Developing extended communities of practice to support implementation of Inspiration® in elementary classrooms

Michael Richard Towne

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DEVELOPING EXTENDED COMMUNITIES OF PRACTICE TO SUPPORT IMPLEMENTATION OF INSPIRATION® IN ELEMENTARY CLASSROOMS

A Project
Presented to the Faculty of California State University, San Bernardino

In Partial Fulfillment of the Requirements for the Degree Master of Arts in Education: Instructional Technology

by Michael Richard Towne
June 2004
DEVELOPING EXTENDED COMMUNITIES OF PRACTICE TO SUPPORT IMPLEMENTATION OF INSPIRATION® IN ELEMENTARY CLASSROOMS

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June 2004

Approved by:

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24 MAY 04
This project examined the need for systematic, on-going professional development for teachers, specifically, the need for training in technology integration. Furthermore, it explored the interdependence of technology and pedagogy. It developed an on-line community, mediated by a website, to provide an extended community of practice for professional educators attempting to implement Inspiration®, a commercial software application. The project sought to present a research-based justification for employing cognitive mapping strategies in a wide variety of pedagogical contexts. It also provided a dynamic list of examples demonstrating concrete applications, explicitly connected to content and technology standards. Finally, the project examined and implemented current design features for websites.
ACKNOWLEDGMENTS

I want to acknowledge the professional efforts of my readers, namely, Dr. Brian Newberry and Dr. Eun-ok Baek. Their guidance and suggestions helped me finish this project. Without their help, the quality of this project would be diminished.
DEDICATION

This project is dedicated to the best professional educator I know, my wife Julie. Her unfailing support kept me going when I thought I could not finish. Her reliable dedication to her profession and her students create a vision for me to emulate. I have many professional goals, but the one I keep closest to my heart is my desire to try to become a teacher worthy of being in her company.
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CHAPTER ONE

BACKGROUND

Introduction

Classroom teachers in California find themselves facing increased demands to meet standards, help students improve performance on standardized tests and develop deep conceptual understanding of various content areas, such as science, social studies and mathematics. Students and teachers in today's classrooms have more access to technology than any previous generation; yet typical classroom lessons do not take advantage of technology to supplement or enrich learning experiences or processes (Cuban, 2001).

Classroom teachers need active, on-going professional development to help them meaningfully integrate technology into all curricula (Vannatta & Beyerbach, 2003; Prain & Hand, 2003; Wepner & Tao, 2002; Christensen, 2002). Successful implementation of technology in classrooms across schools or districts requires sustainable communities of professional educators providing a pool of pedagogical knowledge, technical expertise and integration strategies based on experience and research (Vannatta & Beyerbach, 2003; Prain & Hand, 2003; Wepner & Tao, 2002;
Pierson, 2002; Schlager & Fusco, 2003; Zhao, Pugh, Sheldon, & Byers, 2002). Reflective educators need to consider the pedagogical context for technology (Pierson, 2001; Christensen, 2002). They need to examine core beliefs about learning and how their philosophy may determine their use of technology (Pierson, 2001).

Cuban (2001) decries decades of hype from well-meaning technology advocates has raised expectations for the roles technology can play in education. Local, state and national administrators have higher expectations for technology inclusion and integration. Too often, they view technology as a silver bullet solution for educational problems deeply rooted in society and our educational system. Professional educators need to know technology integration requires firm footing in research-based pedagogical practices (Zhao et al., 2002).

Teachers find themselves caught between seemingly contradictory demands for classroom time, energy and focus. Practicing professionals need to transform technology from an added curricular demand into an effective learning tool. Successful integration requires educators to view technology as a means to an end (Zhao et al., 2002). To be effective, the tool must be: simple to learn, flexible enough to meet diverse content and
grade-level needs, powerful enough to improve student
cognition and organization, and finally, engaging for
learners.

Statement of the Problem

Classroom teachers often lack a sustainable community
of practice to support their needs for technology
inclusion and integration. Due to constraints of time and
location, educators also lack the resources to collaborate
with each other regarding the pedagogical contexts for
technology and the implications for learning.

