Case Studies of Internet Use in Alberta Schools: Emerging Issues

Susan Gibson
Dianne Oberg

Abstract: A case study approach was used to collect data on how Alberta schools were using the Internet and how teachers were learning to use it, as well as data on the perceptions of educators and parents of its value as an educational tool. The study took place in six schools in Alberta in the Winter 1997. The study schools are described in the paper in terms of five "traditional" schools and three "virtual" schools. The researchers found that teachers, principals, and parents were excited by the potential of the Internet but were concerned about the quality of the available information and the schools' approaches to controlling access. Overall, a limited number of teachers and students were Internet users. Teachers were overwhelmed and frustrated by the vastness of the Internet and many were unaware of what was available. Teachers' Internet use was influenced by training in Internet use and school context.

Resume: Une methodologie d'etude de cas a -ete adoptee pour rassembler des donnees sur 1'emploi de 1'Internet par les ecoles en Alberta, sur Fapprentissage de 1'Internet par les enseignants, ainsi que sur les perceptions qu'ont les enseignants et les parents de I'utilite de 1'Internet comme outil educatif. L'etude a /mplique six ecoles albertaines pendant I'hiver de 1997. Dans cet article, les ecoles a 1'etude sont decrites comme etant cinq ecoles "traditionnelles" et trois ecoles "virtuelles". Les chercheurs ont trouve que si les enseignants, les directeurs et les parents etaient enthousiasmes par le potentiel de 1'Internet, ils etaient egalement preoccupes par la qualite de 1'information qui y est disponible et les demarches entreprises par les ecoles pour y controler 1'acces. Globalement, un nombre limite d'enseignants et d'etudiants etaient internautes. Les enseignants se sentaient depasses et frustres par 1'immensite de 1'Internet et plusieurs d'entre eux n'etaient pas au courant des ressources qui y sont disponibles. L'emploi que faisaient les enseignants de 1'Internet etait influence par leur formation sur ['utilisation de 1'Internet ainsi que par le contexte de I'ecole.

Introduction

The Internet resources into their teaching (see Schoolnet's Grassroots Projects Program, in Schoffro, 1996). At this point, however, the actual extent of Internet use in Alberta is undocumented.

Little research addressing Internet use in education currently exists. The research that has been done to date suggests that effective use of the Internet is dependent upon such factors as availability of sophisticated technology in terms of hardware and software (Maddux, 1994), teachers' technological skills (Peha,

1995), and new models of teaching and learning (Follansbee et al., 1996). While the use of the Internet can change teachers' attitudes towards the computer as an instructional tool and can encourage them to restructure their classes, continued and effective use requires ongoing training, technical support, home access, and time to learn how to incorporate it into teaching (Gallo & Horton, 1994; Hack & Smey, 1997; Honey & McMillan, 1993).

Research available on the Internet and student learning suggests that students tend to accept electronic resources as accurate, current and authoritative and that they have difficulty evaluating Internet resources (Brauch, Gerhold & Pratt, 1996; Futtoran, Schofield & Eurich-Fulcer, 1995). Kafai and Bates (1997) found, for example, that elementary students experienced difficulty in selecting good Web sites. They also found that, although students were able to extract information from bookmarked Web sites, it was not until grades 5 and 6 that they were able to effectively use search engines and search strategies. McNicholas and Todd (1996) found that senior secondary students (as well as their teachers) were "woefully under-prepared for the diversity and enormity of search results" (p. 41) when using the Internet.

Factors such as the ambiguity, unpredictability, lack of structure, lack of selectivity, and variable information quality which characterize the Internet have been found to contribute to the intricacy of the Internet as a learning environment (Todd, 1996).

Provincial government funding of access to the Internet in schools has provided an excellent opportunity for beginning a longitudinal study of the growth of Internet use in Alberta schools. This exploratory study, conducted from February to May, 1997, of how Alberta schools are developing and using their access to the Internet reveals some of the complexities of Internet use in schools.

Purpose of the Study

The purpose of this study was to investigate the use of the Internet as an educational tool in Alberta, through case studies conducted in rural and urban schools. The case studies form part of a proposed five-year longitudinal study of Internet use in Alberta schools. The focus of the case studies was on collecting and analyzing base data about how some schools were using the Internet, about how selected teachers in those schools learned to use it, and about the perceptions of educators and parents of its value as an educational tool.

Research Design

A case study approach was chosen because of the exploratory nature of the study. Yin (1989, p. 23) defined the case study as "an empirical study that investigates a contemporary phenomenon within its real-life context, when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used." Three methods were used to collect data: interviewing of key informants, visiting the schools, and reviewing of documents.

Interviews were tape recorded and transcribed. Tape recording and transcription permitted the review and analysis of complex interview information for both factual and affective content. Field notes were kept, related to interview sessions and to visits to schools. Relevant documents such as the technology plans of the schools and the districts were reviewed.

