

# **TECHNOLOGY MENTORING: A PROFESSIONAL DEVELOPMENT APPROACH TO PROMOTING THE TECHNOLOGICAL LITERACY OF TEACHERS**

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## **ABSTRACT**

Few would deny the close relationship between science and technology – many would argue that they are inextricably linked to one another to the extent that they are very often referred to in the same breath. In order for learners to function effectively in the scientific domain it is very important for them to embrace technology. While educators have traditionally addressed the need for scientific literacy they are less experienced at promoting student technological literacy and the integration of information and communication technology (ICT) and, often, are ill prepared to do so. At the previous conference on Computer Based Learning in Science (CBLIS 2005), the authors challenged the success of the traditional in-service workshop model and established the rationale for mentoring as an effective approach to achieving and promoting the technological literacy of teachers. The presentation went on to describe the general outcomes of a research project that explored the characteristics of successful technology mentoring programs for practicing teachers. This follow-up-paper will address some of the specifics of the mentoring programs including the nature and configuration of mentoring activities, their frequency, and the topics that were addressed during mentoring. The paper will also review the main, qualitative findings of the project.

## **KEYWORDS**

Technology mentoring, Professional Development, ICT in education

## **INTRODUCTION**

At the previous CBLIS conference, the authors described a project that was designed to explore the characteristics of successful, ICT mentoring programs for teachers.

This project did not attempt to define the criteria by which prospective school sites were defined as being successful nor did it develop the criteria for participation in the project. Instead, it relied on a process established by the federal government for participation in a Canada wide project called the Network of Innovative Schools (NIS). This unique, federally funded project was developed to recognize and encourage schools using ICT in meaningful and creative ways to improve learning (Canada's SchoolNet, 2003). All Canadian, grade schools are eligible to participate in the NIS project with selection being based on a competitive application process. Using detailed scoring rubrics, applicants (schools), are judged by a national selection committee comprised of education stakeholders. To be selected for participation in the NIS, a site must evidence the following characteristics.

- Student-centered philosophy
- Long and short term technology planning
- Culture of innovation
- Readily available technology
- Ongoing professional development
- Established framework of support for using ICT

- Administrative support for the use of ICT
- Culture of collaboration within the school, the community, and beyond

Ten NIS members (that had adopted mentoring as their approach to staff development) were invited to be involved in the project. Of these ten, four agreed to participate. Active contributors across the four schools included six mentors, nine protégés, and five administrators. The project was conducted in two phases - the first phase was quantitative in nature and the second phase was qualitative. Phase one featured the use of online surveys to gather information from the school administrators and the mentors regarding school demographics, resources committed to mentoring, mentoring topics, and the nature and frequency of mentoring activities. In phase two of the project, interviews (in-person and by telephone) were used to gain a perspective on the nature and relative merit of the mentoring experience (both at the individual and the school level).

### **MENTORING TOPICS**

The focus of mentoring fell into one of four broad categories, notably:

- Hardware
  - Printers
  - Scanners
  - Digital still cameras
  - Digital video cameras
- Software
  - Operating system
  - Word processing
  - Data base
  - Spreadsheet
  - Graphics
  - Presentation
  - Marks management
  - File transfer
  - Web page development
  - Video editing
- E-communication
  - Email
  - Online collaboration
  - Videoconferencing
- Access to information
  - File management
  - Internet use
  - CD based research

These topics indicate a wide range of ICT use and are more than suggestive of the reality that not everyone is at the same level of sophistication (despite the fact that microprocessor technology has been with us for more than a quarter of a century). Indeed, the research project described here provided clear indications that ICT mentoring would only be successful if it respected the knowledge, skill, and,

attributes of the protégé (including comfort level). This was especially evident when the participants were asked to define the characteristics of a good mentor.

## NATURE AND FREQUENCY OF MENTORING

Mentoring was conducted in both one-on-one and small-group modes. Mentors were asked to estimate the extent to which mentoring was provided on the four major categories listed previously and in each of the two modes. In presenting this information, the term “infrequently” is used to describe the delivery of service at a rate of twice per year or less (including no service at all), the term “sometimes” is used to describe the delivery of service at a rate of three to four times per year, and the term “frequently” is used to describe the delivery of service at a rate of five or more times per year.

As discussed in the previous paper, mentoring activities took place at a variety of times, including, during staff meetings, at lunch breaks, after school, and on designated professional development days. Typically, small group mentoring was initiated the mentor(s) who either chose an area of perceived need or worked with a technology planning or professional development committee to focus on a priority area for desired growth. Several mentors felt that group work on specific skills helped to establish both a comfort level and an understanding of what could be accomplished with technology. Some teachers took what they learned and immediately began to work on their own with students, others required ongoing mentoring support in order to begin implementing technology in their classes. Table 1 shows the prevalence of small group mentoring.

