

**Helping Teachers Integrate Technology With Curriculum:
A Professional Development Model
Using Concepts From Knowledge Management**

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Abstract

We can borrow concepts from knowledge management to create teacher professional development models that help teachers integrate technology into the curriculum. This paper borrows concepts from the knowledge management research to create a professional development model that is meant to help teachers integrate technology in the classroom. Four modes of knowledge creation are integrated with elements found in the fields of mentorship, learning communities and professional development research. The model focuses on a structured mentorship program that promotes the dissemination of tacit and explicit knowledge in a collaborative school environment.

Introduction

School divisions are spending considerable amounts of money on technology hardware with the intent for teachers to integrate technology with the curriculum. Pods of three to four computers are being installed in classrooms across the country. Teachers typically attend a one or two day inservice at the beginning of the year to learn how to operate them. However, the technology is used largely to reward students who are finished their regular work early and thus is not in fact used to its full potential (Maddin, 1997). Current literature on professional development recounts many such incidents of technology misuse due to the lack of teacher support and inservicing (Maddin, 1997). Technology initiatives often fail because too little thought is given to maintaining a school environment that nourishes the initiative (Maddin, 1997; Garavaglia, 1996).

Teachers need a professional development program to help them integrate technology with the curriculum. A beneficial program would be one that educates and supports them year long in a collaborate environment. One possibility is to look to the

business sector, which is currently dealing with similar knowledge transfer issues. Businesses have recognized the importance of intellectual capital in knowledge based companies and is creating environments that facilitate the transfer of knowledge within the company (Nonaka, 1994). A knowledge based company recognizes that their most valuable assets are the “skills, competencies, and creativity of its staff, not its buildings, equipment, and manufacturing facilities. The worth of the software company, as reflected in its stock price, includes an estimate of the potential human creativity and innovation that becomes embodied in the software the company creates” (Schwen et al., 1998, p. 76). In business, “an organization loses its knowledge easily when an employee quits, transfers to another department, retires or is laid off (Schwen et al., 1998, p. 76). Similarly, in education, if a teacher does not socialize, retires, they take with them an abundance of knowledge that was never shared. Education, like business, should be concerned with creating programs and environments that facilitate the transfer of knowledge.

Knowledge Theory

When creating a model that facilitates knowledge transfer it is essential to understand what knowledge is. It is important to recognize the existence of both tacit and explicit knowledge. Knowledge exists on a spectrum. “At one extreme it is almost completely tacit, that is, semiconscious and unconscious knowledge held in peoples’ heads and bodies. At the other end of the spectrum, knowledge is almost completely explicit, or codified, structured, and accessible to people other than the individuals originating it. Most knowledge, of course, exists in between the extremes” (Nonaka & Takeuchi, as cited in Leonard & Sensiper, 1998, p. 113). Constructivists view

knowledge as highly personal, context specific and subjective making it difficult to formalize and communicate. Knowledge “is a process, organic, fluid, dynamic and is in a constant state of flux and evolution” (Schwen et al., 1998, p. 78). For this reason it is transferred through socialization.

Many businesses are concerned with the dissemination of mainly explicit knowledge within the company. For example companies formally train their employees how to use new software programs, use an intranet, specialized computer database mining programs, and email, to facilitate the availability of information to all company employees. In education explicit knowledge is transferred through the use of workshops that train teachers how to use computers. However, often we do not create conditions for the transfer of tacit knowledge or the conversion between tacit and explicit knowledge.

Ikurjiro Nonaka proposed four modes of knowledge creation in any organization. His theory explains how knowledge held by individuals may be enriched through, spiral, interactive amplification of tacit and explicit knowledge (Nonaka, 1994).

Figure 1 Modes of Knowledge Creation

		Tacit Knowledge	Explicit Knowledge
		To	
Tacit knowledge	From	Socialization	Externalization
Explicit knowledge		Internalization	Combination

Nonaka, 1994, p.19

From tacit to tacit (Fig. 1), “an apprentice observes and models a master performer and unconsciously internalizes knowledge” (Schwen et al., 1998, p. 80). For

example, in a mentorship model a mentee observes a master teacher modeling a lesson and unconsciously internalizes how the master teacher deals with student questions in a computer lab environment.

From tacit to explicit (externalization): “Tacit knowledge becomes explicit through dialogue” (Schwen et al., 1998, p.80). For example, when teachers are given the chance to discuss their successes and failures in integrating technology with the curriculum, they begin to articulate some of their know how.