Data were coded and analyzed using the content analysis approach recommended by Berg (1989). This approach involved a systematic combing of the transcripts, field notes, and documents and a thorough immersion in the data until themes began to emerge. When the data had been thoroughly examined, coding frames, that is, ways to organize data and identify findings, were determined. Successive sorting of the data using those coding frames allowed themes to arise from the data. Data were analyzed by the co-investigators first by individual case and then by using cross-case comparison techniques.

Six case study schools in and around Edmonton, Alberta were selected from across the K.-12 sector. All of these schools were reputed to be advanced in their use of Internet and were selected in consultation with the superintendents and/or consultants of the four school districts represented. One school declined the invitation to participate on the basis of limited Internet use; the principal of the school nominated a second school which agreed to participate. Research assistants, trained by the co-investigators, worked in each school for at least 30 hours over a four month period beginning in February 1997 and concluding in May 1997. They kept field notes of their observations and conducted semi-structured interviews with principals, technology support personnel, two teachers, and two parents in each case study school.

Description of the Schools

The study schools are described here in terms of five "traditional" schools and three "virtual" schools. The five traditional schools included two K-6 schools, a K-9 school, a 7-9 school, and a 10-12 school. The three virtual schools included a 7-9 school, and two programs within two of the traditional schools, one for Grades 3-6, and one for Grade 10. For the purpose of this report, a virtual school is defined as a school or a program within a school serving students off-site and delivering instruction primarily through electronic communications.

Traditional schools

School A was a new K-6 school with 300 students and 14 teachers. The school was built three years ago with an open plan design and a vast array of technology, including a closed circuit video system, incorporated into the building. The school had 40 Internet connections. There was one in every classroom, about twelve each in a lab and in the library, and four in the office and workroom area. When the school first opened, it shared the services of a district technology facilitator with eight other schools who helped the teachers to design the school's Web page and to begin to publish student projects on the Web. Each year in the Fall, the teachers have had in-school inservices on computers, and in Fall 1996 the full-day workshop

was on Internet use. The principal and a lead teacher provided inservice and individual assistance to teachers in the area of technology. The school had developed a three-year technology plan with the support of the parents in their community.

School B was a K-6 school with 400 students and 17 teachers. Built in 1983 with an open plan design (the library at the center), the school now has 4 portable classrooms. Until December of 1996, the only Internet connection was in the principal's office. At the time of the study, there were 15 connections in a lab setting, 3 in the library and 3 in the office and workroom area. The school was in the process of developing a Local Area Network and hoped to have Internet in all classrooms by 1998. The principal and lead teacher provided inservice and technical assistance to teachers. A Learning Resources Coordinator (0.5 FTE) has been hired for the 1997-98 school year to assist teachers with the integration of technology into instruction. A three-year technology plan for the school has been developed as part of the school's three-year business plan.

School C was a K-9 school with 350 students and 22 teachers. When the school was renovated three years ago, a schoolwide computer network (WAN) was installed. At the time of the study, there were two Internet-connected computers in every classroom, computers in two lab settings with a total of 43 Internet connections, and several other connections in the library and in the school office and workroom area. The principal took a strong leadership role in the integration of technology into instruction, providing inservice to the school as a whole and to teachers on an individual basis. Two lead teachers (each with 0.1 FTE release time) also provided technical assistance, inservicing, and individual consultations for teachers using technology. The school developed a three-year technology plan which included curriculum integration and training of staff, students, and parents.

School D was a 7-9 school with 450 students and 21 teachers. The school had 18 Internet connections, 11 in a lab off the library and the others in various places throughout the school. The library technician and the information processing teacher provided technical assistance and inservice assistance. A full-day workshop on the Internet and its use was provided for the staff in Fall 1996 by a district consultant. The library technician worked with teachers at noon hour and the information processing teacher made himself available after school to assist teachers and students. The principal used e-mail as well as productivity software, both for administrative purposes, but was at the beginner stage in Internet use.

School E was a 10-12 school with 850 students and 40 teachers. The school's main Internet connections were in one of the school's three computer labs (30 connections). Other connections were in the library and the office and workroom area. Inservicing and technical support were provided by two lead teachers. In addition to inservicing teachers in their school, they also provided inservicing to about 100 other teachers in the district. The Internet was being used in the grade 10 social studies program; there was one CTS module on the Internet; and noon hour classes were available for students interested in using the Internet for research

projects. The school's administrative communication was primarily by e-mail, and the principal used Internet in connection with his own administrative work. The school's schedule had been organized to provide staff meeting and professional development time one Friday a month, and the principal supported provision of technology inservices at that time. The school had a home page which was being used to provide links to relevant sites for students and teachers.

