Utilization of Communication Technologies to Facilitate Follow-up to On-site Professional Development

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Abstract

The primary research objective of the hypotheses-generating study focused on the viability of the communication technologies (Internet, e-mail, phone, and fax) as effective media for professional development. The central research question was: What impact does communication technology have on the facilitation of follow-up sessions to traditional on-site professional development? First, the study explored the facilitation of follow-up professional development for teachers in rural and underserved areas. Second, the research considered the type of communication technology that is best suited to the needs of teachers in rural and underserved areas. Third, the study investigated the impact of various factors, including technical skill with computer and related technologies and adequate equipment, on the utilization of communication technology as a means of continuing education. The findings indicated communication technologies were useful for follow-up to on-site professional development. However, inconsistent access to the Internet and e-mail at school was a barrier to their effective utilization. The participants indicated e-mail was the preferred mode of communication with other professionals. Differences in technical skill did not appear to negatively impact dialogue via communication technologies during the study. On the other hand, there were some equipment and server problems noted by the participants as barriers to consistent access to the Internet and e-mail. As a result of the research, the following hypotheses were generated: (a) e-mail is the most viable method of follow-up to on-site professional development to meet the needs of teachers in rural and underserved areas; (b) the actual typical availability of communication technologies to teachers in rural and underserved areas is less than is reported by administrators; and (c) access to the Internet is more problematic for rural and underserved teachers. Additional research should be conducted to develop distance professional development that fosters collaborative, reflective practice.

Purpose

The objective of the hypotheses-generating study was to augment on-site professional development workshops via continued critical dialogue using communication technologies. The participants for the study were part of a larger professional development program, "Project Energy," at a research university in the southeast. Project Energy focused on increasing energy literacy in K-12 schools by providing teachers with resources and instruction in effective energy lessons and integration of technology in the classroom.

After several teacher institutes, results from formal and informal surveys of the participants indicated a need for follow-up sessions between on-site professional development workshops. The purpose of the research was to investigate the viability of communication technologies (Internet, e-mail, mail, and fax) to provide a forum for the follow-up sessions.

Background

The demand of an "Information Society" has created increased need for continuing professional development of educators. Traditionally, professional development has been of short duration (Joyce & Showers, 1995) with teachers as passive recipients of professional development activities (Sparks, 1997). Renyi (1996) noted that teachers are often isolated, inhibiting the establishment of collegial, collaborative groups of teachers who work to implement reform (Jonassen, Davidson, Collins, Campbell, & Haag, 1995; Smith, Lane, & Enfield, 1999). Since interactions with other learners are crucial in the formation of new constructs (Vygotsky, as cited in Glasson & Lalik, 1993), communication technologies provide opportunities to form collaborative, reflective networks of teachers (Loucks-Horsley, 1998) for the purpose of improving practice (Dimauro & Jacobs, 1995).

Communication technologies offer an opportunity to create a community of reflective practitioners and can be a vehicle for collaborative communication of current issues and practices in the classroom (Bauer, 1997; Chase & Merryfield, 1998; Loiselle, St-Louis, & Dupuy-Walker, 1998; McGinnis, 1995; Northrup & Little, 1996; Smith et al., 1999). The use of distance professional development allows teachers to be lifelong learners (Jeager, 1995) and maintain critical conversation with colleagues over a wide geographic area (Sharma, 2000). In addition, research indicates distance professional development reduces the isolation of rural underserved teachers, a barrier to classroom change (Fullan & Hargreaves, 1996; Williams, Gold, & Russell, 1995; Yap, 1996).

Dialogue via communication technologies can be accessed synchronously, asynchronously, rapidly, and anywhere on the globe where there is access (Bauer, 1997; Hall, 1997; McMahon, 1997; Williams, 1995). In a case study of seven students enrolled in an undergraduate/graduate sociology course, Sorg and McElhinney (2000) reported a synchronous online learning environment empowered students to discover new meanings through interaction with course content and online discussions with peers and the instructor. However, participants identified frustrations with a text-only environment, a lack of visual and aural cues, and the moderation style of the instructor as barriers to optimal learning within the online classroom.

