachers with an introduction to the resources available to them on the Internet and provided them with an introduction to LISTSERV technology. The LISTSERV enabled the teachers to have the "sustained interaction" found to be necessary to effect change in teachers. The study, therefore, explored an approach that combined elements of traditional staff development with elements of new technology.

Due to the lack of research evidence, there is a significant need for research that explores the use of LISTSERV technology to extend and sustain staff development sessions. Specifically, such research should be aimed at practicing K-12 educators.

Research Questions

The following questions guide this investigation:

1. Are there significant differences between the effectiveness of traditional staff development coupled with a LISTSERV discussion group and traditional staff development sessions alone on teachers' use of Internet resources?
2. Are there significant differences between the effectiveness of traditional staff development coupled with a LISTSERV discussion group and traditional staff development sessions alone on teachers' confidence in their ability to use Internet resources?
3. Are there significant differences between the effectiveness of traditional staff development coupled with a LISTSERV discussion group and traditional staff development sessions alone on teachers' self-efficacy related to the use of Internet resources?
4. To what extent do the elements: a). sustained interaction, b). teacher collaboration, and c). convenience of LISTSERV discussion groups increase the Internet usage, confidence, and self- efficacy of a group of K-12 teachers?

Methodology

This study was conducted in a small town in an isolated area in the southeastern United States. This school district has received numerous grants to fund the technology in their schools. In addition, the school system receives financial support from the surrounding community to provide technology in the schools. Every class has at least one computer for student and teacher use.

The school district distributed a needs survey to all teachers during Fall of 1999. The results of the survey indicated that several teachers still needed and wanted more technology training despite the fact that the system had offered numerous training opportunities in the past. Specifically, the teachers expressed a desire to have training and staff development in the area of the Internet.

The sample for the study consisted of 25 teachers from various grade levels. Data from four of the participants, two each from the experimental and control groups, were not included in the data analysis. Two of these teachers failed to complete the pre-survey and two failed to attend the final workshop where the post-survey was administered. Therefore, data from 21 teachers are included in the data analysis. The groups consisted of both elementary and high school teachers (See Table 1). All of the participants in the study were white females. The group had a mean of 11.00 years teaching experience.

Table 1
Subject and Grade Level for Participants by Group

Group	Elementary	Secondary	Special Education	Physical Education	Total
Experimental	3	5	2	1	11
Control	3	4	2	1	10
Total	6	9	4	2	21

Teachers in this study participated in three Internet training workshops during a six-week period. They completed pre- and post-surveys at the first and third workshops, respectively. (See Appendix A for survey.) In addition, an experimental group participated in a LISTSERV discussion group via e-mail. Six participants from the experimental group participated in qualitative interviews. (See Appendix B for interview questions.)

Teachers who agreed to participate in the study were asked to report to the training site on three separate occasions. During these three occasions, the researcher conducted workshops that focused on using Internet curricular resources to plan lessons.

The workshops were designed based on the Academic Seminar Training Activity (ASTA) developed by Farenga and Joyce (1996). The ASTA includes three phases to "guide learners through a hierarchy of skills ranging from simple activities through complex tasks" (p. 6). The phases include Direct Instruction, Guided Practice, and Open Exploration.

A survey entitled "Internet Survey" was administered to the group before the beginning of the first workshop and after the last workshop. The survey has a total of twenty-five Likert-type items. The first five items of the survey include statements that deal with the frequency of teachers' use of the Internet to plan lessons. The reliability for the usage subsection was alpha = .88. The next five items include statements that deal with teachers' confidence in their ability to use the Internet to plan lessons. The final fifteen items, revised from the Science Teaching Efficacy Belief Instrument (STEBI B), constructed and validated by Enochs and Riggs (1990), deal with teachers' self-efficacy in regards to using technology. The reliability for the confidence and self efficacy subsections was alpha = .98 and alpha = .78, respectively. In July of 1999, the survey was field tested for reliability. The final question from the previously field tested instrument was not included on the pre- and post-surveys. The final question asked teachers to indicate whether or not they had Internet access in their classrooms. All of the participants in this study had Internet access.

Results

Research Question 1

Research question 1 was: Are there significant differences between traditional staff development coupled with a LISTSERV discussion group and traditional staff development sessions alone on pre-post measures of teachers' use of Internet resources? This research question was addressed by using a Repeated Measures ANOVA. The experimental group had a mean score of 9.10 with a standard deviation of 3.41 on the usage sub-test on the pre-survey, with the control group having a mean score of 9.40 and a standard deviation of 4.32. On the post-survey, the experimental group had a mean score of 14.45 with a standard deviation of 4.46. The control group had a mean score of 11.30 with a standard deviation of 3.70 (See Table 2).