Table 1. Small group mentoring frequency prevalence

Mentoring focus	Small Group Mentoring Frequency Prevalence (%)		
	Infrequently (2 or less times/year)	Sometimes (3-4 times/year)	Frequently (5 or more times/year)
Hardware	62.5	20.8	16.7
Software	56.7	30.0	13.3
E-communication	83.3	5.6	11.1
Access to information	66.7	22.2	11.1

The numbers shown in Table 1 are measures of the *prevalence* with which mentors indicated that they offered support to users according to a certain frequency. These measures incorporate all sub-topics within a category. Primarily because of the small sample size (the six mentors in this case) no distinction has been made as to which specific sub-topic was addressed. It is important to note that questions that were asked related to a frequency range with which mentoring was offered. Because of this, the numbers in the table do not represent the proportion of sessions that were offered nor do they necessarily represent the amount of time spent on mentoring (since that question was not explicitly asked). They are, however, indicative of the extent of mentoring that was provided.

The figures in Table 1 certainly suggest that low frequency mentoring was the norm in small group mentoring situations. One possible explanation for this is that small group mentoring is more formal – formal activities typically imply more research, planning, and preparation and thus require more time and effort to deliver. Another explanation could be that it is more difficult for participants to take the

time to engage in sustained activities, particularly if the topic is not of immediate practical interest. Mentoring in the area of e-communication seems to differ from the other areas in that there is a much higher prevalence of low frequency mentoring. A possible explanation here is that email, undoubtedly a principal element in this category, has been a central element of the workplace for a considerable time. As well, applications such as email and other communications software are relatively easy to use and, thus, do not require intensive or sustained support.

Technology mentors also worked in a variety of ways with individual teachers. At times, support was as simple as an informal exchange of ideas in the staff room. On other occasions, a mentor would work with the protégé’s class so that the protégé could watch how the technology lesson worked with their students.

Table 2 shows the prevalence of one-on-one mentoring.

Table 2. One-on-one mentoring frequency prevalence

Mentoring focus	One-on-one Mentoring Frequency Prevalence (%)		
	Infrequently (2 or less times/year)	Sometimes (3-4 times/year)	Frequently (5 or more times/year)
Hardware	37.5	29.2	33.3
Software	48.3	31.7	20.0
E-communication	44.4	33.3	22.2
Access to information	38.9	33.3	27.8

The numbers in Table 2 are distinctly different than those in Table 1 - while there is still a tendency towards less frequent mentoring in one-on-one situations, it is nowhere near as pronounced as it was for small group mentoring. This is almost certainly associated with the fact that one-on-one mentoring is a reflection of needs that were precipitated by the protégé (ownership). It is easy to anticipate that the topic of mentoring was highly relevant to the protégé and that sh/e (the protégé) would have been strongly motivated towards a successful and practical outcome (integration). As well, there will have been a greater diversity in the nature and extent of the problems and challenges that were addressed (if you ask people what *they* want help with, they will probably tell you).

### QUALITATIVE ASSESSMENT OF ICT MENTORING

Qualitative findings, which are organized under five themes that emerged during the project, are summarized in point form below – they represent the collective perspective of the mentors, the protégés, and their administrators.

The five themes are:

1. Mentoring – the why, what, and how of mentoring
2. Qualities of an effective mentor
3. Mentoring as a model for professional development
4. Support for mentoring

## 5. Indicators of success

### 1) Mentoring

The following reasons were offered when participants were asked why their school had chosen mentoring as their approach to professional development in ICT.

- Implementation of the learner outcomes in ICT
- Past, conventional models of PD had not worked well
- Teachers afraid to “go there (integrate ICT) alone”
- ICT was a school/district priority that needed a “local champion”
- The expectation that mentoring would “revolutionize” their use of ICT
- The schools planning team’s research suggested the approach

The Learner Outcomes in ICT is an extremely important reason - it relates to what could be considered one of the most important developments in regular schooling in decades. In 1998, the department of Education in the Province of Alberta launched an interim program of studies called the Learner Outcomes in ICT. This program defined learner outcomes in ICT for all students in kindergarten to grade twelve schools. The program, which is now mandatory, essentially represents the fifth core curriculum (alongside mathematics, language arts, science, and social studies). The introduction of this program (Alberta Learning, 2003) has placed great responsibility on all teachers thus emphasizing the need to focus on professional development towards the integration of ICT into teaching and learning.