Another aspect of dialogue using communication technology, whether asynchronous or synchronous, is the type of interaction. In research involving a panel of eight experts in distance education (Delphi technique), the panel rated learner-learner interaction as the most critical type of discourse to impact student learning (compared to other types of interaction, e.g. learner-instructor interaction, learner-content interaction, and learner-self interaction) (Soo & Bonk, 1998). In terms of asynchronous and synchronous, the majority of the experts (seven) indicated a preference for asynchronous dialogue because it allowed time for reflection. However, one expert disagreed. He noted that other distance educators indicate a preference for asynchronous dialogue because they are more experienced with that particular format. He concluded a mixture of both methods of distance instruction (asynchronous and synchronous) were necessary for effective online learning. In a similar study involving 15 engineers divided into 6 cooperative groups, Bhattacharya (1999) studied the difference between the use of asynchronous as compared to synchronous online learning. Approximately half of the participants used asynchronous communication and the other half used synchronous communication. Participants using the chat (synchronous) room indicated they had difficulty constructing responses because they had insufficient time to reflect on dialogue submitted by other participants. Thus, it appears

an asynchronous format allows for more reflection, an important component in effective instruction.

Winniecki and Chyung (1998) offered suggestions to mediate asynchronous dialogue. In typical face-to-face conversation, participants use a variety of techniques to maintain dialogue: turn taking, repair (statements that refer to prior dialogue), overlap (listener begins talking before speaker finishes), and formulations (summarizing previous conversation). In order to make online dialogue more like face-to-face discourse, the following suggestions were posited:

1. Copy and paste (The authors term was "snip.") crucial portions of the dialogue (italics or bold) before writing a response to a threaded discussion item (online version of conversational overlap).
2. Use bold and italic text to begin the online formulation and repairs, summarizing prior dialogue including who said what and when.

Cheng (2000) reported the use of communication technologies for professional development activities allows teachers to continue working, to work at their own pace and to immediately apply new knowledge and pedagogy in their own classrooms. On a similar note, Smith, et al. (1999) reported a shift in pedagogy from teacher-centered instruction to a learner-centered paradigm in a study of four elementary teachers using an Internet Web site to construct effective lesson plans. The studies of Cheng (2000) and Smith, et al. (1999) indicated communication technologies could be used to immediately improve classroom practice with current knowledge and effective pedagogy and possibly reduce a mismatch between theory and reflective practice.

Hall (1997) postulated the discourse via communication technologies might be more reflective than face-to-face dialogue perhaps because the participants have more time to construct responses. Dialogue mediated by communication technologies is primarily in the form of written discourse, which requires more reflection than verbal communication (Vygotsky, as cited in Glasson & Lalik, 1993). Along with increased reflection, an online course is more democratic because the anonymity results in more varied opinions than in a traditional face-to-face meeting (Bos, Krajcik, & Patrick, 1995).

The research base indicated the Internet and e-mail are viable means for meeting in-service professional needs of teachers (Bohrer, Colbert, & Zide, 1998; McGinnis, 1995; McMahon, 1997; Smith et al., 1999). Convenience is often cited as the primary rationale for using the Internet and e-mail to maintain dialogue with professional colleagues (Burke, 1994; Glickman, Gordon, & Ross-Gordon, 1995; Lewison, 1996) and teachers like the fast response of e-mail (Hall, 1997).

Other communication technologies are also used in distance education. Knapczyk, Rodes, and Chung (1998) noted that simplicity in the use and maintenance of the technology used in distance education was one requirement for a successful distance education class. Therefore, they rely on the telephone, fax, and simple e-mail applications to communicate with their students. In fact, Knapczyk, Rodes, and Chung noted the fax machine is invaluable for last minute documents.

Whitaker (1995) observed the use of different types of distance communication in education, including teleconferencing, fax, e-mail, Internet, mail, and the telephone, allows multiple avenues of oral and written communication for the learners and the instructor. However, he cautioned that distance education requires careful planning and consideration of the limitations of the media. For example, in videoconferencing the instructor must take care to remain on-camera and limit distracting body movements. Another example of careful planning

for distance education involves the fax machine. The fax machine has been used to send students corrected papers, but the instructor must remember that the fax may only print in black.

The telephone is an important communication link between students and their instructors. Typically in higher education, instructors use voice mailboxes, which allow students to leave messages that the instructor can access 24 hours a day from anywhere in the world (*Telephone technology increases communications across the board*, 1994). Another use of the telephone in distance education is the audioconference. The telephone, attached to a speakerphone, can be used for whole-class distance discussions or for lectures from the instructor or outside experts (Steele, 1993).