Virtual schools/programs

School F was a virtual program in its first year, with one teacher and 20 students in grades 3-6. The teacher was an experienced elementary teacher who worked full time in the virtual program, from an office space in a traditional school. Her students worked in their homes, located in Alberta and beyond. One was in Turkey, for example. About one-third of the students had experienced problems in the traditional classroom because of Attention Deficit Disorder; others were students who wished to move quickly through the curriculum; a few were students with health problems. The teacher was an experienced computer user and had taken a number of inservices on technology but became an Internet user only in the six months before she began working as a virtual teacher. She had participated in the inservicing provided in the traditional school where she worked and she made use of the Internet resources made available by district consultants on the district's Web page. The teacher saw herself as providing support to parents who were homeschooling—facilitating that learning and teaching—rather than providing instruction in the traditional sense. She responded to the requests and questions from parents and students, provided resources they might need, and organized small group meetings with students and parents.

School G was a 7-9 virtual school with 260 students and 11 teachers. It had been in operation for two years at the time of the study. Most of the teachers worked full-time for the school. They worked from their homes and provided on-line lessons to students as far away as Ontario and parts of the United States. Technical assistance and inservicing forteachers, parents and students was provided by a technician on contract from a private consulting firm. In-depth inservice was given to the teachers when they began working in the virtual school. Parents and students received a 90 minute computer orientation as part of the school's Fall one-day orientation program. Students were provided with computer equipment and Internet access (up to 3 hours per day for students and one hour a day for parents for $150 / year). Students were generally from families interested in homeschooling or looking for a low cost alternative to private schooling. The principal and teachers, and the students and their parents used e-mail and the WWW as part of their work. There was also provision for interaction among the participants in the school through callbacks several times a year, organized by the school. The students had access to social and athletic activities in host schools around the province, and the parents organized activity nights as well.

School H was a virtual school program in its first year, offering a grade 10 program to 50 students. All 14 of the teachers in this virtual school (4.5 FTE) were

full-time teachers working in the traditional school of which this virtual program was a part. About 25% of their time was assigned to virtual teaching. The teachers were given some additional preparation time in order to develop course materials for the virtual program. The school expected to expand the virtual program to grade 12 over the next two years. All teachers in the virtual program had an Internet connection where they worked. The students in the virtual school could lease computer equipment from the school ($160 / year) and they also could purchase Internet access ($ 100 / year for 50 hours access per month). Some students enrolled in the virtual school to continue homeschooling; others, because of medical or behavioral problems; and still others, because of dissatisfaction with the local school or because their parents' work involved extensive traveling. The students in this school came from all over Alberta. The school had an orientation for students and parents in the Fall. The student and teachers in the program communicated through e-mail and a chat program. The virtual program was coordinated by a teacher, and technical assistance and inservicing was provided by two lead teachers.

Findings

A number of major themes have been identified across the six case study schools. The investigators make no claims that the schools or these findings are representative of the schools in Alberta. However, the study does highlight issues that are likely to be of importance to other schools as they begin to use the Internet. The findings have been clustered under the headings of educators' and parents' perceptions of the value of the Internet, use of the Internet by students and teachers, Internet knowledge and training, and the impact of the school context on Internet use. Excerpts from interview transcripts have been provided in italics throughout this section in support of the findings. The speaker has been identified in brackets following each quote as either a teacher, administrator or parent. Also identified is whether the speaker represents a traditional school (t) or a virtual school (v). Readers should bear in mind that the administrators, teachers, and parents interviewed were those individuals most knowledgeable and experienced in relation to the Internet in each of the case study schools.

Perceptions of the Value of the Internet

Perceptions of teachers and administrators

Overall, teachers and administrators who participated in this study concurred that the Internet has a great deal of potential as a teaching and learning tool. The benefits they most often cited included immediate access to current, relevant information; world wide connection; the ability to better meet the needs of individual learners; the ability to provide alternative education delivery; and, the positive attitude towards school and learning generated by computer use.

While all of the teachers interviewed acknowledged the potential benefits of Internet use, concerns with its use were also noted. For example, censorship issues

influenced the teachers' willingness to use the Internet. The majority of schools in the study did not allow "free" surfing although time to explore was recognized as being a valuable experience in using the Internet. Most of the case study schools had opted for a user policy with one either already in place or under development. Permission had to be signed by the parents before students were allowed access to the Internet.

When we're teaching our kids to drive, we don't suddenly say, 'OK, there you go. We get in with them. We drive with them. We teach them and, as they get better, we let them do certain things ... Probably even after they get their driver's license , the first time they get in the car, they don't get to go on a trip to Calgary ... Why do we do it any differently with computers or the Internet? *(Principal, t)*

In other cases, website access was further restricted by using a search engine such as Magellan in order to filter out what were deemed to be inappropriate sites. This raised some concerns for some teachers, however, as they found that personal judgment was still needed at times when visiting filtered sites. A number of teachers interviewed were more comfortable with bookmarking sites for their students ahead of time.