Purpose of the Project

The purpose of this project is to create a
sustainable on-line community of professional educators to
support technology in various pedagogical contexts
providing systematic, on-going training and support for
classroom teachers implementing Inspiration, a commercial
software package, to create interactive concept maps,
across the curriculum. Consistent findings show students
who use knowledge maps retain main concepts better than
those who rely on text alone, especially students with low
verbal skills or limited background knowledge (O'donnell,
Dansereau, & Hall, 2002).
Significance of the Project

Diverse populations of students and teachers can use this website to integrate technology, specifically the building of dynamic knowledge or concept maps, into their daily lessons. "Research on the use of knowledge maps has consistently shown benefits for students with low verbal ability or skills (O'donnell et al., 2002, p. 78). The training and support focus on principles that encourage innovation, flexibility and novel thinking strategies designed to improve deep comprehension and conceptual understanding of topics. The generative nature of the software application as well as the inherent non-linearity of the environment encourages sophisticated thinking.

The main audience for the website is teachers but most students will find sufficient scaffolding to produce simple organizers. The creation of a sustainable, on-line resource for pedagogical and technical support is also a benefit.

Limitations

During the development of the project, a number of limitations were noted. These limitations are the following:
1. Insufficient time for iterative design and feedback loops.
2. Small number of respondents.
3. Inadequate time for implementing on-line community building strategies.

Definition of Terms

The following terms are defined as they apply to the project.

Visual Learning - Learning that incorporates spatial representations to convey meaning, as in cognitive maps, illustrations, graphs or diagrams.

Graphic Organizer - An organizer integrating both verbal and spatial attributes to communicate meaning.

Concept Map - A tool for organizing information and relationships between concepts. They include concepts, usually within a circle or rectangle and propositions, which are two concepts connected by an idea. The important attributes of a concept map are the hierarchal organization and the existence of cross links. Cross links show relationships between concepts (Novak, 2004).

English Language Learner (ELL) - A learner who has a primary language other than English. ELL’s include
those who speak a language other than English in their homes or whose first language learned was other than English.

Web page - A single screen specified by an address on the WWW (Ozok & Salvendy, 2000):

**Ecological Interface Design (EID)** - An EID is an interface which puts low cognitive demands on the user. The interface is intuitive. An EID displays the physical and functional structure of the site in an easy to comprehend manner.

**Information Architecture** - The practice of implementing deliberate organization of information to allow for a useable navigation structure (Proctor et al., 2002).

**Constructivism** - Constructivist practices can be defined based on student tasks, curriculum structure, teaching style and related perceptions (Becker & Ravitz, 1999). Student tasks tend to be more contextualized or authentic than traditional student tasks. The curriculum is structured thematically, favoring in-depth study of fewer, interrelated topics rather than surface study of many, unrelated topics. The teaching style emphasizes construction of knowledge during authentic tasks and communication between peers. Perceptions of learning differ from
the more traditional, transmission theory of practice. Students and teachers tend to view learning as a process.

**Generative Activities** - Activities in which learners are required to generate a product, often periodically. For example, after reading each page of a book, the learner writes a brief synopsis of the main idea.

**Gradual Release of Responsibility** - The process by which a teacher provides large amounts of support, or scaffolding, for students initially and gradually removes support until students can produce results independently.

**Anchor Experience** - A meaningful experience used for reference by students and teachers. Often the anchor experience is memorialized by an artifact, such as a chart or an organizer to help learners remember the salient issues of the experience.

**Dual coding** - Information represented in both text and graphic form, allowing learners to process spatially or verbally.

**Transformed Environment** - Learning environments characterized by subject-specialty teaming, activity-based projects and learning, and multi-grade or multi-age instruction (Butzin, 2001).
Low Visualization Users - Some website users tend to spontaneously create a spatial visualization of the website's navigational and informational structure in their heads. Low visualization users do not "see" this same picture in their heads as they navigate a site. Low visualization users expend more processing resources trying to figure out the structure of the website.
CHAPTER TWO
REVIEW OF THE LITERATURE

Introduction

The recent decade of research into teacher professional development supports the need for sustainable on-line communities of practice (Schlager & Fusco, 2003). Providing on-line support for classroom teachers integrating technology across the curriculum requires consideration of several factors. Among the factors to consider are the characteristics or attributes of teachers. Another consideration is the interdependence of technology and pedagogy. A third consideration is the usefulness of dynamic graphic organizers as a pedagogical tool. Teachers, like any consumers of information or services, need to perceive the pedagogic value of the strategy and the software application before they will embrace the principles and implement them (Parr, 1999; Prain & Hand, 2003). "Unless a teacher views technology use as an integral part of the learning process, it will remain a peripheral ancillary to his or her teaching" (Pierson, 2001, p. 427). Another important consideration, therefore, is the choice of software application. It should be flexible and applicable to a variety of
pedagogical contexts. The final consideration is the design characteristics of the on-line environment used to support training and implementation.