Although studies indicated communications technologies are viable vehicles for continuing professional development, there are barriers to the effective utilization of the Internet and e-mail. Time constraints are often cited as problematic (McMahon, 1997; Smith et al., 1999), as are technical difficulties (McMahon, 1997). While the process of writing elicits reflection, it is also time-intensive, a barrier to effective use of the technology (Bohrer et al., 1998; McMahon, 1997; Smith et al., 1999). Another problem is the lack of nonverbal cues in the written dialogue. Nonverbal cues are used to make meaning of the conversation and a lack of nonverbal cues could lead to misunderstandings (Bos et al., 1995). Bos, Krajcik, and Patrick (1995) also indicated it was more difficult to arrive at a consensus online. Problems not only exist with the communication; the equipment can lead to difficulties in creating and maintaining a viable, collaborative, and reflective community of educators. In fact, the size of the screen of the monitor often limits the length of the message to very short conversations that can fit on the screen, limiting reflectivity in the dialogue (Bohrer et al., 1998; McMahon, 1997; Smith et al., 1999). For teachers without access to the technology at home, a lack of privacy and access are barriers to effective use of the Internet and e-mail (McMahon, 1997). In addition to access, availability of appropriate equipment is problematic and a financial burden (Saunders et al., 1997).

Previous studies cited indicated the viability of communication technologies to create dialogue within a community of reflective educators (Bos et al., 1995; Loucks-Horsley, 1998). However, Guy and Lima (1999) indicated there was a lack of personal interaction necessary for conceptual change and effective learning. Additionally, some participants make little effort in maintaining a reflective dialogue via communication technologies (Saunders et al., 1997).

Effective professional development via communication technologies must be carefully planned to ensure learning (Bohrer et al., 1998). While the development of professional activities via communication technologies is time-consuming, Dahlogren (1998) noted distance education instructors might be more effective than face-to-face instructors because of the extensive planning required for course development.

In summary, communication technologies can be a viable means for collaborative, reflective dialogue (Bos et al., 1995; Loucks-Horsley, 1998). Distance professional development can be used to meet the time/space needs of rural and underserved teachers (Sharma, 2000) and reduce the isolation of rural and under-served teachers (Fullan & Hargreaves, 1996; Williams, 1995; Yap, 1996). Dialogue can be conducted at any time and anywhere on the globe where there is access (Bauer, 1997; Hall, 1997; McMahon, 1997; Williams, 1995). Time-constraints (Smith et al., 1999), technical difficulties and access (McMahon, 1997), and limited resources are often cited as barriers (Saunders et al., 1997).

Research Methodology

The convenient sample of 18 science teachers was drawn from a population of 208 science teachers involved in a federally-funded professional development program conducted through a large research university located in the southeast. The participants in the professional development program were from 39 counties constituting 41 school systems (Sunal, 2000). The schools represented by the teachers in the study involved settings that were rural (52%), suburban (24%), and urban (24%). According to the 2000 U.S. Census, 15% of the population of the state lived at or below the poverty level.

The teachers in the convenient sample were volunteers and each chose a pseudonym to ensure anonymity and protect the identity of the schools they represented. The experience of the teachers ranged from novice (6 teachers, less than 5 years experience, 36% of sample), mid-career (6 to 20 years experience, 10 teachers, 52% of sample), to late career teachers (more than 20 years experience, 2 teachers, 12% of sample) (N=18). The average years of teaching experience was 10.65 years (53%).

The teachers attended two workshops, one in February and one in June. The participants in the convenient sample were chosen from teachers attending the February workshop. Other teachers in the population were not offered the opportunity to participate in the follow-up sessions via the Internet because a new module of instruction using graphing calculators and data collectors was developed and implemented at the February workshop. Thus, other teachers in the population would not have experienced the new treatment (model of instruction using graphing calculators and data collectors). The purpose of the follow-up sessions was to extend the instruction of the use of the graphing calculators and data collectors of the February on-site seminar to the June workshop. However, the model was later made available to the entire population via the Web site developed for the follow-up sessions.