Table 2
Pre- and Post-Survey Scores by Group

	Mean	Standard Deviation
Usage Subsection		
Pre-Survey		
Control	9.40	4.32
Experimental	9.10	3.41
Post-Survey		
Control	11.30	3.70

Experimental	14.45	4.46
Confidence Subsection		
Pre-Survey		
Control	9.90	5.84
Experimental	13.90	14.00
Post-Survey		
Control	24.40	12.38
Experimental	35.64	4.30
Self-Efficacy Subsection		
Pre-Survey		
Control	37.00	7.92
Experimental	36.36	6.45
Post-Survey		
Control	47.60	10.83
Experimental	54.72	6.10
Total		
Pre-Survey		
Control	56.30	15.46
Experimental	59.36	20.03
Post-Survey		
Control	83.30	24.27
Experimental	104.81	10.40

Data analysis indicated that there was a significant interaction for Time by Group ($F = 9.52$, $p = .006$) (See Table 3). Changes in Internet usage depended on the group to which a teacher belonged. There was a statistically significant difference between pre-post tests for the experimental group ($F = 47.93$, $p < .000$). Likewise, there was a statistically significant difference between pre-post tests for the control group ($F = 5.47$, $p = .030$). There was no statistically significant difference between the groups on the post-survey ($F = 3.11$, $p = .094$).

The results of the analysis show that there was a statistically significant increase in mean scores between pre-post measures for both groups. However, there was no statistically significant difference in mean scores on the post-survey between teachers who participated in traditional workshops coupled with a LISTSERV discussion group and teachers who participated in traditional workshops only.

Table 3
Repeated Measures ANOVA for Time by Group
Teachers' Use of Internet Resources

Source	Type III Sum of Squares	df	Mean Square	f	Sig
GROUP	21.21	1	21.21	.74	.000
TIME	138.18	1	138.18	41.86	.000
TIME*GROUP	31.42	1	31.42	9.52	.006
Error(TIME)	62.72	19	3.30		
Error(GROUP)	541.41	19	28.50		

Research Question 2

Research question 2 was: Are there significant differences between traditional staff development coupled with a LISTSERV discussion group and traditional staff development sessions alone on pre-post measures of teachers' confidence in their ability to use Internet resources to plan lessons? This question was addressed by using a Repeated Measures ANOVA. On the pre-survey, the mean score for confidence was 13.90 with a standard deviation of 14.00 for the experimental group and a mean score of 9.90 with a standard deviation of 5.84 for the control group. The post-survey analysis indicated a mean score of 35.64 with a standard deviation of 4.30 for the experimental group and a mean score of 24.40 with a standard deviation of 12.38 for the control group.

Results of the repeated measures ANOVA for teachers' confidence using the Internet are presented in Table 5. There was no significant interaction for Time by Group ($F = 1.57$, $p = .226$) (See Table 4). Although there was a significant effect for group, the interpretation of this significance is not meaningful since the difference in groups is based on the average of the pre-post measures together. There was a significant main effect for time. Overall, teachers had significantly more confidence in the use of the Internet after the workshops than before the workshops.

Table 4
Repeated Measures ANOVA for Time by Group
Teachers' Confidence Using the Internet

Source	Type III Sum of Squares	df	Mean Square	f	Sig
GROUP	608.73	1	608.73	5.32	.032
TIME	3437.28	1	3437.29	39.41	.000
TIME*GROUP	136.80	1	136.80	1.57	.226
Error(TIME)	1657.34	19	87.23		
Error(GROUP)	2173.41	19	114.40		

Research Question 3

Research question 3 was: Are there significant differences between traditional staff development workshops coupled with a LISTSERV discussion group and traditional staff development sessions alone on pre-post measures of teachers' self-efficacy related to the use of Internet resources? This question was also addressed using a Repeated Measures ANOVA. On the pre-survey, the experimental group had a mean score of 36.36 with a standard deviation of 6.45 and the control group had a mean score of 37.00 with a standard deviation of 7.92. The experimental group had a mean score of 54.72 with a standard deviation of 6.10 and the control group had a mean score of 47.60 with a standard deviation of 10.83 on the post-test.