Teacher Attributes

Teacher Attitude

One important consideration for staff development designers is the attitudes of teachers. On-going technology training and support has significant influence over the attitudes of teachers and, to a lesser extent, students (Christensen, 2002). Teachers who underwent a needs-based technology integration seminar with on-site follow ups showed improved attitudes towards technology integration in the classroom and used the technology more frequently (Christensen, 2002). Teacher attitude is important to professional development because if teachers reject a strategy or content, students will likely not be exposed to it, since teachers act as the gatekeepers to knowledge in the classroom.

Teachers frequently view technology as an added curriculum. Often, teachers fail to recognize potential value for technology infusion into the curriculum (Williams & Kingham, 2003). Many teachers, especially veteran teachers, find themselves humbled by their lack of
mastery over technology (Wepner & Tao, 2002). Teachers may have spent years, even decades, improving their professional knowledge and experience. They are accustomed to perceiving themselves as proficient in all aspects of their profession. Technology can make teachers revert to feeling like a novice. Even when teachers feel confident in their own abilities to use technology, they may integrate technology infrequently, if at all (Chin & Horton, 1993).

Teachers need to know learning and integrating technology is an evolutionary process (Wepner & Tao, 2002). Teachers report needs for on-going support and hands-on training to integrate technology (Chin & Horton, 1993). Effective teacher training and support includes modeling, discussion, brainstorming ideas for integration and hands-on activities (Mouza, 2003). Educators need to learn to form support systems among their colleagues for technical troubleshooting and curricular infusion (Wepner & Tao, 2002; Watts-Taffe et al., 2003; Mouza, 2003).

Teacher Proficiency

Three important proficiencies to consider are technical, pedagogical and integration proficiency. Exemplary teachers, who integrate technology effectively, have skills in all three areas. Professional development
should provide support and training for all three skills. Teachers need continuing support to accomplish this collaboratively (Vannatta & Beyerbach, 2000; Prain & Hand, 2003). One way to improve collaboration is through peer support networks (Schlager & Fusco, 2003). Schlager and Fusco (2003) found the need for extended communities of practice beyond the school site. Modern technology provides the means for creating extended communities of practice.

**Educational Philosophy**

Two major inhibitors to educators’ integration of technology are pedagogical beliefs and lack of a collaborative culture (Parr, 1999). Technology integration often brings about shifts in pedagogical practice. Technology infused classrooms are typified by less teacher talk and more student peer interaction (Wepner & Tao, 2002). In fact, some observations of technology infused classrooms showed students working in pairs or small groups more than 90% of the time (Wepner & Tao, 2002), significantly increasing the student interaction compared to traditional objectivist classrooms. The teacher in this classroom must be prepared to give up some control and train students for a high level of independence using technology. Teachers need to have a firm understanding of
instructional management and social constructivist principles (Watts-Taffe et al., 2003).

Flexibility

Teachers need to be creative in their use of technology, yet realistic in knowing student limitations (Wepner & Tao, 2002). Clearly, there exists a range of pedagogical philosophy in today's classrooms. "To the extent technology is flexible, it will be bent to fit existing practice, and to the extent it cannot be bent, it will not be used" (Parr, 1999, p. 288). So, it appears technology must bend a little and teachers must bend a little.

Interdependence of Technology and Pedagogy

Training, support and planning for technology are not enough to ensure integration. Teachers need to connect their pedagogic knowledge with their technical knowledge (Parr, 1999). Teachers who fully integrate technology into their practice tend to have classroom procedures, assessments and assignments that look similar for technology infused lessons and non-infused lessons (Pierson, 2001). In other words, the technology folded into their lesson planning, application and assessment nearly seamlessly. Reflective teachers, who are aware of
their own pedagogical beliefs, tend to be more adaptive and flexible (Zhao et al., 2002). Parr (1999) found teacher trainers and support providers need to offer more than technical expertise, they need to be able to demonstrate the sound pedagogical practices necessary to integrate technology effectively across curricular boundaries and grade levels. "One important characteristic of a progressive, technology-using educator is a dynamic, constructivist vision of technology integration" (Vanatta & Beyerbach, 2000, p. 144).