The research involved a mixed design using both qualitative and quantitative strategies. The qualitative portion involved the use of naturalistic research (Patton, 1990). The quantitative portion used a pre/post test quasi-experimental design (Campbell & Stanley, 1970) using statistical software (Statistical Package for the Social Sciences, SPSS).

The qualitative analysis was conducted using psycholinguistic analysis of the artifacts including: field notes, e-mail, Internet postings, telephone interviews, and a focus group session. "Investigator triangulation" (Denzin, 1978; Patton, 1990) was obtained with data collected from a variety of artifacts: lesson plans, e-mail discourse, field notes, telephone interviews, and photographs (Joyce & Showers, 1995). "Methodological triangulation" (Craft, 1996, adapted from Cohen & Manion, 1989; Denzin, 1978; Patton, 1990) was obtained by utilizing the same data collection methodology at different points during the duration of the study. The online dialogue was coded and analyzed for emergent patterns (Patton, 1990) and for reflections using a coding system outlined by Lamy and Goodfellow (1999) and one delineated by Surbeck, Han, and Moyer (1991). The focus group session was conducted at the end of the research and a summary of the dialogue was submitted to participants for member checks. The discourse of the focus group session was then coded and analyzed for emergent patterns. The lesson plans submitted during the study were analyzed by guidelines delineated by Lawson (1995) and photographs of the three classrooms selected for convenience were analyzed as described by Cuban (1993) and Harper (1994). Finally, the results of the research were compared to an unpublished report conducted by an external reviewer (McFadyen-Christensen, 2000).

Quantitative analysis of the e-mail and telephone interviews was conducted using SPSS software and the data was analyzed for the frequencies of the time of day and day of the week to determine if the participants were using technical resources available at school or at home. Statistical analysis was also conducted on the categories of barriers and categories of responses (reflective or social). Finally, the data was analyzed to ascertain if there were any significant factors, which impact the use of communication technology (gender, teaching experience, and expertise) and availability of equipment (home, school, or both). The significance level was selected at .05 because the study was hypotheses-generating and the purpose of the research was to determine the need for future research.

Results

On workshop evaluations (February 5, 2000 and June 1 and 2, 2000), participants indicated a need for follow-up sessions to the on-site professional development workshops. A barrier to more frequent on-site workshops was that the distance participants had to travel to the university for the on-site workshops. The average distance to the university for the participants was 95.5 miles with an average travel time of 1 hour 57 minutes. The solution was to use communication technologies as a means of continuing the professional development activities between scheduled workshops.

The follow-up sessions took place between the onsite workshops held on February 5, 2000 and July 15, 2000. On evaluations of the February 5, 2000, on-site workshop, participants noted the hands-on activities with the graphing calculator and data collecting equipment were the stronger features of the professional development activities. However, the teachers indicated there was insufficient time to complete the instructional activities (Sunal, 2000). Therefore, an Internet Web site, e-mail, newsletter, telephone, and mail were used to continue the instruction in the effective use of the technology in the classroom and effective science teaching pedagogy.

Surbeck, et al. (1991) delineated a rubric for analyzing student journals for reflective content. The rubric was used in this study to analyze e-mail messages. The majority of the discourse was coded as a reaction (66%), the lowest level of reflectivity (Surbeck, et al., 1991). A response was coded as a reaction if the message simply replied to information disseminated to all participants. The following is an exemplar. “Aloha! I just checked my e-mail.....I am still in Oahu! Thanks for the new lab” (Terese Fox, e-mail, March 31, 2000).

A few of the messages were coded as an elaboration (11%) (Surbeck, et al., 1991). If the teacher responded to the message and then added additional information, the dialogue was coded as an elaboration. The teachers were asked to indicate their preference for the type of communication technologies (Internet, e-mail, mail, and fax) best suited to follow-up sessions. The following message was coded as an elaboration on the requested information.

> For me personally, e-mail works best. It is more one-on-one and it is something that I can do when I get the opportunity. Most of the time I get mine daily or at least every other day. Also, with e-mail, I know when I get my messages if you have something specific for me whereas a website is not directed. A website would be a good idea for lessons. It would be good to be able to do a search for a lesson that is specific to the topic you are working on then. (Jessica Wright, e-mail, May 15, 2000)

Contemplation, the highest level of reflectivity (Surbeck, et al., 1991) was present in only 23% of the messages. However, most of the messages were from one participant, Terese Fox. Terese Fox was concerned about pursuing National Board certification and a Ph.D. program. In

summary, there was little evidence of higher levels of reflectivity in the e-mail dialogue. Figure 1 is a summary of the responses.