There was no significant interaction effect for Time by Group ($F = 3.85$, $p = .064$) (See Table 5). There was no significant interaction effect for group. There was a significant main effect for time. Overall, teachers had significantly more self-efficacy using the Internet after the workshops than before the workshops.

Table 5
Repeated Measures ANOVA for Time by Group
Teachers' Self-Efficacy Related to the Use of Internet Resources

Source	Type III Sum of Squares	df	Mean Square	f	Sig
GROUP	110.35	1	110.35	1.29	.271
TIME	2197.10	1	2197.10	53.69	.000
TIME*GROUP	157.86	1	157.86	3.85	.064
Error(TIME)	777.47	19	40.92		
Error(GROUP)	1631.66	19	85.88		

Research Question 4

Research question 4 was: To what extent do the elements: a). sustained interaction, b). teacher collaboration, and c). convenience of LISTSERV discussion groups increase the Internet usage, confidence, and self-efficacy of a group of K-12 teachers? This question was addressed using qualitative interviews of 6 of the participants in the experimental group. The first interview question asked the teachers to describe the usefulness of the LISTSERV to help them learn to use Internet resources in their lessons. The teachers differed in their perception of the usefulness of the LISTSERV. Some teachers indicated that the convenience of the LISTSERV was helpful to them. One participant indicated that the LISTSERV was "useful because I don't have time to just search the web, you know, versus the people who do have the time." Another teacher responded that the LISTSERV "saves time in that I can find more sites than I could on my own." Teachers also listed the sustained interaction with the researcher/workshop trainer as being useful. One teacher said, "…since you have been giving all these web sites, I went through for about an hour the other day looking at these great transition objectives for my class. So, it's really, really become helpful." Some of the participants also listed teacher collaboration as being a useful aspect of the LISTSERV.

> Well, I guess it made me want to look, but it also gave me an incentive to look at some of the addresses and try to find information. So that's probably how it was useful because it kind-of made me do it, whereas, if I had to do it on my own I don't know if I would have taken the time to sit down and look at them,. But the more I looked the better that I found that I was getting at finding things on the Internet.

Other teachers indicated that the teacher collaboration was useful because it increased the number of sites in which they became aware.

The second question in the interview asked the teachers directly what element: a). sustained interaction, b). teacher collaboration, or c). convenience of the LISTSERV was the most beneficial to them. Many of those interviewed indicated that the teacher collaboration was the most beneficial element of the LISTSERV discussion group. One teacher stated, "They were all good. I guess I really like hearing from all the teachers." Other teachers indicated that they liked the sustained interaction with the researcher/workshop trainer. One teacher stated that "I think probably having connection with you and being able to ask questions and knowing that you knew what you were talking about and could answer my questions." One teacher stated that the LISTSERV is convenient "if you stay caught up." This statement is in response to the fact some of the teachers "got behind" if they were out of school and away from their computers. If a teacher was away from their computer for an extended period of time, the number of email messages from the LISTSERV overwhelmed them upon their returned.

The third question in the interview asked the participants if they enjoyed using the LISTSERV to receive assistance and interact with colleagues, and if so, why. All of those interviewed indicated that they did enjoy using the LISTSERV. One teacher stated that she liked the LISTSERV because she "enjoyed interacting and looking up all the addresses that everyone sent and finding new information because it gave me new ideas and new things I could use in my classroom." Another teacher stated, "It gives me access to more sites and it is interesting to see what everyone else is doing and what they find interesting." Still another teacher said, "I could go at my own pace and check it when I wanted to send and receive."

The results of the analysis of the interviews indicated that the teachers benefited from the sustained interaction, teacher collaboration, and convenience of the LISTSERV. From the interviews, it seems as though the teachers benefited the most from collaboration with other teachers. Most of those interviewed mentioned the usefulness of teacher collaboration at least once during the interview. So, all three elements: a). sustained interaction, b). teacher collaboration, and c). convenience of the LISTSERV discussion group were beneficial to the participants, with teacher collaboration identified as the most beneficial.

Discussion and Conclusion

Statistical analysis indicated that there was a significant difference between pre-post measures for both groups for Internet usage. However, there was no statistically significant difference between the groups on the post-survey measurement. In addition, there was no significant interaction effect for Time by Group on Internet confidence or

self-efficacy. Teachers reported in qualitative interviews that they benefited from the sustained interaction, teacher collaboration, and convenience associated with the LISTSERV.