> I think initially I can act as a guide. I can go to some of these sites ahead of time and determine what will be of value or useful for students. At the same time, I certainly don't want to limit their explorations and their own research. *(Teacher, t)*

While teachers expressed some concern over the quality of the information provided on the Internet, they generally felt that inappropriate information has always been available to children in other forms. It was generally recognized that supervision to some degree was necessary when students were using the Internet, however, this supervision did not appear to exceed what would normally occur.

Teachers and administrators generally felt that a more effective way of addressing the censorship issue for children would be to teach critical viewing skills, so that they can learn to make judgments about the appropriateness of websites for themselves.

> I don't believe that censoring information is the answer. We need to teach students to deal with the information they access. I still see a place for the personal element in teaching. Technology won't replace teachers. An adult will always need to be there to guide students and help them to use the information properly. (Principal, *t)*

> Yesterday we were in the computer room doing China research ... They [the students] had finished the bookmarks that I had found for them and they were looking for some other things. One of the girls came across a massacre that had gone on in ancient Chinese history. The site had a warning: 'Contains disturbing pictures.' I was quite impressed because

> she read this and said to me, 'This has a warning. Do you think I should go there and look at these pictures?' That was a really interesting experience for me because we are so concerned as teachers ... yet here is a kid monitoring herself as to whether or not she should got to the site. (Teacher, t)

Most of the teachers felt that with proper training and familiarity with a user expectation policy students would be responsible for appropriate Internet behavior. It was recognized that a small minority of the student population might abuse that responsibility but no more than in any other circumstance where choices were involved.

Perceptions ofParents

Generally the parents in the case study schools were excited about the potential of the Internet.

> It's a way of communicating globally...From my kid's perspective it makes a difference learning about Japan through a textbook to learning about Japan by talking to people in Japan and having that instant connection. (Parent, t)

The interest in the Internet as an educational tool was just beginning to spread. Some parents used the Internet in their work; some used it for recreational purposes and to located information on topics of personal interest; and others had not used it in any way as of yet. All parents concurred that they wanted their children to "have every advantage" in their schooling and that technological knowledge and skill would help to "prepare them for the real world." Parents in the virtual schools also liked that the Internet offered their children an alternative method of delivery.

In the majority of the cases, the parents acknowledged that their children had more technological skill than they did. For most of these parents, finding the time to learn about the Internet was the major stumbling block. Most claimed that their children taught them everything that they had learned about it to date. Others noted their appreciation of the opportunity provided by some of the schools to attend parent and child Internet training sessions at the school site.

The parents expressed some concerns about the use of Internet in schools and at home. Some felt that it should only be used as an educational tool rather than for playing games and chatting. One parent noted that there was "too much surfing and not enough school work "going on when using the Internet. Another was concerned that her children were too "sedentary" already and the Internet would further promote that lifestyle choice. While some were impressed with the possibilities as a communication tool afforded by the Internet, others talked about the importance of face-to-face communication in developing social skills and felt this was discouraged through Internet use.

It's easy to hide behind the machine because you're an unknown. You can use a pseudonym or an alias and say and do all kinds of stupid, illegal, destructive

things, but nobody knows you...But you need to have the ability to interact with people and if we're going to be like that kind of society then I think we're in deep trouble. (Parent, t)

Others were concerned over the issue of privacy and the unknown. One parent mentioned that her child was scared by having to converse over the Internet. Other parents talked about how cautious children need to be with this public way of communicating and cited concerns that they saw with the use of chatlines in particular.

> My child finds e-mail and the Internet kind of scary...There is something scary about those faceless people to him. He writes something and sends it out there and he doesn't know where it goes and he's found that uncomfortable." (Parent, v)

Some serious censorship concerns regarding the Internet were expressed by parents except in the schools where there was not widespread use of the Internet. While parents noted concern about the inappropriateness of some of the information on the Internet, they generally "trusted" their children and allowed open access at home. Several parents felt that it was their responsibility to help their children learn to make value judgments about sites.

> I think that if I train my children right, and something surfaces accidentally, they could quickly remove themselves from it...I am more inclined to be concerned over information that children receive through technology that they think is always the truth and that people can give them misinformation and they would accept it. *(Parent, v)*

Several parents also noted that their children were unhappy with access restrictions caused by their school's acceptable use policy.

One final concern mentioned by parents was the cost of providing this tool for their children and the fear that their children would get further behind if they did not provide it.

Use of the Internet

Use of the Internet by Teachers and Administrators

Some of the variety of purposes that the Internet was being used for by teachers and administrators included: professional development, such as taking on-line courses, contacting other professionals using newsgroups and listservs, downloading professional documents, researching educational issues and visiting sites to ask questions related to teaching; developing lesson plans by surfing sites to find unique lesson plan ideas; delivering lessons via e-mail; sifting to find appropriate sites for students to visit; providing virtual tour experiences for students; looking for specific educational software through online catalogs; for professional communication with the school and district administration, and virtual parents

and students via e-mail; for personal communication especially to e-mail relatives and friends: and, for searching the world wide web or contacting user groups dedicated to specific hobbies, interests and recreational purposes.