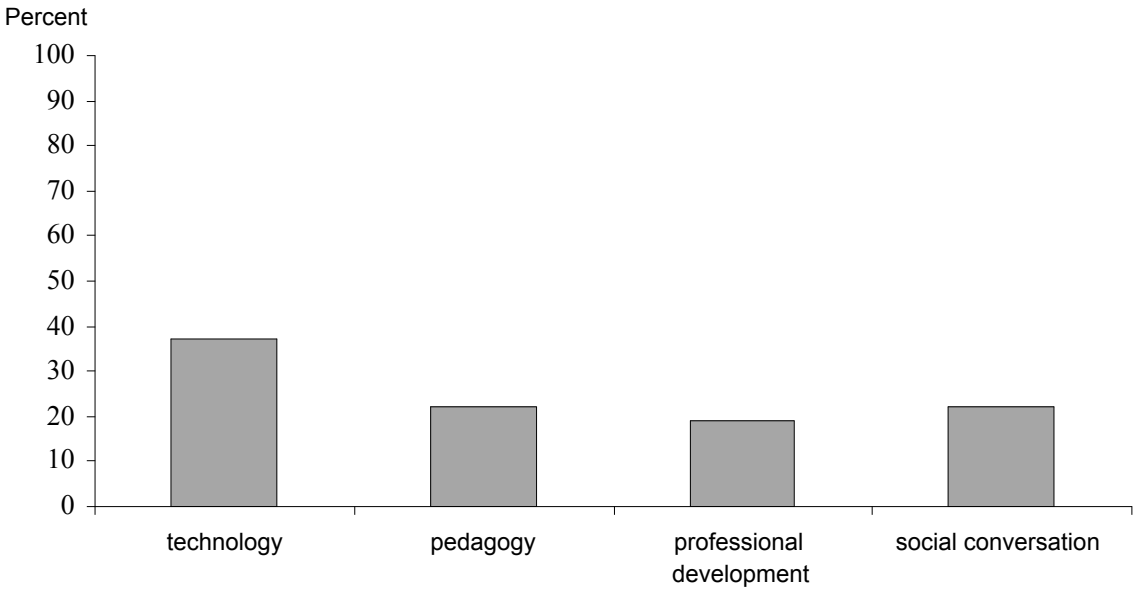

Figure 1. **Frequency of categories of responses**

However, the on-site workshops allowed time for the teachers to interact with each other in professional dialogue on a variety of in-service topics. Emma noted the peer interaction during the workshops was an important facet of professional development program.

> Say another colleague says "I don't quite understand how to do this," then I can explain it to her. There are several teachers today for the first time and they are not comfortable with the graphing calculator and CBL. I told them that I will be putting on workshops in our county to help them throughout the next academic year and to feel more comfortable using the technology. (response to external reviewer at the February 5, 2000 workshop) (McFadyen-Christensen, 2000)

Jean Bradley indicated the importance of follow-up sessions: "Every time you come to the institutes you build confidence and knowledge. Finally, after four institutes, this year I feel that I am confident." (McFadyen-Christensen, 2000, p. 26-27).

Results of the June 1 and 2, 2000 workshops also confirm the necessity for follow-up sessions. Of the 25 evaluation surveys completed, 32% of the participants indicated they needed more instruction on the effective use of the graphing calculators and CBLs.

At the focus group session and from e-mail messages, the participants reported the use of the Internet, and particularly e-mail, as a way to augment the face-to-face workshops (focus group session, June 1, 2000). Bunky Harvey's response was typical, "The e-mail has been fine. I check it often so I felt that I knew what was happening" (e-mail, May 16, 2000). Typical information provided during the follow-up sessions was general information on future professional development opportunities and new laboratory activities and lesson plans distributed via the Web site and a periodic newsletter.