The participants were able to create and supplement lessons using resources available on the Internet. Participants in the experimental group were able to use the LISTSERV to interact with the workshop trainer/researcher and other teachers in the group. Participants in the experimental group reported that they gained confidence and increased their Internet usage as a result of participating in the LISTSERV discussion group.

This study was affected by the limitation common to studies involving the use of technology, such as training time, inadequate technologies, and training facilities that support large numbers of participants. In addition, the results of the study may have been impacted by the test-retest factor. The short duration between pre and post measures may have affected the scores of both groups. However, the major limitation of this study is that the teachers who participated in the Internet training represent a group which has been resistant to technology training in the past. The school system in which this study was conducted has had Internet technology in every classroom for several years. The system has provided many opportunities for training in the past. This particular group of teachers represents a small percentage of the faculty that had not participated in the training. Research has indicated that innovativeness of teachers is a predictor of technology use (Marcinkiewicz, 1994b; Marcinkiewicz & Wittman, 1995; & Corwin & Marcinkiewicz, 1998). These teachers would not be categorized as innovative in their use of technology. It is likely that the more innovative teachers were the first to receive the Internet and technology training. The fact that these teachers took the step to receive training despite their inexperience and apprehensiveness is noteworthy.

Recommendations for Further Research and Delivery of Professional Development

This study investigated the effects of traditional staff development workshops coupled with a LISTSERV discussion group on teachers' use, confidence, and self-efficacy related to the use of Internet resources to plan lessons. As a result of the findings of this study, several recommendations are made for further research.

1. The small number of participants in the study may have affected the statistical results. The standard deviations for mean scores an all sub-tests were large, which affected the significance of the tests. Larger numbers of participants would decrease the standard deviation. Future research should explore whether or not larger numbers of participants in both groups would produce different statistical results.

2. Teachers in the study were surveyed directly after the final workshop. Fulton (1989) stated that "computer anxieties can best be overcome by time and practice-time to experiment, and practice to develop confidence" (p. 12). One recommendation for future research would be to conduct a longitudinal study that surveyed teachers months or years later to see if their usage, confidence, and self-efficacy levels increase significantly after they have had more time to "practice."

3. In an effort to overcome teachers' apprehensiveness about staff development due to limited personal time, future research should explore other distance education

opportunities. For example, online staff development classes could be offered for teachers for a number of staff development needs.

4. Finally, this study simply asked teachers whether or not they used Internet resources in their classrooms. Participants were not asked to elaborate on how they used Internet resources. It is possible that some of the teachers are using the Internet in ineffective ways. Future studies should explore specific ways in which teachers are using Internet resources in their classrooms. These studies could also explore whether or not the resources are used in an effective manner.

References

Alexander, L., & Newsom, R. (1998). Internet listservs: A follow-up to faculty development at two-year colleges. *Community College Review, 25*(4), 61-74.

Bennett, L., & Pye, J. (1998). *Technology: Creating a community of thinkers.* Proceedings of selected research and development presentations at the National Convention of the Association for Educational Communications and Technology, St. Louis, MO. (ERIC Document Reproduction Service No. ED 423 822)

Bitter, G. G., & Yohe, R. L. (1989). Preparing teachers for the information age. *Educational Technology, 29(*3), 22-25.

Boe, T. (1989). The next step for educators and the technology industry: Investing in teachers. *Educational Technology, 29*(3), 39-44.

Brand, G. A. (1998). What research says: Training teachers for using technology. *Journal of Staff Development, 19*(1), 10-13.

Browne, D. L,. & Ritchie, D. C. (1991). Cognitive apprenticeship: A model of staff Development for implementing technology in schools. *Contemporary Education, 63*(2), 28-34.

Chopra, R. K. (1994). Using technology in schools to empower our young people. *NASSP Bulletin, 78*(563), 1-9.

Corwin, T., & Marcinkiewicz, H. (1998). *Prediction of and differences in computer use when universally available*. Proceedings of selected research and development presentations at the National Convention of the Association for Educational Communications and Technology, St. Louis, MO. (ERIC Document Reproduction Service No. ED 423 823)

Enochs, L. G., & Riggs, I. M. (1990) Further development of an elementary science teaching efficacy belief instrument: A preservice elementary scale. *School Science and Mathematics, 90,* 694-706.