The most common Internet service used by teachers was e-mail, and, in the traditional schools, this was highest where administrative information such as daily announcements and student attendance reports were communicated in no other way. The next most commonly used service was the World Wide Web, which teachers were using to find curriculum resources and lesson plans. The virtual teachers rarely used the WWW lesson plan resources because those resources were primarily designed for traditional classroom teaching and were not generally suitable for virtual teaching. The WWW curriculum resources most frequently mentioned were sites with topic information that teachers could use in preparing instruction and sites that could be bookmarked for students to visit. The use of the Internet for newsgroups, for news updates, and for file transfer was rarely mentioned by the teachers. Several teachers noted their preferences for CD-ROM resources, over Internet resources, because they were more convenient and less time-consuming to use.

Teachers noted that identifying appropriate sites required an extensive amount of time outside of school. The vastness and tentativeness of the sites on the Internet frustrated their searches at times as well.

> When you are on that thing surfing, you are looking for one thing, but there is so much that comes up along the way. Instead of going where you are going, you end up going around in a circle...That's the hard part. (Teacher, t)

> We have so many different browsers ... you know, all those things, and I really don't have an understanding of each of them and how they work. (Teacher, t)

> I would like to improve my skills on the question of searches, to be able to zero in more on a specific subject rather that waste a lot of time on the larger topics. (Teacher, t)

Several teachers reported that they could cut down on their searching time by making use of their district designed webpage which contained previously bookmarked sites that were curriculum and subject area specific. Another school offered an after school club for students who were given the responsibility of locating specific websites requested by teachers for use in their planning or instruction.

In the schools represented in this study, the use of the Internet as a research tool was strongest at the elementary and junior high levels. The higher the grade level, the less time was spent on the Internet at school. One high school teacher claimed:

> If you want to get technology in your high school, you've got to do it in grade 10 when the kids have flexibility. You have to follow that up in grade 1 1 because in grade 12... kids want to get marks so they can go on to higher institutions. If technology will help them they'll use it. But they don't want to spend time learning it. (Teacher, t)

While the Internet was being used in a variety of ways by both teachers and students, this use was restricted in traditional schools to a small number of people. As well, schools were using only a few aspects of the Internet. Surprisingly, some of the schools who were well-equipped with technology were only using the Internet as a communication delivery system rather than as a research tool. Although students and teachers in the virtual schools used the Internet daily, their use rarely extended beyond e-mail for lesson materials and assignments. There was an overall recognition by staff interviewed that they had just begun to address the "tip of the iceberg."

> We are just starting to introduce the Internet to the staff and get them to understand the opportunity that it can bring related to information or knowledge acquisition. (Principal, t)

> Currently, we're still in the development stage, although I don't know when that will ever end with computers. We are not using the Internet directly. (Teacher, v)

Use of the Internet hv Students

Teachers reported that their students were using the Internet for the completion of class projects, such as researching for information, communicating with professionals, building home pages, contacting key pals and subject area experts, as well as for e-mailing friends, teachers and penpals; game playing; accessing chatlines; and, generally, surfing for fun on topics of personal interest including finding information on upcoming movies, learning about music groups and watching film clips on specific websites.

Student access to and use of Internet resources in all schools varied a great deal, and was heavily dependent on the their teachers' interest in and knowledge of Internet resources. In one school high levels of use were reported for the academically gifted. In only a few instances was student use part of a planned unit of instruction and even more rarely were students involved in publishing their work on the WWW. Some students were involved in learning how to develop their personal home pages, but the most commonly reported uses were "exploration" and visiting sites identified by URL or bookmarked by their teacher.

Overall, teachers and administrators noticed increased student enthusiasm and excitement about the use of technology and the Internet in their schools.

> I have seen the children excited about what it is they are doing with the technology. And if they are that excited about what they are doing then that must mean they are thinking. (Principal, t)

However there were also some concerns voiced by the teachers. One teacher expressed a concern about the nature of student assignments that she saw being produced using the Internet.

> When something comes in to me I have no idea where it originated. Plagiarism and copyright violation are rampant on the Internet and reproducing material in assignments just gets easier and easier. (Teacher, t)

Still others were worried about what direction computer use in schools would take.

> I worry that information recovery is going to be given greater importance than information processing. Some of my students think that computers are going to give them the answer to everything and they won't have to think about it. (Teacher, t)

The teachers and administrators generally noticed similar stages occurring in the students' use of the Internet. Most students began with a "play and learn" approach to "get used to how the technology works" and then they advanced to "seeing a purpose" for using it to complete a particular task. It was emphasized that allowing for exploration time was very important for encouraging more students to want to use the Internet.