Participants also used e-mail and the Web site to obtain assistance with technical problems. Duke submitted a question to the Web page for technical help. "I want to know how to enlarge FA-122

transmitted graphs and print them" (Duke, Web posting, April 2, 2000). The query was answered by the local company representative and forwarded to all participants. The person who chose the moniker 0120G requested purchasing information and instructions of the effective use of a link from a computer to a large screen TV. The information and instructions were obtained from a local librarian and forwarded to all participants. "Thank you for the information about the cable needed to link the TV to a computer. I cant (sic) wait to begin using it" (0120G, e-mail, April 21, 2000).

Other e-mail messages were of general interest to all participants. For example, two of the participants were working on obtaining National Board certification. The following information was distributed to all the participants.

> At the Project Energy workshop, we were talking about the National Board Certification. It is above and beyond anything your school pays. It is separate and comes directly from the state of Alabama. You can max out of your pay scale and still receive the $5000 a year from the state. (Terese Fox, e-mail, February 22, 2000)

e-mail was the preferred mode of communication with the university according to 80% of the teachers involved in the research. "E-mail is the easiest way to communicate. Newsletters are not real useful" (Bunkie Harvey, field notes, telephone interview, March 16, 2000). "E-mail is the best way to contact me for professional development. E-mail seems less intrusive and less of a bother. Too many messages at work, too many messages at home on the answering machine" (Duke, field notes, telephone interview, March 22, 2000).

The participants who indicated a preference for e-mail listed the convenience of the media as the rationale for their choice. "E-mail can be answered at our convenience" (focus group, June 1, 2000). "E-mail is the best way to contact me. I can sit and do it after I get the kids in bed. Mail at school tends to get misplaced" (Jessica Wright, telephone interview, April 10, 2000). Figure 2 summarizes the results.

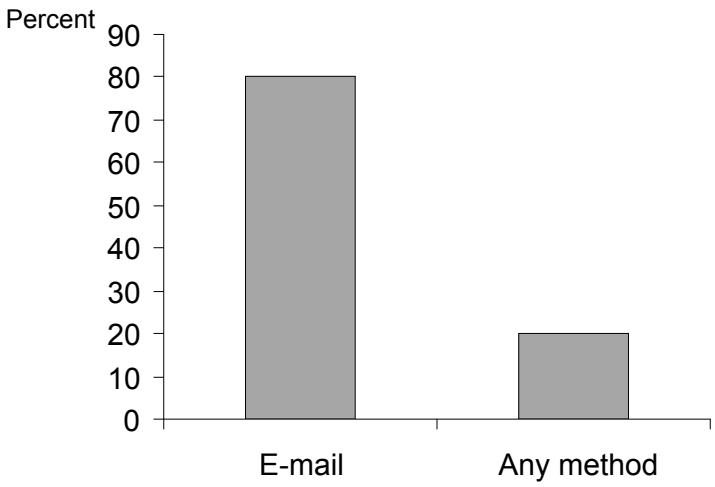

Figure 2. Preferences for types of communication technologies.

The Web site did not appear to be as useful to the participants. The average hit on the counter was only once a week during the course of the investigation. However, the Web site could be utilized by students to guide them through a laboratory activity using the graphing calculators as reported by Emma.

> I couldn't get in the first time. I could get in the second time. It was helpful. Yes, it is very helpful. The picture of the calculator is helpful. It is helpful to go through the directions. I got a TV monitor to help the students follow the directions. (Emma, field notes, telephone interview, March 21, 2000)

Other participants (24%, 4 of the 18 teachers) did not even attempt to access the Web site. Access to the Internet and e-mail was problematic for 24% (4 of the 18 teachers) throughout the study because the local school systems were updating servers. Jean Bradley commented, "I had problems accessing the Web page at school because they are updating our server" (field notes, telephone interview, March 20, 2000). Martha Bolton voiced a similar complaint, "We have a new server at school and I can't get online at school" (field notes, telephone interview, March 20, 2000).

In addition to consistent access to the Internet and e-mail, one participant, Bertha Cassiday, noted difficulties with her equipment. "I've had major computer problems this semester. My Mac at home went on the fritz, so I eventually bought a new PC. Then I had to re-format the hard drive, get a new printer..." (e-mail, May 15, 2000).

The research considered the impact of various factors, including skill in using technology, on the effective use of communication technologies for follow-up to on-site professional development. In general, the teachers indicated they were comfortable with the use of e-mail (82%) and the Internet (94%). Over half of the participants (59%) had access to a computer both at school and at home. All of the teachers had Internet access either at home or at school and e-mail was available to the majority of teachers (94%).

