Intregrating Technology into Subject Areas

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Introduction to the Study

Integrating technology into subject areas has been a recent focus of many school divisions. Large budgets have been provided for schools to purchase hardware and software that will keep students current and comfortable with new technologies. Many divisions are now realizing that having the hardware in place does not necessarily mean that teachers are comfortable using it (McKenzie, 1999).

Although, by nature, students are very curious and willing to dive right into using computers, scanners, digital cameras and new software, many teachers are not. Schools have tried to solve this issue by offering hardware and software training sessions for teachers. However, using technology in the classroom involves more than just learning how to use technological tools. Many stages of learning and planning need to occur before teachers will become comfortable using computers in their respective subject areas. As James McKenzie (1999, p.3) observed:

> "too many (divisions) put the network "cart" ahead of the learning "horse". As wiring, cabling and hardware purchases race far ahead of program development and human resource development."

Although numerous strategies and divisional plans have been developed to train teachers to use technology in their subject areas, plans often lack many of the key components that have been identified by teachers as reasons they don't use computers in their classrooms (Bailey, Dunbar, Lumley, 1995, p.129). To enable teachers embrace the new technologies; school divisions need to address teachers' interests, learning styles and special needs. Money needs to be invested, not only in hardware and software, but in also providing individualized, subject specific, and classroom supported training.

The purpose of this study was to ascertain whether adequate supports are in place to initiate and sustain the integration of technology. The questions that guide this study are:

1. What do teachers deem as adequate support in the integration of technology into classroom practices?
2. How might we best provide this support?

This study suggests a mentorship paradigm that has been utilized at Fairview Middle School, which addresses the in-servicing needs of teachers. In addition, the study suggests some recommendations for implementing a successful mentorship program.

The study concludes by outlining possible educational implications and raising questions for further consideration.

Background to the Study

This study was originally conceived from questions that emerged in my own work as a computer teacher and coordinator at Fairview Middle School. In 1990/91 our school was selected to participate in a project in Saskatchewan entitled "Chalk, Chips and Children." The project allowed for corporate sponsorship to fund a technology upgrade at Fairview School. Teacher training was provided on school inservice days with the entire staff and through the concept of "in- school sabbaticals." All teachers were provided with a home computer to familiarize themselves with the technologies available. Sponsored by Apple Canada, Macintosh computers and printers were purchased and networked throughout the school. We had three software programs that we used with the students. The load was manageable.

The "Chalk, Chips and Children" pilot was completed in 1991/92. In December of 1996 change took place in Swift Current. A Computer Consultant was hired for the division and a decision was made to switch to Windows computers. A variety of hardware was purchased and included scanners, digital cameras, projectors, and CD burners. In order to meet the resulting information overload, technology training session were started at Fairview School. Once a week, large group morning training sessions were provided. In addition system wide training sessions, based on a survey of needs assessment were offered for teachers. Teachers were given one day paid leave each year to participate in their choice of the training sessions. In addition, a government funded project was available to provide out of class support for teachers using technology in their subject areas in which teachers planned lessons incorporating technology and requested training based on their individual needs.

In 1998/99, there was a shift in our teacher inservice needs. School based morning inservice showed poor attendance. System wide training sessions, although abundant and varied, was not meeting the individual needs of teachers. Government grants were made available to encourage teachers to integrate technology in curricula. These grants provide release time and had the appeal of a curriculum-based focus, but were only effective over a short period of time. The grants were available for a one-year term with

restrictions and time restraints. Generally, inservice opportunities provided training, but no follow up or on-site support.

A report published in the United States by *Education Week* entitled "Technology Counts"(1997), studied the use of technology in schools in all 50 states. The report confirmed that: "adequate allocation of time and money for staff development - on site - and for follow up support is a feature shared by schools that manage to sustain their use of technology over time" (Cradler, cited in Kent & McNergney , 1999).