**Cognitive Constructivism and Technology**

Technology integration is more likely to occur when teachers view technology as a means to an end (Zhao et al., 2002). "The traditional instructional model is not designed to accommodate computer enhanced learning" (Butzin, 2001, p. 372). Technology acts as an agent of philosophical change or as a catalyst for enabling constructivist teaching practices (Becker & Ravitz, 1999). Teachers reported assigning longer, more complex tasks. They also allowed for more student choice in topics and materials. The results showed more interdisciplinary work and more student initiative. These results are consistent for all teachers including those who are predisposed to use constructivist practices and those who are not.
Teachers trained to use computers for interdisciplinary work developed more confidence and implemented constructivist strategies to teach problem solving using technology (Halpin, 1999).

**Social Constructivism**

"Good learning is a process of socially based, active co-construction of contextualized knowledge and webs of relations among its nodes" (Salomon & Talmog, 1998, p. 226). Hung and Nichani (2002) advocate implementing collaborative learning communities within schools. They propose society is becoming increasingly complex, requiring community members to think critically, analyze problems in context and work in effective collaboration. To this end they suggest students use a variety of learning strategies to produce artifacts as teams and individually. Students assess their own learning and take responsibility for meeting their goals. Increased dialogue between students as they produce authentic artifacts is one way to contextualize learning.

Salomon and Talmog (1998) note technology facilitates the kinds of environments necessary for constructivist learning. Technology can provide for interdisciplinary study, team based approaches, simulations, data collection and analysis as well as improved communication.
Pedagogical Alignment with Technology

The role technology plays in the classroom depends on the pedagogical skill and philosophy of the teacher (Parr, 1999; Pierson, 2001). In fact, Pierson (2001) found the ways in which technology was used by teachers of various proficiencies determined in their minds what technology integration meant. This definition of technology integration determined the management of computer time and student access to technology. Furthermore, teachers tend to teach about technology according to their own personal learning style, educational philosophy and beliefs about technology (Pierson, 2001). In order for teachers to take full advantage of technology in the classroom, there needs to be a match between the pedagogical philosophy of the teacher during technology infused lessons and non-infused lessons (Hung & Nichani, 2002).

"The underlying barrier [to effective technology integration] is that the traditional instructional model is not designed to accommodate computer-enhanced learning" (Butzin, 2001, p. 372). Computers can provide increased opportunities for collaboration, communication and constructivist learning, but often are used by teachers, in traditional teaching environments, as electronic worksheets, rather than as constructivist tools (Becker &
Ravitz, 1999; Butzin, 2001). The determining factor in the efficacy of computers in elementary classrooms may be teachers’ philosophy and pedagogical practices associated with the use of technology. Specifically, computers have been shown to improve student outcomes when used as a constructivist tool. Additionally, computer use can increase test scores on standardized tests when used in a transformed environment designed to enhance constructivist student-computer interactions (Butzin, 2001).

Graphic Organizers: Pedagogical Theory

Concept Maps

One form of graphic organizer is the concept map, sometimes referred to as knowledge maps or networks. Concept maps can be used as a learning tool, as content enhancement and as an evaluation tool (Novak, 2004). Teachers can evaluate the hierarchal structure of student concept maps to determine the accuracy of student learning and identify possible misconceptions.

Concept maps consist of concepts, which are generalizations or perceived regularities in events or objects, usually contained within circles or boxes. One important attribute of concept maps is their hierarchal structure, with more general or inclusive concepts at the
top and more specific, less inclusive concepts at the bottom. Another important attribute of concept maps is the existence of cross-links. Cross-links show the relationships between concepts. "Knowledge maps make the macrostructure of a body of information more salient" (O'donnell et al., 2002, p. 75). Concept maps help learners see cross-concept relationships more readily than a linear organizer or outline (Langan-Fox, Waycott, & Albert, 2000).

