Abstract

Teachers need to develop new informational and technological skills, as well as feelings of competence and confidence, in order to help their students to use the Internet for learning. To develop these skills and dispositions, teachers need support for their learning and a user-friendly technological infrastructure. This article reports findings related to teacher learning from two phases of an ongoing program of research investigating Internet use in Alberta schools. Teachers' experiences as they learned about the Internet were examined through school-based projects and through a provincial survey. The findings suggest that important aspects of technical support and learning support are lacking for many Alberta teachers.

Introduction

Widespread Internet availability in schools is very recent, and there is little research examining how teachers learn to use it as an educational tool. What is known is that successful implementation in schools of a new technology, such as the Internet, is influenced by such factors as the availability of appropriate hardware and software (Maddux, 1994), the attitudes of teachers towards the innovation (Woodrow, 1991), the adoption of new models of teaching and learning (Gallo & Horton, 1994; Hooper & Rieber, 1995) and the development of teachers' technological skills (Peha, 1995). Teachers using the Internet are working in an environment of information abundance instead of information scarcity, which leads to new problems related to the location, evaluation and use of informational resources (McNicholas & Todd, 1996). Teachers
need to acquire information skills that enable them to use Internet resources that are relevant to the curriculum and appropriate to their students' needs.

More research is needed to examine how teachers go about developing these technological skills. This paper reports findings from two phases of an ongoing program of research investigating teachers' Internet use in Alberta schools--a study involving school-based research projects and a province-wide survey. The school-based research projects study examined individual teachers' experiences as they learned about the Internet, including how they initially got interested in the Net, how they learned to use the Net, and the factors that supported and challenged their learning. The survey investigated the nature and extent of teachers' Internet use as well as the support for Internet use, in terms of both technology infrastructure and teacher learning opportunities.

Two Studies of Teacher Learning

School-Based Projects Study

For the school-based research projects study, three elementary schools and three secondary schools from four districts in Alberta were selected, on the recommendation of superintendents and/or district consultants, based on the schools' advanced Internet use. In the Fall of 1997, each of the six schools was invited to identify one teacher to work with a graduate student research assistant in order to develop ways to integrate the Internet into their teaching and to enhance their own learning about the potential of the Internet as an instructional tool. The graduate students were all experienced classroom teachers.

The graduate research assistants and classroom teachers met on a weekly basis over a two to three month period in the Fall of 1997. They talked about their professional learning experiences and preferences as they collaborated in planning and teaching using the Internet. The graduate research assistants kept extensive field notes based on conversations, observations and activities over the duration of the partnerships. As well, the teachers and research assistants interacted through e-mail journals in which they reflected on their experiences with the Internet. All e-mail interactions were shared with the co-investigators.

The Mail Survey

In the Spring of 1998, questionnaires were mailed to a sample of 297 schools from K-12 in Alberta. Within the selected schools, three educators were surveyed--an administrator and two classroom teachers. The computer-scoreable questionnaires consisted of 72 items, including Likert scale rating items and yes/no items. Participants were asked to provide data related to the size of the school, the nature of the school community, their educational background and work experience, and their Internet knowledge, access and use. Responses were received from 166 administrators and 300 teachers (an overall response rate of 52%). The responses from the teacher surveys only have been considered for this paper.
Findings from the School-Based Projects and the Teacher Survey

Four themes related to teachers' Internet learning experiences emerged from the teacher survey and from the school-based projects: motivations for getting started on the Internet; approaches to learning to use the Internet; factors that assisted learning; and factors that presented obstacles to learning. For each theme, statistical data from the teacher survey as well as comments from the teachers in the school-based projects have been provided.

Learning about the Internet: Motivations for Getting Started

Both intrinsic and extrinsic motivations were behind the teachers' decisions to begin using the Internet. Of the teachers who responded to the survey, the majority reported intrinsic motivations for learning about the Internet. That is, they were motivated by personal interest and/or curiosity (72.7%) and/or by the desire to learn new teaching tools (59.3%). The sources of extrinsic motivation most frequently identified by the survey participants were students (37.3%), colleagues (29.6%), and school administrators (24.7%).

The teachers in the school-based projects described their motivations for starting to learn about the Internet in these ways:

- *I needed to begin from a personal interest.* (Margaret)
- *I probably first got interested in using the Internet because of all the press and media reports about it. Then it was probably because the administration put a push on it. The next way that I got introduced to it was when we had the students attempt to start using it.* (Joe)
- *We were expected to check our e-mail first thing every morning and several times a day as all messages from the administration were communicated in this way.* (Rhonda)

Learning to use the Internet: Learning Approaches

Teachers in the two studies took a variety of approaches to learning about the Internet. On the survey, teachers were most likely to report that they had learned about the Internet on their own through trial and error (69.6%) and, of those, two-thirds felt that trial and error was an effective way for them to learn. A smaller number of teachers reported learning about the Internet by working with a colleague (29.3%), and/or by working with students (29.0%). Fewer of the survey respondents identified the following as effective means of learning to use the Internet: district in-service (20.4%) and school in-service (20.7%), taking courses (20.6%) and using manuals and on-line tutorials (16.0%).