Too often teachers are trained in an isolated setting and have little opportunity to use what they have learned to establish practices in their own schools. An ongoing collaborative approach to professional development allows for a culture that promotes sharing and continuous professional development (Kozma & Shank, 1988, pp.22-25). Teachers need support in their own school and training specific to their subject needs. Teachers may believe that computers have potential for motivating and enhancing student learning but they need an environment that nutures and provides coaching. When a professional culture is established through ongoing collaborative approaches, it will support sharing and continuous professional development. The classroom teacher will then in turn create a self-expectation to continue seeking new ideas and to study some aspect of practice. (Kozma & Shank, 1998).

Technology training must also continue over time. Because teachers have a diverse level of comfort with computers, teachers need time and support to acquire and sustain computer literacy(Holbein & Jackson, 1999). Teachers need to talk, plan, revise and use technologies. Scheduled, structured time must be available long term. The structured support could be reduced as the teacher becomes more comfortable with the technology, but in school support must be available when collaboration or training is needed. Teachers can not be left to fend for themselves if a long-term commitment to growth with technology is desired.

Bailey, Dunbar & Lumley, (1993) identified reasons that teachers surveyed gave for not using computers in teaching and learning. These include:

- Minimal or no staff development
- Lack of time
- Technophobia

- Inability to integrate into curriculum
- Hardware and software incompatibilities
- No or limited access

School divisions can not assume that everyone will use the technology, even if hardware and software are in place(Bailey et al, 1993).

Methodology

Although a variety of methods are appropriate for qualitative research, often the primary instrument for data collection and analysis is the researcher herself. As sole researcher, I spent time conducting interviews with the two teacher participants. Taped interviews were used and question sheets were answered. I used a baseline checklist (see Appendix A) for a measure of technological literacy and retested the participants at the conclusion of each project. I kept a journal of my involvement in the projects and also read through the participants' journals.

During the projects I met with the participants approximately one day every two months. As I was personally involved in the project, my reflective journal recorded classroom observations and informal discussions with the teachers. Thus, data analysis was a recursive process that occurred across all phases of the investigation rather than a distinct final stage of research.

Findings

To solve the problem of how to provide support to teachers incorporating technology into their subject areas I involved myself and two classroom teachers. All of us taught grade eight students at Fairview Middle School. I was named the computer mentor, since I had the expertise in the use of technology. The other two participants were classroom teachers who had volunteered to learn how to incorporate technology into their subject areas. Both teacher participants one and two were comfortable with basic word processing skills and teacher participant two felt quite comfortable with the internet. Both teachers had experienced many frustrations in the computer lab, but saw the value in using technology as a tool for teaching. A framework needed to be developed to help reduce the frustration and provide adequate support.

The Technology Mentoring Framework was initially developed based on literature and my past experience with learning and integrating technology. The framework needed to be tested and revised by classroom teachers in a school setting to have some validity. The teachers in the study were providing feedback revolving around what was working, what needed to be improved and their feelings about their own growth during the process.

From the data collected, three overlying concerns emerged during the development of the framework. One concern that surfaced was the issue of time. Many aspects of time were involved. Collaboration and planning time were very important to the teachers:

> It's wonderful to have some time to spend just talking about what we would have done differently. But also about the growth that our students have made in writing. (T1-03-00)

Time to train was also very important to the teachers in the project. They felt a need for immediate and ongoing training over time because of their lack of experience with the software:

> That's part of the problem with technology, it's easy to forget if you don't use it everyday. (T2-03-00)

The second issue dealt with training. Training that was individualized and planned provided a motivational setting for the teachers. As computer mentor I recorded the following comment in my journal following inservice training:

> I was surprised at how detailed they (classroom teachers) wanted the information. They wanted to know everything about the camera and then they wanted to practice. (T1-08-99)

Also the training needed to focus on meeting curriculum objectives in the teachers subject area:

> I found it very hard to justify taking up so much time to learn technology if the project didn't fit into curriculum objectives. (T3-03-00)