Access to the Internet was problematic for four of the participants (24%) and one participant noted hardware problems during the study. However, none of the teachers reported problems using e-mail or the Internet to maintain dialogue with professional colleagues.

Analysis revealed a statistically significant relationship between the number of hours per week on the computer (0.36; $n = 17$; $p = .15$) and the number of computer applications the participants felt confident they could use. In addition, the more time spent on the computer, the more e-mail messages the teacher posted (0.43; $n = 14$; $p = .13$). There was a statistically significant correlation between experience and the number of hours spent on the computer per week (0.50; $n = 14$; $p = .04$). The more experienced teachers, on the average, spent 16 or more hours and the computer. However, half of all of the participants did spend between 6 to 15 hours per week on the computer. Table 1 summarizes the results.

Table 1

Average Hours on the Computer per Week and Years of Teaching Experience

Teaching Experience	0-5 hrs on computer	6-15 hrs on computer	16+ hrs on computer
0-5 years	1	4	1
6-10 years	0	3	1

11 + years	1	2	5

To summarize, generally the participants were able to effectively utilize and access the Internet and e-mail for the purpose of follow-up to on-site professional development workshops. The more hours a participant used the computer, the more often the participant posted e-mail messages. Finally, the more experienced teachers were more likely to spend in excess of 16 hours a week on the computer.

Limitations of the Study

The emphasis of this study was centered on generating hypotheses and therefore the conclusions cannot be generalized. The small size of the sample limits the findings of the research. The sample was convenient and not random; the quasi-experimental design cannot be generalized. The participants were teachers at the 5th- to 12th-grade level; the findings are limited to educators assigned to teaching at this level.

Conclusions

The Internet Web site was underutilized by participants. Access to the Internet was problematic because local school officials were updating the servers and one participant had equipment problems. Several studies have noted similar barriers to the use of communication technologies for professional development (Bohrer et al., 1998; McMahon, 1997; Smith et al., 1999).

Although several modes of distance communication were available to the participants—Web site with discussion board, telephone, fax, and mail—the participants reported a preference for e-mail. The rationale provided indicated e-mail was preferred primarily because of convenience and also because the medium allowed them to maintain contact with professional colleagues between on-site professional development workshops. In related studies, Burke (1994), Glickman, et al. (1995), and Lewison (1996) noted similar results.

The average participant worked in a rural school (52%) and traveled 1 hour 57 minutes (95.5 miles) to the on-site workshop. The use of e-mail and the Web site provided an opportunity for the rural and underserved teachers to dialogue with other professionals. Research reported by Fullan and Hargreaves (1996), Williams, (1995), and Yap (1996) indicated the use of communication technologies is useful in reducing teacher isolation, a factor in effective professional development. In addition, the technologies were available to the participants at home or the local school at their convenience; Sharma (2000) reported similar use of the Internet and e-mail to meet time/space needs of rural teachers. In summary, the teachers were able to communicate effectively with other professionals via the Internet and e-mail and differences in technical skill or access/equipment did not appear to negatively impact dialogue during the study.

Emergent Hypotheses

1. E-mail is the most viable communication technology for follow-up to on-site professional development.

2. Differences in experience or expertise in using communication technologies does not negatively impact the use of the Internet or e-mail for follow-up to on-site professional development.
3. Access to the Internet is more problematic for rural and underserved teachers.

Further Research

Further research should investigate whether synchronous or asynchronous online professional development activities are equally effective. A longitudinal study of the effectiveness of online professional development versus traditional on-site face-to-face professional development should be conducted to ascertain the lasting impact on exemplary pedagogy actually in use in the classroom.

The participants were part of a cadre of teachers with a relationship spanning four years or more. Additional research should be conducted on the optimal time and number of face-to-face sessions needed to create a collaborative, reflective network of teachers who are able to maintain critical dialogue with colleagues via communication technologies.

In summary, the results of the study indicated the technology shows promise as a viable method for professional development. Research indicates improvement in actual classroom practice is the result of sustained professional development through rich dialogue with mentors and peers (Dimauro & Jacobs, 1995; Loucks-Horsley, 1998). Thus, the results of the study indicate a need for distance professional development that fosters and elicits professional growth.

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