From explicit to explicit (combination): “explicit to explicit knowledge exchange is the essence of most formal training programs”(Schwen et al., 1998, p.80). For example, in a mentorship program a master teacher instructs the mentee how to use Microsoft PowerPoint so that he or she could use it with their class.

From explicit to tacit (internalization): as new explicit knowledge is shared throughout an organization, other employees begin to internalize it – that is, they use it to broaden, extend, and reframe their own tacit knowledge (Nonaka, 1991, p. 99). For example, when teachers are informally discussing their experiences with technology, they are able to reflect on their own experience and thus internalize it. By listening to other teacher’s experiences they add to their own tacit knowledge.

Presentation of Professional Development Model

The following technology professional development model is created to help teachers integrate technology with the curriculum. It supports, educates and creates a collaborative environment that facilitates the transfer of tacit and explicit knowledge. By borrowing concepts from the knowledge management research, Nonaka’s four basic

patterns for knowledge creation are integrated with elements found in the fields of mentorship, learning communities and professional development research.

Overview of Program

A structured mentorship model is presented because it offers on going support to teachers. It focuses on the transfer of both tacit and explicit knowledge between mentor and mentee in a collaborative school environment. As well, it may be operated at a school or division level and may easily be modified or adapted to individual teachers or situations.

A. Mentorship Group

This mentorship program is centered on a knowledgeable lead teacher who has experience with integrating technology with the curriculum. This lead teacher (mentor) is paired with two other teachers (mentees) within the same school to make a mentorship group. One mentor may be responsible for numerous pairs of mentees, depending on availability of mentors and number of mentees. Two mentees are desirable in order to give support to one another when the mentor is not available. Throughout the mentorship the two mentees may meet informally and offer support by creating an opportunity to discuss successes and failures. The mentor will give support through planned structured meetings and through email, phone and informal face-to-face meetings. The mentorship group will plan and implement specific projects or lessons that incorporate technology with what the mentee is teaching in their classroom. There will be opportunities for the mentor to model or team-teach lessons with each of the mentees. An important mentorship group reflection time will also be given. Substitute teacher release time will play an important role in making all meeting time available to the mentees. The

mentorship group will continuously communicate and meet in a cyclic fashion throughout the year. To enhance the program, steps should be taken to create a collaborative environment that allows for formal and informal socialization around technology.

B. First Meeting

At the beginning of the year the program should start with a quarter-day meeting of the entire mentorship group. This meeting should be used to establish rapport within the group, discuss goals and expectations for the program, and set professional goals. Further the group should outline ways to support and communicate with one another and decide on a specific technology activity or project that the mentor could help prepare at the second meeting.

It is a good idea to discuss one specific project, which the mentor could use to help integrate technology with the curriculum in the mentee's classroom. This could include setting up KeyPals, a WebQuest or a student project involving PowerPoint. To ensure success, this project should not be too complex nor should it require extensive skill acquisition on the part of the mentee in order to complete. Deciding on a project at the first meeting will give both parties an opportunity to determine required resources and prepare for a second meeting. It is important to talk about possible skills that are required for the project, for example e or new software applications so that the mentor may prepare to formally teach the required skills to the mentees at the second meeting.

Before the second meeting the mentor and mentee should establish communication via email or telephone to discuss any details needed to prepare for their second meeting. Communication support between mentor and mentees will rely mainly

on email and telephone. It will be important for both the mentor and mentee to prepare any materials needed for the planned technology activity.

C. Second Meeting

For the second meeting the mentor will meet with each mentee individually in a half-day session including a planning and formal training session. The mentor would help the mentee carefully plan the lesson or project they decided upon at the first meeting. The mentor would also teach any skills the mentee needs to complete the project at this session. Depending on the skill and confidence level of the mentee, it may be sufficient to provide them with ways of obtaining the necessary skills through the use of online tutorials or courses.

D. Third Meeting

For the third meeting the mentor will meet with each mentee individually in a quarter day session in which the mentor will model or team-teach one of the first lessons in the project. This allows the mentee the opportunity to gain tacit knowledge.

E. Fourth Meeting

The Fourth meeting will include the entire mentorship group. It will occur during a quarter day after both mentees have had a chance to implement their technology project. At this meeting the mentorship group will meet to reflect through discussion on the successes and shortfalls of the technology implementation. This discussion should give rise to possible solutions to problems that arise. This will give the mentees a chance to internalize and externalize any successes or failures of the project.