Most of the teachers in the school-based projects also were self-taught and felt that the most beneficial learning experiences for them came through trial and error and through professional reading, as these comments suggest:
I was more or less self-taught initially ... Usually I'll pursue things on my own and if I feel I need extra instruction, I'll take a course. I'll research what I need to know. I guess the Internet is that exactly. You research the Internet to learn more about it. (Daryl)

I like to have the information in front of me in some written form, and then I like to actually go through and try it myself. When I finally try it myself, I think that I probably have the best retention of the material. (Joe)

Some teachers in the school-based projects also reported working with others:

Another colleague with strong technology skills introduced me to the Internet...n Over the year, this colleague continued to pass on [Internet] projects which I loved to do and by the end of the school year, I had taken over the school web page. (Nancy)

I learned most of what I know about using the Internet from my students who come into the library to use the Internet and show me how to access information and how to use the options. I found this the most useful because what I learned was what I needed to learn to complete whatever task I was doing. (Carol)

Like their colleagues on the survey, the teachers in the school-based projects noted that many of their in-service experiences had been ineffective for them:

I had some in-servicing but that was not very effective. (Don)

I went to an in-service on how to surf the Internet. It was a small group, about 10, and there weren't enough computers for us all to have hands-on opportunities ... I found the ... workshop frustrating--there just wasn't enough hands-on and I felt short-changed. (Joe)

Learning about the Internet: Supports

The participants in both studies identified a number of factors that assisted them to become more competent and knowledgeable Internet users. The majority of the survey respondents viewed their administrators as supportive of Internet use (85%). However, only half (52.4%) felt that their school provided adequate support for learning to use the Internet and less than half (42.7%) felt that there was adequate technical support for using the Internet in teaching. Less than half (46.3%) of the teachers surveyed reported that their district provided adequate support for learning to use the Internet and less than one-third (30.7%) reported that their district provided adequate technical support for using the Internet. Opportunities for collegial sharing were viewed as effective in enhancing their learning by 35% of the teachers responding to the survey.

The teachers in the school-based projects most often identified the following as supporting factors for learning about the Internet: administrative, technical, and parental support; opportunities for collegial sharing; being able to learn within the context of something relevant; and having a positive attitude toward change.

Our administration is supportive and we have technical staff available.
Our parents may not have the knowledge but they are excited and committed. (Daryl)

It is stimulating to be able to share ideas with another person. With this interaction, new ideas are born and the willingness to try new things becomes heightened. It is also good to be able to converse with someone about the difficulties of the changes or new learning that is occurring. (Nancy)

Seeing other teachers and children engage in Internet use has been helpful as well. ... I think teachers need to see the relevance of the technology or they are not interested. (Gina)

Learning about the Internet: Obstacles

On the survey, teachers were asked to indicate the extent to which various obstacles limited their use of the Internet. The most frequently reported obstacles were: limited time available for using the Internet (65.6%), pressure to cover the curriculum (41.0%), lack of school funds to purchase or upgrade hardware and/or software (40.4%), and limited access to computers connected to the Internet (34%). Problems related to the Internet itself or to their skills in using the Internet were less frequently seen as limiting factors. Less than a quarter of the teacher respondents identified concerns related to relevance of information (23.0%), reliability of information (20.4%), the nature of information (20.0%) on the Internet, and limited skills in using search engines and/or search strategies on the Internet (21.3%).

The teachers in the school-based projects also faced a number of challenges as they learned to use the Internet effectively. For them, too, the most often cited challenge was time, in particular, time for learning the intricacies of the technology, time for accessing information and appropriate sites, and time to prepare lessons using the technology. Other obstacles mentioned by them included: inaccessibility of computers, including home access; lack of administrative and collegial support; and difficulty in using the technology. Here are some of their comments about the challenges they faced:

The biggest difficulty is keeping up. Time is a factor, certainly. You could spend all day learning about interesting things but at some time you have to put it altogether and package it up. Things change so quickly. It can be exciting and frustrating at the same time. You wonder if you will ever master it. (Daryl)

The biggest problem is the limited number of computers. It's [the computer lab] not always available to bring classes in. The availability of the Internet to the classes in the school will ultimately determine if it will be used. I don't have a hookup at home so I have to find time to do searches at school, and that can often be a problem. (Joe)

The loss of a supportive principal changed the way technology was viewed in the school and how I was treated. My staff thinks the Internet is a frill. This appears to be especially true when there's enough to do in teaching as it is. (Nancy)
Without the support of colleagues new learning can be isolating and lonely. Learning under these conditions can be tedious as well as time consuming. (Rhonda)

The Internet is not always easy to use. Inexperienced users are frustrated by breaks in delivery, lost links, unavailable sites and deaden searches. The technology gets in the way. (Gina)

Teachers find it difficult to carve out a section of time for Internet-related project work, given the pressures of the 'official' curriculum. (Earl)

Discussion

The findings from the two studies, the teacher survey and the school-based projects study, were consistent in their reflection of teachers' experiences with learning to use the Internet. The teacher survey data provided an overall picture while the school-based project data provided a close-up look at individual teachers' experiences. Three critical aspects of the findings from the two studies related to teacher learning are discussed briefly below: administrator support for teacher learning; effective in-service for teacher learning; and time for teacher learning.