Knowledge and Training

Level of Experience

A critical factor that influenced Internet use was the level of the user's Internet knowledge. For example, prior Internet experience was a variable that affected the teacher's attitude toward the Internet as an instructional tool, and attitude affected use. The skill level and comfort level of users tended to be much higher among staff and students who were online at home, therefore, the use of the Internet in school was highly correlated with home use.

> I would say, on a regular basis, clearly those four people who have it at home are using it with their students at school. (Principal, t)

Recognizing this correlation, some parents, teachers and administrators raised the issue of equity of schooling experience. There was deep concern that those without the funds to provide computer and Internet access at home would fall further behind while those with home access pulled ahead.

> It's a problem in that some kids have a whole bunch of additional resources

> available to them ... I think at times that could have a bearing on how complete a particular project is. (Principal, t)

Learning to use the Internet

The majority of the teachers and administrators who were knowledgeable about the Internet in this study were largely self taught. Many noted that they learned from their students at times because students who were frequent users of the Internet were more knowledgeable and skilled with its use. Teachers who were interested in learning about the Internet did so regardless of the inservicing support offered. Many teachers and administrators suggested that unless there was this interest in learning to use the Internet and a vision for how the Internet might change their teaching style, then inservicing would have little effect. In schools where there was a high level of commitment and enthusiasm for the use of the Internet, an interest and excitement in exploring this new avenue for its potential in assisting students' learning was cited by teachers. Student and teacher attitudes with respect to learning about the Internet were positively influenced by using the Internet to research topics, to design projects, or to communicate with someone about topics that had personal relevance to them.

> There should be a willingness to learn that technology...There is so much to learn and if you have that mind-set that you are prepared to learn, I think that it's a great way to role model for not only other teachers, but for the kids. Because if they see you working and enjoying it. it shows that you are learning too. (Teacher, t)

Staff mentoring

While acquiring knowledge and skill in the use of the Internet was integral to the teachers willingness to use it as an instructional resource, on-going support in that use was also imperative. Having someone available on staff who could mentor the novice user was particularly influential in encouraging beginning use.

> Most of what I learned about the Internet was through this phenomenal person. She had three different projects going on the Internt... I got to sit back and watch and learn that way, but also she gave me little projects to do, starting small ... so I did them. I was keen and she basically was my mentor. (Teacher, t)

In the traditional schools, lead teachers were designated by the principal and, in two schools, lead teachers were provided with small amounts of release time to assist other teachers in Internet use. Administrators with considerable success in bringing teachers to the Internet tended to start small, usually one class at a time. Demonstration of what was possible on the Internet was found to be a powerful tool in encouraging others to use it.

Encouraging peer sharing was also a powerful motivation for increased use. Staff helping other staff in small groups was commonly done in schools that had a high number of staff online at the school. A team work approach in a collaborative atmosphere was common on staffs who were willing to experiment and incorporate the Internet into their curriculum.

> We like literally all of us sit down ... and surf together ... and every time someone finds a really good site, full of lesson plans or sites the kids would really just love, they share it with the rest of the staff. (Teacher, t)

Inservicing

Inservicing provided support and encouragement for Internet use.

> I think there is a real need for inservicing. I know a lot of times I'll help staff members just by chance. There isn't anything beyond the basics, in terms of professional development. I think that is an area that really needs to be looked at, just for getting comfortable with the various things that we have available . (Teacher, t)

Administrators attempted to address the issue of increasing user knowledge of the Internet by offering inservicing both within the school and at the district level. The principals and lead teachers often provided both formal and informal inservice to their staffs and, in two schools, provided inservice to other teachers in the school district. In all of the traditional schools, full or half-day inservices for teachers on Internet use had been provided on an annual basis at the school level, and all the teachers had access to district inservice programs. These district level inservice sessions were not always well attended. Many teachers noted that they were not willing to invest the substantial amount of time required to learn to use the Internet, especially when it was after school time that was required. Most administrators recognized that there was a steep learning curve associated with learning to use the Internet and attempted to offer some release time for teacher exploration in addition to school level and district level inservicing or arranged for technology training to be the focus of professional development days. Teachers in the virtual schools reported less involvement in inservice, reflecting perhaps their selection of and attraction to virtual teaching because of higher levels of technology knowledge and experience.

Impact of the School Context on Internet Use

Location of computers

One of the factors that influenced the willingness of staff to use the Internet was how accessible it was to them. The location of the computers with Internet hookup within the school either encouraged or discouraged Internet use. The teachers claimed that a lab setting was the least desirable set up because scheduling

and supervision problems caused frustration for them. The most effective place to have access, they felt, was in the classroom so that the Internet was easily accessible when needed.