Constructing concept maps involves identifying key concepts and adding the linking words that connect the concepts. According to Novak (2004), students who develop concept maps are engaging in meaningful learning in much the same way scientists or mathematicians construct knowledge. A good concept map has structure and links that make relations between concepts clear. Linking is one important way students make meaning from concept maps. When students remark that it is hard to make linking words, this is an indication they poorly understand the relationships between the concepts (Novak, 2004).
In figure 1, the linking words help learners understand the relationships between concepts. It is important to use a consistent set of linking words (Novak, 2004). For example, veins, arteries and capillaries are all types of blood vessels. Also note a consistent use of shapes to imply similar relationships. The diamond-shaped boxes, for example, all indicate functions of blood vessels.

Learners need to see many examples like this before they can begin to create meaningful cognitive maps. Here, the links between concepts are labeled, explicitly stating the relationships between concepts. Once students begin to
create diagrams like this, they are constructing knowledge, rather than receiving knowledge (Novak, 2004).

**Process Maps**

Another use for graphic organizers is as procedural facilitators or process maps (Baker, Gersten, & Scanlon, 2002). Process maps make a process concrete. Researchers found that learning-disabled students often failed to do some of the complex processes proficient readers do spontaneously. Namely, organize material, ask themselves questions, make inferences or create outlines. A procedural facilitator, or process map, can provide students with the necessary support to perform a complex process. Teachers need to be aware of the need for explicit instruction on how to use procedural facilitators. When used with the gradual release of responsibility, they can produce independent learners.

Process maps act as a permanent record or anchor activity of student-teacher interactions (Baker et al., 2002). They provide an anchor experience to scaffold students as they attempt complex processes. They encourage learners to think aloud to themselves, thus helping to develop an inner academic voice to help guide themselves through complex academic processes.
Figure 2 illustrates an example of process mapping. Students often have difficulty revising their writing. Revision is a complex, cognitively demanding activity. This process map gives the student a concrete scaffold to bridge the gap between teacher support and self-sufficiency. A map like this is not a substitute for a teacher. This kind of scaffold should be given to students only after several lessons have been taught, with the teacher modeling how to use the process map while he or she revises a piece of writing to improve word choice. Gradually, students can be encouraged to eschew the process map, and begin revising independently.
Choose a piece from your writing portfolio. Write the title here.

Re-read your piece to a yourself or a partner.

Circle each time you used a dead word, such as said, went, beautiful or nice. (You should choose any word or group of words that does not give your reader enough information.)

Write the dead word here

Write the feeling or idea you want your reader to get from your writing.

Chooses a replacement for your dead word here.

Choose a replacement for your dead word here.

Replace your old, dead words with your new words. (You have just revised your writing for word choice.)

Figure 2. Process Map

Conceptual Models

Novice learners often rely on surface features of text to make meaning, whereas proficient learners tend to
create conceptual models spontaneously. Proficient learners make connections between background knowledge and new information. They integrate concepts in ways that foster novel problem solving. This allows proficient learners to transfer learning to new contexts (Langan-Fox et al., 2000). In other words, they seem to be able to extract clues, combine them with previous knowledge and create a new synthesis. Langan-Fox et al. (2000) found novice learners could be helped to develop sophisticated conceptual models. Explicit instruction on the building of conceptual models helped novice learners build connections between background knowledge and new information by organizing their previous knowledge and imposing structure on new information.
Figure 3. Concept Map

This is an example of a concept map. It helps students understand the process of digestion as a series of steps. For many students, seeing this process laid out as a series of connected steps helps them grasp the concept and dispels misconceptions. As usual, students
should be given the chance to construct concept maps like this, after seeing multiple examples.

**Learner Benefits**

Graphic organizers are cognitively less demanding for students than linear organizers. "By seeing relations, students are relieved of the burden of untangling them from linear cobwebs of text" (Langan-Fox et al., 2000, p. 28). They provide learners with the advantages of dual coding. A graphic organizer relies on verbal cues and spatial cues to code information for the learner. "The advantage of diagrams is not that they contain more information; rather, they support extremely useful and efficient computational processes" (Langan-Fox et al., 2000, p. 30). This reduces the processing demands on the working memory.