2. Phase Two

In order to meet the goal of yearlong program, the next step is to repeat the cycle again. The first meeting that occurred face-to-face to establish rapport and program goals may be replaced with communication via phone or email to set up the next project or lesson the mentee wants to work on. Between events and meetings ongoing support from the other mentee and mentor can occur informally via email, phone, or short meetings.

Creating a Collaborative Culture

It is important to realize that knowledge transfer is not restricted to the above events in the professional development program. Socialization is the key to sharing knowledge. An important part of this professional development program is to create opportunities for teachers to create and discuss their technology experiences outside the regular mentorship program. Creating a collaborative culture within the school would enhance communication and give socialization opportunities to all teachers. A collaborative culture is characterized by, “an atmosphere where joint planning, collegiality, support, trust, experimentation, creativity and reflection are the norm”. (Mitchell, & Sackney, 1995, p. 193)

Many formal and informal opportunities may be created to enhance teacher socialization and collaboration within the school. Formal opportunities outside the regular mentorship program may include freeing up time for teachers to plan technology lessons together, team teach or observe one another teaching lessons which integrate technology. Set times, such as staff or grade alike meetings, to engage in professional conversation around the topic of technology. In a trusting and collaborative school, informal opportunities usually happen spontaneously: informal sharing of successes and

failures may happen between teachers in the staff room or in hallways between classes or after school.

Technology may be used as a means of sharing technology experiences with other teachers or to receive technology help. Electronic interaction may be done through email, chat rooms, and listservs. Email may be used as a means of communication with a mentor or other experts on the Internet. Educational technology listservs or chat rooms allow teachers to share their successes and failures with integrating technology in their classroom. Listservs may also help by providing a forum ask questions and receive answers.

How This Model Utilizes Knowledge Management Concepts

Tacit Knowledge and the Conversion Between Tacit and Explicit Knowledge

Tacit knowledge “consists of mental models, beliefs, and perspectives so ingrained that we take them for granted, and therefore cannot easily articulate them” (Nonaka, 1991, p. 98). Apprentices work with their mentors and learn not through language but observation, imitation, and practice (Nonaka, 1991). Tacit knowledge grows through shared observation and from mimicking behavior, even without the mentee being aware of it (Leonard & Sensiper, 1998). In order to enhance the transfer of tacit knowledge, modeling or team teaching one of the lessons prepared by the mentor and mentee was chosen. Having the mentor team-teach or model the first lesson of the project the mentee through observation will facilitate tacit knowledge transfer. When teaching that technology lesson, the mentee will imitate the mentor in his or her own lessons without consciously knowing it. The model also emphasizes that in creating a collaborative

environment teachers should look for opportunities to team-teach or observe other teachers in their school.

Giving teachers the opportunity to socialize in a collaborative school culture facilitates the transfer of tacit knowledge and the conversion between explicit and tacit knowledge. Teachers sharing their experiences with integrating technology may be done formally in planned meetings or informally around the staff room or hallways. This sharing often gives others insight into an individual's tacit knowledge. The third meeting in the professional development model exists to give teachers a chance to share their successes and failures with integrating technology with the curriculum. This meeting gives teachers a chance to reflect on their experiences. This reflection will help them internalize any explicit knowledge and make it tacit. When knowledge is shared, others begin to internalize it and build on their own tacit knowledge (Nonaka, 1991). Through discussion teachers are also able to articulate their tacit knowledge and thus make it explicit.

Explicit Knowledge

There are many opportunities for a mentee to obtain explicit knowledge in the above professional development model. Explicit or codified knowledge is formal and systematic and therefore easily communicated and shared (Nonaka, 1991). Most professional development programs focus on teaching teachers explicit knowledge. Any formal training the mentor gives the mentee allows for the transfer of explicit knowledge. In the above model, during the second meeting the mentor plans a specific lesson and must also help teachers obtain any skills they do not possess in order to complete the project. Teachers will also receive explicit knowledge through means of support from the

mentor and other teachers. This will be achieved by asking questions in person and via email from the mentor. Also, teachers may choose to participate in an educational listserv. This will give mentees the opportunity to ask questions and receive answers about how to integrate technology with the curriculum.

Conclusion

In conclusion, researchers and practitioners should look outside their own disciplines for solutions. No one discipline has the complete answer. This model was based on research from the fields of knowledge management, mentorship, learning communities, and professional development to create a solution to the current problem of helping teachers integrate technology with the curriculum.

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