> Because we don't have any networking that goes directly out into the classroom yet, our teachers are not using it yet on a daily basis with their students. (Principal, t)

Capabilities of available computers

Another crucial factor in determining a teacher's commitment to learning to use new technology was ensuring that the technology needed to implement the technology plan was available in the school. Ensuring hardware and software compatibility, functioning equipment and committing resources to keeping up with fast paced change were very important.

> So you have a lesson booked for Block 2 to take them surfing on the Internet, and you get there and half the computers don't work. That in itself poses a lot of problems and it happens all the time. It's just life with computers. They don't always work ... I know many teachers at the school who have planned out their lesson they're going to do on the Internet, and they're very new at it so they're a little nervous. So they take their kids in the lab and half the computers don't work so they say, 'Forget it,' and they go back to class. It's too much hassle. (Teacher, t)

Technical assistance - installing and keeping the technology running - fell in large part onto the shoulders of principals and lead teachers. In one school, the principal estimated that only 10% of the time allocated for Internet support went into inservice; the rest of it was eaten up by hardware and software concerns. Where technicians were available, they were district or private industry personnel whose services were provided through contract or other fee for service arrangements. In all but one school, teachers had the task of troubleshooting hardware and software problems. In none of the schools was there an in-school technician who maintained the computers. Technical support for any serious problems came from outside the school and usually involved substantial wait time.

> When all the problems come up I can't always solve them and then you get frustrated because you have to wait for someone to come out and fix them. (Teacher, t)

The capabilities of the equipment also influenced access especially in terms of the amount of wait time required for getting on-line and for downloading certain files.

> When I was doing searching, it was slow, it was treacherous. You were waiting around for the information to come back to you. The searches were taking a lot time. So, you know, this technology is great and the

> information is good but ifthings don't happen in the hardware end ... then it becomes useless. (Teacher, t)

Scheduled lab time could easily be wasted trying to locate relevant sites due to the vastness of the information available:

> You can surf and you're going to sit there twenty minutes while your computer whirls around and brings up the site. You are always going to be one step behind technology. We spend lots of money on computers and we have computers that are outdated. It's just a part of life. (Teacher, t)

Administrative support

The principals in all of the schools but one took a strong role in supporting the use of Internet technology in their schools. The attitude and support of the administration directly affected the quality of the enthusiasm regarding Internet use in the school.

> We wouldn't be where we are at this school without the vision of the principal and the desire to put in the money so that the technology can be supported. I know [the principal] is very interested in the Internet personally. When the access was only in his office, he would say to the teachers, 'Come and bring your kids in. I've got this really neat site they can visit' or Til show you how you can show your kids." So you'd have 25 kids crowded on the floor looking at a certain site. *(Teacher, t)*

Administrators who had a vision regarding technology and consistently modeled the various ways it could be used appeared to have had an easier time convincing staff members to take risks in their learning. Having a well thought out technology plan with considerable staff input tended to move a school closer to implementing a goal of computer and Internet literacy. Principals of new schools cited a willingness to learn about new technology, rather than an expertise with it, as a criteria for selecting staff.

Community support

Parental and community support for Internet use was also cited by teachers as an important factor in their willingness to use it as an instructional tool. The school that had the least number of parent consent forms returned also had the most significant teacher apathy regarding the value of the Internet as a teaching tool. To encourage community support, some schools offered a program that allowed for inservicing of parents on the Internet to either show them how to use it, show them how it was being used as educational tool in the school or both. Support from the community for use of the Internet and technology in general appeared to be affected by socio-economic status.

Discussion

The six case study schools featured in this article served students in urban, small town, and rural settings in and around the Edmonton area. Some of the students in virtual schools lived in the same area but others lived in other provinces and in the United States. In the virtual schools, all students had home access to the Internet. In the traditional schools, the estimated proportion of students with home access ranged from 10% to 30%. School access for students in traditional schools in the study ranged from a ratio of 5 students per connection in a small town school with a connection in every classroom and two lab environments suitable for whole class teaching to a ratio of 27 students per connection in a city school with connections in one lab and in the library. Only one school had a schoolwide plan that specifically addressed the integration of technology such as the Internet into learning.

This purposive sample of six schools is not representative of Alberta schools overall. The schools were selected because, in the Winter of 1997, they appeared to be at an advanced stage in the use of the Internet. They had the appropriate technological infrastructure in place to support Internet use and its integration into teaching and there were administrators and teachers in each school known to be Internet users. Most teachers in this initial study, however, were at the exploratory stages of using the Internet as a research tool. In the traditional schools, the proportion of teachers with a high level of Internet knowledge and use, based on principals' estimates, was quite small, ranging from 20-35% of staff. Teachers were still trying to discover what was out there and to negotiate their way through the maze of information.

Most staff interviewed felt that the Internet was the wave of the future but were not always clear about what that meant. Several people felt that textbooks would eventually become obsolete as they were no longer cost effective in the light of the advances on the Internet. Others expressed concerns regarding the lack of interaction that increased computer use (especially through virtual school programs) would promote and emphasized the importance of socialization and the human dimension to learning.