Teachers need support when learning something new. Administrator support for teacher learning is crucial, and administrators are in the position to provide the necessary resources of time, technology, and expertise. The majority of teachers saw their school administrators as being supportive of Internet use and as trying to provide adequate technical support. The teachers in the school-based projects talked about this support in these terms: having a clear school vision for technology use, having a collaboratively-developed technology plan, and having opportunities for collegial sharing about technology. Administrators who were experienced Internet users themselves and who presented staff in-services were cited as important supports for teachers' efforts in learning about the Internet and using it in their teaching.

Another important support is teacher in-service. The teachers in both studies were less likely than expected to report that they learned about the Internet through attending district or school in-services, and only a few who did attend these in-services found them to be very effective in enhancing their learning. There are a number of possible ways of explaining the reported ineffectiveness of in-servicing. Anecdotal evidence gathered from teachers on other occasions suggests that school and district in-services are often too intensive in terms of the amount of information and the pacing of delivery. These teachers report that they experience such in-services as information overload. The situation is exacerbated by the lack of opportunity for teachers to practice the skills and/or apply the strategies being demonstrated subsequent to in-service sessions. A critical aspect of in-service success is the opportunity to practice the new skills, but teachers rarely have the time or opportunity to practice their new skills within a time frame conducive to retention and/or development of those skills. Too often in-services do not include sufficient practice and discussion time, and opportunities for practice and discussion are limited when teachers return to their busy, often hectic, lives.

Teacher learning should be facilitated by professional development activities that are accessible and timely. Teachers need hands-on experience to explore the Internet and to practice new skills.
Instructional sessions should be short and followed by lots of practice time. Linking the training to classroom projects works well because the teachers' learning can be applied immediately to classroom needs. Teachers need to see the relevance of the technology for teaching and learning. When educational applications are apparent, teachers are more motivated to take the time to learn how to use the technology. Before beginning to learn to use this technology, teachers need to see other teachers using the Internet in a variety of teaching and learning situations. Watching other teachers model new skills and strategies gives teachers a clearer understanding of how they could be used within the context of the classroom and curriculum. School-based professional development in a collaborative environment can provide accessible and timely support that is context-specific. Two especially effective approaches are pairing teachers to learn together and providing novice Internet users with access to assistance from more knowledgeable Internet users.

A critical aspect of support for teacher learning is time. To incorporate a new technology into teaching practice, teachers need time to learn the tools of the Internet. They need time to find appropriate curriculum based resources. They need time to collaborate with other teachers and time to rethink tried-and-true teaching strategies. Whenever teachers are learning new skills, they and their colleagues need to consider their other roles and responsibilities. If the time and effort involved are too consuming, frustration and resistance can result. There appears to be a great deal of time and effort wasted in some schools because of malfunctioning or inaccessible equipment. The adequate maintenance of computer technology appears not to be addressed in any systematic way in some Alberta schools and districts. Technology implementation is a complex and demanding challenge. Teachers and administrators need to work together in order to set realistic, attainable goals for learning and teaching with technology and in order to maintain balance in their lives and learning. Schools embarking on Internet learning and teaching initiatives should have clearly articulated objectives incorporated into school budget plans and into teachers' professional growth plans.

**Reflections**

These studies began with the premises that teachers need to develop new informational and technological skills, as well as feelings of competence and confidence, in order to help their students to use the Internet for learning, and that teachers need support for their learning and a user-friendly technological infrastructure. While little of what the teachers in these studies revealed about their experiences with the Internet is new or surprising, it is, nevertheless, important as a reminder about both the motivations and frustrations involved in major changes of this nature.

Many teachers are frustrated by the vastness of the Web and are unaware of much of what was available on the Internet. Teachers, even those who are experienced Internet users, have little knowledge of the search engines and search strategies needed to make efficient use of Internet resources (Gibson & Oberg, 1997). The location of Internet access in the school, the capabilities and availability of computers, and the vision and support of administrators are all factors within the school context that influence teachers' willingness to learn about and use the Internet. As well, teachers' level of Internet knowledge and amount of prior experience influence their willingness to use it. Teachers are assisted in learning to use the Internet by collegial sharing.
However, teacher learning is limited by a lack of time for learning and by a lack of suitable in-service opportunities.

There has been a major commitment to providing Internet connectivity in schools in Alberta and elsewhere. While there is considerable potential in this new technology, it is clear that implementation of this technology in schools is a complex and demanding process. Those involved in helping teachers to incorporate this technology in ways that enhance teaching and learning need to heed the lessons of research and practice related to teacher learning in technological change, models of staff development, and models of support for teacher learning in schools.

Interactive technologies such as the Internet can encourage more student-centered, authentic learning. However, this potential cannot be realized unless teachers have the opportunity to learn how to incorporate this powerful tool into teaching and learning in the classroom.

References


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