The third issue involved how the support is make available. Teachers will take risks and try new technology if the support is immediate and continues over time:

> Knowing that the help is available if I need it, makes me more confident using technology. (T2-03-00)

I am really worried about what would happen if something went wrong and you (computer mentor) weren't around! (T3-06-00)

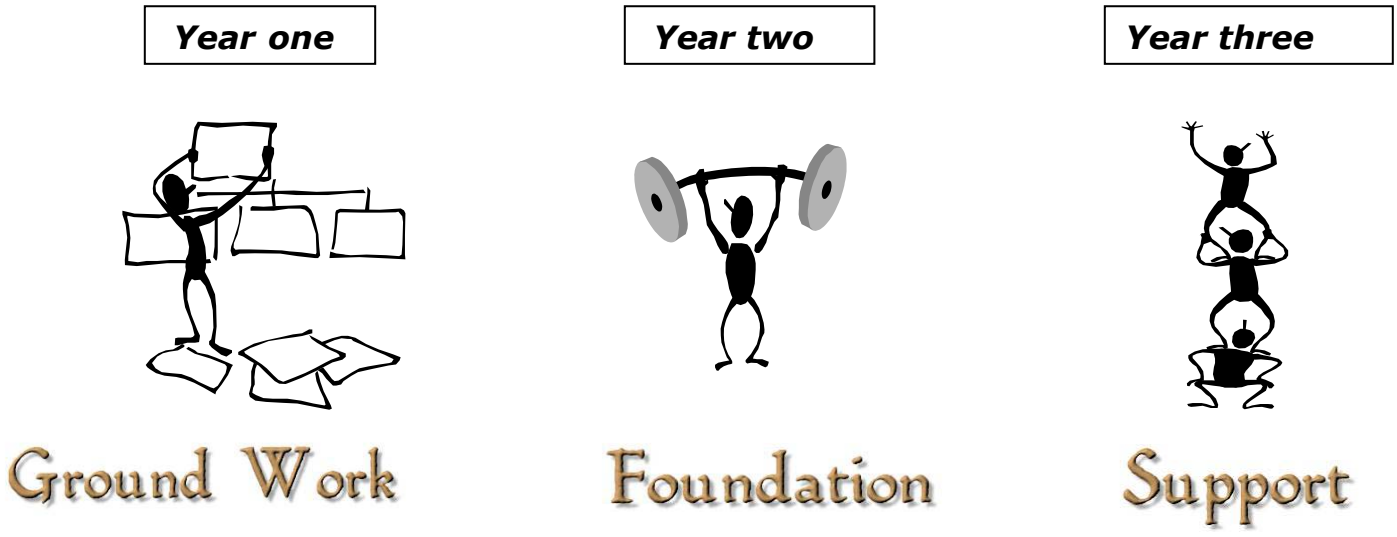
To provide adequate support for the two teachers integrating technology into their classroom practices, I developed a mentoring framework. Based on data collected from taped interviews, question sheets, journals and literature four guiding principles were considered:

1. Long term assistance and mentoring.
2. Training based on individual needs and learning styles.
3. Collaboration between professionals.
4. Curriculum based focus that fit into the teacher's subject areas.

Technology Mentoring Framework

The mentoring framework arose as a result of this research and on the research that suggests teachers need different kinds of support and training at different phases in the mentoring model (cited in Teaching and Learning with Technology, Professional Development for Alberta Teachers, 1998). As a teacher evolves in the continuum they become more skilled with the technology. The teacher gains full control of their project. They also request support based on their personal training needs.

The Mentorship Model is based on a three year Professional Development Plan in which each transitional phase is designed to nurture teacher growth and movement to the next phase.