Farenga, S. J., & Joyce, B. A. (1996). *Procedural Knowledge Teaching Model: Effects of short-term Internet training on preservice teachers*. Paper presented at the World Conference on Educational Multimedia and Hypermedia of the Association for the Advancement of Computing in Education, Boston, MA. (ERIC Document Reproduction Service No. ED 403 162)

Fulton, K. (1989). Technology training for teachers: A federal perspective. *Educational Technology, 29*(3), 12-18.

Glenn, A. D., & Carrier, C. A. (1986). Teacher education and computer training: An assessment. *Peabody Journal of Education, 64*(1), 67-80.

Lemon, D. K. (1997). Cyberspace for the tenderfoot. *NASSP Bulletin, 81*(590), 91-94.

Loiselle, J., St-Louis, M., & Dupey-Walker, L. (1998). *Giving professional help to preservice teachers through computer-mediated communication.* Paper presented at the Annual Meeting of the Association of Teacher Educators, Dallas, TX. (ERIC Document Reproduction Service No. ED 418 087)

Marcinkiewicz, H. R. (1994a). *Subjective norms predicting computer use*. Proceedings of selected research and development presentations at the 1994 National Convention of the Association for Educational Communications and Technology, Nashville, TN. (ERIC Document Reproduction Service No. ED 373 739)

Marcinkiewicz, H. R. (1994b). *Practicing vs future teachers: Comparisons and correlates of computer use*. Proceedings of selected research and development presentations at the 1994 National Convention of the Association for Educational Communications and Technology, Nashville, TN. (ERIC Document Reproduction Service No. ED 373 738)

Marcinkiewicz, H. R., & Wittman, T. K. (1995). *Tracking teachers' personal variables and computer use: Phase Two*. Proceedings of the 1995 Annual National Convention of the Association for Educational Communications and Technology, Anaheim, CA. (ERIC Document Reproduction Service No. ED 383 325)

Marshall, G. (1988). Computer training for teachers must be practical and relevant. *The Executive Educator, 10*(3), 26-27.

Mathew, N. M., Barufaldi, J. P., & Bethel, L. J. (1998). *The effects of electronic networking on preservice elementary teachers' science teaching self-efficacy.* Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, San Diego, CA. (ERIC Document Reproduction Service No. ED 424 106)

Mathews, J. (1996). *Assessment of teacher technology needs in fifty-five Southeastern Idaho school districts.* Paper presented at the Annual Meeting of the National Rural Education Association, San Antonio, TX. (ERIC Document Reproduction Service No. ED 402 120)

McLellan, H. (1997). *Information design via the Internet*. Selected readings from the Annual Conference of the International Visual Literacy Association, Cheyenne, WY. (ERIC Document Reproduction Service No. ED 408 942)

Pilburn, M. D., & Middleton, J. A. (1997). *Listserv as journal: Computer-based reflection in a program for preservice mathematics and science teachers*. Paper presented at the International Conference on Science, Mathematics and Technology Education, Hanoi, Vietnam. (ERIC Document Reproduction Service No. ED 404 330)

Ross, T. W., & Bailey, G. D. (1994). Wanted: A new literacy for the information age. *NASSP Bulletin, 78*(563), 31-35.

Russett, J. A. (1994). *Telecommunications and pre-service science teachers: The effects of using electronic mail and a directed exploration of Internet on attitudes*. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, Anaheim, CA. (ERIC Document Reproduction Service No. ED 368 571)

Strenski, E. (1995). Virtual staff meetings: Electronic tutor training with a local e-mail Listserv discussion group. *Computers and Composition, 12,* 247-255.

Sturdivant, P. A. (1989). Technology training… Some lessons can be learned. *Educational Technology, 29*(3), 31-35.

Teeter, T. A. (1997). *Teaching on the Internet: Meeting the challenges of electronic learning*. Paper presented at the Fall Conference of the Arkansas Association of Colleges of Teacher Education. (ERIC Document Reproduction Service No. ED 418 957)

Umbach, K. W. (1997). *Computer fluency: Teachers and the new technology: A discussion paper.* (ERIC Document Reproduction Service No. ED 421 986)

Umbach, K. W. (1998). *Computer technology in California K-12 schools: Uses, best practices, and policy implications*. Sacramento: California State Library, Sacramento, California Research Bureau.

Wilson, E. K., & Marsh, G. R. (1995). Social studies and the Internet revolution. *Social Education, 59*, 198-202.