Students who engage in generative activities demonstrate higher problem solving and reading comprehension scores (Barab, Young, & Wang, 1999). Students who used concept mapping during the writing process wrote more and had a more positive attitude towards writing (Sturm & Rankin-Erickson, 2002). Baker et al. (2002) found learning disability students could grasp historical concepts by constructing concept maps with support from the teacher. Students who use concept mapping
during reading improved comprehension (Baker et al., 2002). Explicit instruction on text structures, sometimes called story mapping, helps students identify textual elements and improves performance on standardized tests.

According to O’donnell et al. (2002), teachers can help students improve learning with knowledge maps in two ways. First, instruction of students on processing strategies, such as summarizing and annotating improves performance with maps. Second, helping students develop design principles to make better maps. Knowledge maps constructed using gestalt principles of design, namely symmetry, proximity and continuation, helped students perform better on tests (O’donnell et al., 2002.)

Website Design Elements

When presenting content through a website, four major areas of concern for designers are deciding the content knowledge or process knowledge to be included, determine the organization or structure of the content, allowing for efficient retrieval of information, and maximizing the accessibility and usability of the interface to all users (Proctor et al., 2002).
Content

When deciding which content to include on a website, designers should consult expert designers, content experts and end users (Proctor et al., 2002). Expert analysis for content can be obtained through interviews, protocol analysis or critical incident reports among other methods. End-user feedback can come in the form of questionnaires, interviews or wants and needs analyses.

Organizing the Content

One way to improve the organization and structure of information is to consider the information architecture, or the manner in which information can be organized and stored to make it more usable (Proctor et al., 2002). The design should take the end users into account and provide interactive navigational aids, such as a site map or persistent major navigational controls. A site map can help a user orient himself or herself within the virtual environment. Site maps provide an overview of the information structure. Persistent navigation provides users with the same major navigational choices on each page of a site, usually organized by major topics. In addition, each page can contain page specific navigation to access the information unique to that page.
The objects-actions interface model is one way a designer can help users grasp the structure of the website or the content contained therein. In this model, both objects and actions should be organized hierarchically. The objects-actions interface model allows for two types of information access. First, structured information objects, analogous to a bookshelf organized by genre, help users find content based on information organized into categories. Second, information actions, or searches allow users to search for information using key words or phrases (Proctor et al., 2002).

Providing for Efficient Retrieval

Many users access content on the Web through search engines. Searching within the site should be natural and obvious. Browsing is another way users, especially more naïve users (Proctor et al., 2002), retrieve information from websites. To facilitate efficient browsing, the structure of the site and persistent navigation can help users. Zhang and Zalvendy (2001) found the key factor for accommodating low-spatial-ability users was to eliminate the need to mentally visualize the site. In other words, the information architecture should be graphically clear to the user.
Interface Design

Ozok and Salvendy (2000) found web page design consistency had three interdependent components: physical, communicational and conceptual. They concluded page consistency, as perceived by users, depended on a consistent physical layout, a predictable or consistent method of communication, such as clicking on an arrow near a box to provide users with a list of choices, and a predictable conceptual organization. Using common tasks required on web pages, namely clicking on objects or filling in forms, they concluded web page consistency improved task performance and satisfaction.

Consistency in web design decreases the cognitive load on the user, and improves speed and satisfaction (Ozok & Salvendy, 2000). Designers can use color or frames to separate navigational portions of a web page from the content of the page (van Schaik & Ling, 2001). Color, however, did not improve performance or satisfaction. Page elements that rely solely on color for identification are not useful for users who have difficulty distinguishing colors, such as visually impaired users. In cases where color is used to separate navigational portions of the website from content portions (for example, a stripe of color may run down the left side of a web page) it is
advisable to provide an alternative cue. Frames, for example, divide the page into separate portions. The main advantage to frames is they allow a user to scroll through the content of the page while keeping navigational prompts visible. They also provide a spatial cue to the user, which does not rely on color alone, signifying the functional separation of two or more screen segments. Using frames located at the Top of the page was most effective, followed by using frames on the left of the page (van Schaik & Ling, 2001).

Making an object visually conspicuous can improve access speeds by up to 83% (van Schaik & Ling, 2001). One way to make objects more conspicuous is to organize the screen. Web page consistency and grouping related items on a page improve organization (van Schaik & Ling, 2001).

Structured preview design provides a way to improve user performance (Zhang & Salvendy, 2001). Zhang & Salvendy (2001) found significant improvements in identifying objects efficiently when structured preview design was used, especially for low visualization users.