Year One- Ground Work

Early in the school year an opportunity to be involved in the Technology Mentorship Program would be made available to teachers. The Technology Mentor would be selected based on his/her use of technology in his/her subject areas and his/her comfort level and familiarity with computer applications. This person needs to have a strong commitment to technological literacy and a willingness to provide ongoing support to colleagues. Selection of classroom teachers for the program will vary from school to school. Using a voluntary approach would be preferred since a willingness to use technology and work as a team is a necessary ingredient to a successful mentoring program. No requirement for technical literacy is required for the classroom teacher, just a commitment to a collaborative approach and continuous professional development. Some schools may need to provide incentives for teacher involvement. Strong leadership and promotion from Administration to make technology an essential component of professional development would encourage teacher involvement.

I. Initial Planning and Training

Once the participants are selected, an initial planning session is scheduled. The mentor and teacher discuss the first project and complete a questionnaire that gages the comfort level and areas of technological need for the classroom teacher. An initial training session is planned. The teacher and mentor are provided with release time to plan their project and to receive technology training as indicated. The computer mentor plans the agenda, prepares handouts, and collects the software needed for training. He/she also ensures that the hardware needed is available and in working order. The initial training session involves a half-day of using the software and hardware which will be integrated into the project. The afternoon is a project planning time during which objectives, method, evaluation, timeline and classroom support is discussed and clarified.

II. Project Implementation

During the GroundWork Phase, the computer mentor provides the training and practice time for the students. The mentor has a scheduled time to teach students in the computer lab. The students get comfortable with the software and hardware prior to working with the classroom teacher on the project. It is very important that the mentor has an on going role in supervision and evaluation of the project. This keeps him/her

aware of the continuous training needs of the students. It also provides a back up support for the classroom teacher who may be feeling overwhelmed with the project.

The classroom teacher introduces the assignment to the students. He/She provides curricular instruction in the classroom or lab. The classroom teacher provides the student with the outline, timeline and project evaluation. The students have received training with the software and hardware, so they are ready to begin work on the project. The classroom teacher arranges times for work on the project. The computer mentor is available to support the teacher out of class time with consultation, repairing problems and trouble shooting with students and teachers.

III. Communication

Communication between the computer mentor and classroom teacher is aided through the use of student log books. Students record daily progress and indicate any problems they may anticipate or have encountered. The teachers read through the logs to track student progress and solve software or hardware issues. Informal discussions between the mentor and classroom teacher help solve issues for the classroom teacher.

IV. Evaluation

At the project conclusion, students' assignments are handed into the classroom teacher. Evaluation is two-fold. The computer mentor evaluates student's work ethic and use of hardware and software applications. The classroom teacher evaluates the curriculum objectives indicated in the initial planning session.

V. Reflection

A one-day inservice is planned following the project to reflect and make revisions and recommendations. Any additional training needs relating to the project are discussed and the appropriate training and follow up are provided.

The ground work phase needs to be repeated for each project. The number of projects in the initial year depends on the goals of the program and funding.

Year two - Foundation

The second year of the Technology Mentorship Program is a time to build a strong foundation. The first year has many ground- breaking achievements. The classroom teacher and mentor need to repeat the planning and training sessions that were initiated in

the first year. It is important that time is set a side for the technology mentor to meet with the classroom teacher in the second year. Teachers need time to collaborate and make revisions and additions to their unit plan. They also need more time to get familiar with the software and hardware they have been exposed to in the first year. Integrating technology into classroom instruction is not a one-year plan. The teachers are not comfortable at this time with all the technologies. The "ground work" initiated in the first year must be provided with a strong foundation through the second year or the project will crumble.

Year three - Support

The technology mentor has helped the classroom teacher lay the groundwork and build a foundation for her/his project. The classroom teacher has been involved in planning, training, discussions and revisions. He/She may still need the technology mentor's support, but the project implementation is now the responsibility of the classroom teacher. Teachers feel they need to do this on their own at this point. The technology mentor does not train the students or teacher any longer. The mentor is available to help troubleshoot in the lab if problems arise. He/She is also a support for the classroom teacher who may want to discuss progress. Having the mentor in the school, available if needed, is a comforting thought for the classroom teacher. If further training still is required, additional funding should be made available through professional development funds.