Appendix A

INTERNET SURVEY

The purpose of this research study is to determine if there is a change in teachers' use of and attitude about the Internet to plan lessons after a series of three workshops. The survey will take approximately 5 minutes of your time. You will be asked to complete the survey once before the Internet workshops and once after. Your responses are confidential. Your participation is strictly voluntary and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. If you have any questions now or at a later date please contact Janet Strickland (205) 554-0600.

For each statement regarding Internet usage, decide whether you strongly agree, agree, are undecided, disagree, or strongly disagree. Circle your response.

1. I frequently use Internet resources to enhance lessons.
   Strongly Agree Agree Undecided Disagree Strongly Disagree

2. I frequently use the Internet as a resource tool to plan lessons.
   Strongly Agree Agree Undecided Disagree Strongly Disagree

3. I frequently use information on the Internet to help me gain new ideas for lessons.
   Strongly Agree Agree Undecided Disagree Strongly Disagree

4. I frequently use the Internet to supplement my lessons.
   Strongly Agree Agree Undecided Disagree Strongly Disagree

5. I take full advantage of the resources on the Internet.
   Strongly Agree Agree Undecided Disagree Strongly Disagree

For each statement, circle the number that corresponds with your confidence in using the Internet to plan lessons. 1 = low confidence 10 = high confidence

6. I am confident in my ability to "surf the Net".
   1 2 3 4 5 6 7 8 9 10

7. I am confident in my ability to use "search" commands to find information.
   1 2 3 4 5 6 7 8 9 10

8. I am confident in my ability to use Internet resources to enhance lessons.
   1 2 3 4 5 6 7 8 9 10

9. I am confident in my ability to evaluate Internet content that will be used in my lessons.
   1 2 3 4 5 6 7 8 9 10

10. I am confident in my ability to use information on the Internet to help me plan lessons.

1 2 3 4 5 6 7 8 9 10

For each statement, decide whether you strongly agree, agree, are undecided, disagree, or strongly disagree. Circle your response.

11. I am not very effective in finding Internet resources that enhance my lessons.

Strongly Agree Agree Undecided Disagree Strongly Disagree

12. I will continually find better ways to use the Internet to plan my lessons.

Strongly Agree Agree Undecided Disagree Strongly Disagree

13. I know the steps necessary to find Internet resources that enhance my lessons.

Strongly Agree Agree Undecided Disagree Strongly Disagree

14. Even if I try very hard, I am not able to find resources on the Internet that enhance my lessons.

Strongly Agree Agree Undecided Disagree Strongly Disagree

15. I know the steps necessary to send email messages.

Strongly Agree Agree Undecided Disagree Strongly Disagree

16. I am typically able to use various search engines to find useful curriculum resources on the Internet.

Strongly Agree Agree Undecided Disagree Strongly Disagree

17. I understand Internet concepts well enough to be effective in finding and using curriculum resources.

Strongly Agree Agree Undecided Disagree Strongly Disagree

18. I am not very effective in finding Internet resources that enhance my lessons.

Strongly Agree Agree Undecided Disagree Strongly Disagree

19. I find it difficult to download and print curriculum resources I find on the Internet.

Strongly Agree Agree Undecided Disagree Strongly Disagree

20. Increased effort in finding and using Internet curriculum resources will produce positive change in my lesson plans.

Strongly Agree Agree Undecided Disagree Strongly Disagree

21. I wonder if I have the necessary skills to use search engines to find curriculum resources.

Strongly Agree Agree Undecided Disagree Strongly Disagree

22. I do not know what to do with curriculum resources I find on the Internet.

Strongly Agree Agree Undecided Disagree Strongly Disagree

23. I generally use information I find on the Internet effectively in my classroom.

Strongly Agree Agree Undecided Disagree Strongly Disagree

24. I know how to modify my curriculum to include Internet resources.

Strongly Agree Agree Undecided Disagree Strongly Disagree

25. I wonder if I will have the necessary skills to locate and use Internet resources.

Strongly Agree Agree Undecided Disagree Strongly Disagree

Appendix B

1. Describe the usefulness of the LISTSERV to help you learn to use Internet resources in your lessons.
2. What elements of the LISTSERV discussion group were the most beneficial to you: a). sustained interaction with researcher?, b). teacher collaboration?, c). convenience?. Explain.
3. Did you enjoy using the LISTSERV to receive assistance and interact with colleagues? Why or why not?
4. What did you enjoy most about the training? Explain.
5. Did you gain confidence in your ability to use the Internet after this training? Explain.