The following points were commonly expressed when participants were asked what mentoring meant to them – they construed mentoring as being a:

- Collaborative endeavour (not a power relationship)
- Two-way street, definitely not a “guru versus the uninitiated” relationship
- Sharing relationship
- Non intimidating way to observe the skills of others
- Way of helping colleagues find “solid ground”

Approaches to mentoring varied but most of the following characteristics were evident in all cases.

- Planning committees that addressed all aspects of ICT use
- Mentoring in both small groups (mentor initiated) and individual situations
- Active and ongoing support for protégé initiated interests
- Mentoring at all times of the day
- Formal and informal initiation of mentoring
- Collaboration

The philosophical underpinnings of all programs were clearly to promote the integration of ICT into teaching and learning. Some participants spoke to this goal by focusing on the teachers’ need to be competent with ICT (as agents for the students) while others focused directly on the “street-level goals” for student learning.

## 2) Qualities of an effective mentor

The qualities of the mentor are clearly of paramount importance to success. When asked to elaborate on what makes a good mentor, participants said that they (mentors) should:

- Be knowledgeable in ICT (but not a “guru”)
- Have a passion for technology
- Possess excellent interpersonal and communication skills
- Be flexible, patient, and empathetic
- Be risk takers
- Be motivational and enthusiastic
- Display a sense of humour
- Be sensitive to those with “a block” and be prepared to repeat and repeat
- Not have forgotten how it feels to learn new things
- Be willing to step out of their zone and into yours
- Be quick to compliment even the small steps towards success
- Knows the curriculum

Interestingly, while protégés and administrators alluded to the importance of ICT knowledge, not one *mentor* mentioned proficiency with ICT as being essential to the task. In fact, most mentors said that they were self-taught. One of the most interesting overall characterizations of an effective mentor was conveyed by a one of the mentors themselves who said that the ideal mentor should have “all the qualities that would apply to a good friend”. This sentiment was echoed by an administrator who said that, “in order to have a mentoring situation in a school you have to have a personal relationships first”.

## 3) Mentoring as a model for professional development

The rationale for mentoring as an approach to professional development in general was elaborated by Wright and Turville (2005). Participants in this project were also asked to express their views on this topic. Prominent among their responses were that mentoring:

- Promoted cooperative planning
- Supported the development of relationships
- Provided help that was both relevant and immediate (just-in-time)
- Was consistent with active, needs-driven, continuous learning
- Provided ongoing support and encouragement

The value of mentoring as an effective model for professional development is captured in the following quotations from an administrator and a protégé respectively:

*[Mentoring], it's a back and forth thing, it's a give and take [situation] Both [the mentor and the protégé] learn from each other and the line of communication is consistent .... That's the biggest key between that and any other form of inservicing one can get.*

*It just gives you such a sense of freedom and the willingness to try because you know you have help. I guess that's the big thing. You know there is someone there to help you.*

#### 4) Support for mentoring

Administrative support for the mentoring programs was considered to be important to all three groups. The following elements were identified as being important to the success of all programs. While the following points express primarily the views of administrators, they were both recognized and endorsed by the other two groups (mentors and protégés). Important elements identified were:

- Commitment of resources (time/money) to ICT use
- Technology as a priority
- Provision of release time for mentoring (for mentors and protégés)
- Administrator participation in the (mentoring) program
- Administrators should role model the use of ICT
- Creation/fostering of a culture of collaboration
- Support the development of a community of learners

The significance of providing release time for mentoring and the establishment of a culture of collaboration and support are aptly captured in the following remark by one of the protégés.

*I have really appreciated the time to learn in this school, not the twenty minutes after school's over when you're trying to think of all the things you have to do before you go home, or the early morning sessions, but actually having the time off with my colleagues to learn together, and then having the mentor on site to help us if we can't remember some of the things they told us.*

#### 5) Indicators of success

There is much that can be said about the successful implementation of ICT mentoring in the schools. For detailed information on the qualitative indicators, the reader is referred to the previously cited CBLIS 2005 paper (Wright and Turville, 2005). Some key indicators of success throughout the schools were:

- Increased use of ICT with emphasis on integration
- Increased commitment and enthusiasm for the use of ICT
- Emergence of “new”, site-based mentors
- Increased number of ICT focused student projects
- Increase in the level of sophistication of student projects
- Increased profile for the use of ICT including parental support
- Establishment of a collaborative community of learners
- Desire for the continuation of mentoring programs
- Emergence and evolution of student mentors

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