Guidelines for Implementation of the Technology Mentorship Model

Some important guidelines need to be considered to provide adequate support for classroom teachers integrating technology into their subject areas.

1. Train teachers to use technology in their own school, with their school computers, software and hardware.
2. The computer mentor must be in the school and available to assist teachers with technical support
3. The computer mentor needs to be involved in the planning of the project and be directly involved in the first and second year of the project.

4. Teachers need scheduled time to plan, discuss and learn new technologies. In school sabbaticals should be available.
5. Scheduling must be done to allow the computer mentor to work with students as well as teachers. The computer mentor's hands on involvement is crucial.
6. Projects must fit into the framework of the curriculum.
7. Technology must be thought of as a means to an end. Focus on the process.
8. The classroom teacher must set a block of time to complete the project. Projects should be structured and a timeline set.
9. Training sessions need to be planned with software and hardware available and working. Instructional handouts should be provided.
10. Ensure that the computers and printers are working properly. Reduce the need for trouble- shooting.
11. Training of teachers and students needs to be done in small steps. Start simple and build on their skills.
12. Pick a project that involves software and hardware that is user friendly.

Further Inquiry into Integrating Technology into Subject Areas

At the completion of an academic inquiry, suggesting answers to initial research questions is a reasonable, and expected, outcome. As well, after working through the process of developing a model to integrate technology into subject areas, other questions and areas of inquiry resulted. Most importantly, what do we know about the current use of technology in schools? Is curriculum based technology integration taking place in Canadian schools?

Many of the questions asked by the two participating classroom teachers revolve around the concern that technology takes more time. Training students and completing a project involves more planning and work periods for students. Teachers want to know if technology works. Does this extra training benefit the students? Does it result in higher test scores and better performance? Are we justified in taking up more time for computer instruction?

A Final Reflection

As I reflect on my experience integrating technology into subject areas I realize the amount of training, time and planning that is needed to provide a positive experience for classroom teachers and students. The time spent planning and training was productive and resulted in some excellent unit plans. I believe everybody benefits from teachers working collaboratively. The classroom teachers benefit from sharing ideas and expertise with a computer mentor . The school division benefits having teachers use the technology. The students benefit from rich curriculum based experiences with technology. A Mentoring Framework is a simple way to provide collaborative, on-going assistance to classroom teachers using technology in their subject areas. Following the model will provide adequate support for the classroom teacher and an enriched experience for all.

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Appendix A

Technology Survey

1. I use technology in my subject areas and I don't need any extra support.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

2. I am very frustrated when trying to use technology in my subject areas.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

3. I feel there is no support when using technology in my classroom.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

4. I have made enormous progress during the past year or so in learning new technologies to introduce into my classroom.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

5. My biggest fear of these new technologies is embarrassment in front of my students or my colleagues.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

6. Most of the technology that has been shown to me would do little to improve my ability to teach or my students' ability to learn and think.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

7. People make far too big a deal over the management issues arising out of new technologies. (scheduling, training)

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

8. Sometimes I fell that there is just too much change coming too fast without enough planning or support for teachers. I wish they would just slow down.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

9. I have begun to enjoy teaching more than ever before because of the new power these technologies have put in the hands of my students and myself.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

10. I do best with new programs and approaches when I can learn them with a partner.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

11. Even though I have more to learn, I am really proud of what I have accomplished with new technologies and I am ready to share my inventions with colleagues.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

12. I sometimes feel that I have been left behind when it comes to technology. I don't feel comfortable with it and I don't' see what good it will do.

____strongly agree ____agree ____sometimes____ disagree ____strongly disagree

Section B

Please indicate your level of comfort and proficiency with each of the following:

H = High

M = Medium

L = Low

_____ internet searches

_____ electronic mail

_____ word processing program

_____ powerpoint

_____ webpage creation

_____ spreadsheets

_____ data bases

_____ graphic editors

_____ digital camera

_____ scanner

_____ color printer

_____ installing software

_____ trouble shooting