All teachers noted that they lacked in search skills and in knowledge how to effectively use search engines. There appeared to be no teachers in any of the schools with specialist knowledge in information searching and resource evaluation (such as, for example, a teacher-librarian). There was also a general lack of awareness amongst students of search engines and search strategies. Student lack of skill in locating information also meant that the teacher or library staff had to spend a great deal oftime giving individualized assistance with the student searches. Generally, locating and evaluating sites, learning how to use search engines and learning how to search efficiently were looked upon as drawbacks when using the Internet. Time for teachers to access and search the Internet was voiced as an issue at virtually every school.

The findings from this study in six schools are consistent with what little research addressing Internet use in education currently exists. In the study schools, the use of the Internet was influenced by the availability of appropriate and reliable technology. Teachers' use of the Internet was limited by their technological skills and by the lack of time they had available to learn how to incorporate it into teaching. Some teachers were beginning to envision the potential of the Internet to support new models of teaching and learning. However, they were experiencing frustrations with searching the Internet and with finding appropriate resources on the Internet. School and district administrators will need to find ways of encouraging and supporting teacher learning in this area if the Internet is to be put to effective uses by more than a few teachers in each school. As one of the principals in the study stated:

We can have all the technology in the world but unless we know how to use it and feel comfortable, and have someone who supports us and guides and encourages us and excites us to want to use it, it's not going to get used.

Future Studies

Based on the findings from the case studies, a province wide survey was conducted in Spring 1998 focusing on how the Internet is being used in the schools of Alberta. It is anticipated that the findings of the provincial survey will be used to guide the design of a national survey. The case studies have also opened up a new area of inquiry related to teachers' knowledge of information searching strategies within the context of research as a literacy task. This has been the focus of a follow-up study conducted in the Fall of 1997 in the same case study sites presented in this report.

References

Berg, B. L. (1989). Qualitative research methods for the social sciences. Boston: Allyn and Bacon.

Brauch, A., Gerhold, K. & Pratt, B. (1996). *World wide web use: A mapping of potential.* [Online]. Available http://www.seattleu.edu/%7Eadamb/research.html

Follansbee, S., Gilsdorf,N., Stahl, S., Dunfey, J., Pisha. B. & Hughes, B. (1996). The role of on-line communications in schools: A national study. Center for Applied Special Technology, Peabody, MA. [Online]. Available http://www.cast.org.

Futoran, G., Schofield, J. & Eurich-Fulcer, R. (1995). The Internet as a K-12 educational resource: Emerging issues of information access and freedom. *Computers Education, 24(3),* 229-236.

Gallo, M. & Horton, P. (1994). Assessing the effect on high school teachers of direct and unrestricted access to the Internet: A case study of an east central Florida high school. *Educational Technology Research and Development, 42(4),* 17-39.

Hack, L. & Smey, S. (1997). A survey of Internet use by teachers in three urban

Connecticut schools. *School Library Media Quarterly,* 25(3), 151-155.
Honey, M. & McMillan, K. (1993). Case studies of K-12 educators' use of the Internet: Exploring the relationship between metaphor and practice. New YorkiNY. Education Development Center for Children and Technology. (ERIC Document Reproduction Service No. 372726).
Kafai, Y. & Bates, M. (1997). *Internet* web-searching instruction in the elementary classroom: Building a foundation for information literacy. *School Library Media Quarterly, 25(2),* 103-111.
Maddux, C. (1994). The Internet: Educational prospects and problems. *Educational Technology, 34(7),* 37-42.
McNicholas, C. & Todd, R. (1996). New kids on the box: Is it worth the effort and investment? *Scan, 15(4),* 40-43.
Peha, J. (1995). How K-12 teachers are using computer networks. *Educational Leadership, 53(2),* 18-25.
Schoffro, M. (1996). SchoolNet offers teachers great opportunities. *The ATA Magazine, Fall,* 13-14, 25.
Todd, R. (1996). Evaluating internet information services. ITEC Virtual Conference TL Strand. [Online]. Available http://www.itec.com.au/virtualConference/papers/ToddR-l.html, June 13]
Yin, R. K. (1989). *Case study research: Design and methods (rev. ed.).* Newbury Park, CA: Sage.

AUTHOR

Susan Gibson is an Assistant Professor in the Department of Elementary Education and Dianne Oberg is an Associate Professor in the School of Library and Information Studies at the University of Alberta. The researchers acknowledge with thanks the support for this research from AACES, the Alberta Advisory Committee for Educational Studies, and from the Office of the Associate Dean (Research), Faculty of Education, University of Alberta. The researchers also wish to express their gratitude to the many individuals who welcomed the research assistants into their school communities and whose generosity made this research possible.