Proctor et al. (2002) describe the use of Ecological Interface Design (EID). EID considerations include using clear labels, graphically obvious maps and other structures the end user is likely to understand. The
former provides semantic help while the latter provides spatial assistance. Standardized interfaces are the most effective for users.

Users will not always navigate learning software the way designers intend (Nelson & Bueno, 1999). Unless restrictive features are designed into the interface, users will find their own, often idiosyncratic ways to navigate the material. There is some evidence of user evolution (Nelson & Bueno, 1999). This refers to the tendency of users to become more proficient at navigating the material, developing creative ways of learning from the interface. DiSalvo (2002) describes the Thinkmap interface that builds knowledge from information. The implication is that the interface can act as an agent for knowledge acquisition.

Nelson and Bueno (1999) advocate four steps to improve usability of the interface. First, design the environment with usability in mind. Second, get input from experts and novice users in the development stage. Third, field-test the product with usability in mind. Finally, revise and maintain the interface based on usability feedback.
Summary

In order to design an effective professional development support website for teachers, four categories were researched. First, the attitudes of teachers towards technology and training were considered, taking into account the needs of teachers and their perceived constraints. Teacher attitudes towards technology and professional development as well as educational philosophy and flexibility were explored.

Next, the interdependence of technology and teaching philosophy was considered. Teachers act as mediators of the resources and content of the classroom. Pedagogical philosophy influences almost all interactions and resources in the classroom. Technology is no exception. Effective training and support for professional development should include a discussion of the pedagogical context and philosophical implications of the technology itself (Zhao et al., 2002). The underlying philosophy of education, in part, determines the uses for which technology is employed. Conversely, technology enables many activities that may influence, or at least facilitate, a change in pedagogical philosophy from objectivism towards constructivism.
Next, the effect of graphic organizers was researched. Graphic organizers include knowledge or concept maps, process maps or procedural facilitators among other uses. The important features of concept maps are the hierarchal structure and cross connections. Graphic organizers help learners by presenting information in dual coded form.

Finally, web page design was examined. The information architecture can facilitate efficient retrieval of content. A consistent interface design decreases the cognitive load on the user and improves satisfaction and speed of use.
CHAPTER THREE
PROJECT DESIGN PROCESSES

Introduction

The design process used to design the project is a five-step process: analysis, design, development, implementation and evaluation (Morrison, Ross, & Kemp, 2001).

The analysis portion of the process sought to answer the question, "What are the needs?" This is the portion of the process where the goals were determined and the specific learning objectives first conceptualized. The design portion attempted to consider the users, context and goals to design an appropriate support website for teachers. The website embodies the instructional strategies and sequencing as well as content necessary for learners to meet the goals and achieve specific objectives.

The development portion developed the website structure, navigation and content materials. Implementation, for the purpose of this project was the beta testing with selected users. Evaluation was in three forms: formative, summative and confirmative. The formative evaluation came in the form of feedback from
expert evaluators and end-users in the early part of development. The Summative evaluation occurred near the end of the beta testing to determine the extent to which the website met the goals. The confirmative assessment will continue on and on-going basis to determine the usability of the website.

Analysis

The analysis portion of the design process was broken into three parts: task analysis, learner analysis and contextual analysis. The task analysis was conducted as a hybrid between a needs analysis and goals analysis. The instruments for data collection were an interview (Appendix B) and a questionnaire (Appendix C). The end-users, in this case 118 teachers at three elementary schools in Southern California, answered questions designed to determine their perceived needs. Since many of the end users are proficient neither in the use of the software application, nor in distance education mediated by a website, goals analysis was also employed.

The goals analysis sought to determine the necessary goals that must be met. Using interviews with experts in pedagogy and website design, as well as research results,
the goals analysis helped determine the objectives for the website.

Task Analysis

The needs analysis was partly based on results of the questionnaire (Appendix C), which were analyzed in two ways. First, the mean response value and variances for each question were computed. Second, the frequency of agree or strongly agree responses were compared to the frequency of disagree or strongly disagree responses. A total of 46 teachers responded to the questionnaire.

The analysis of mean response values and variances are summarized in Table 1. The strongest agreement, based on lowest variance, from respondents was on questions 1, 3, 11, 13, 15 and 18. Based on these results, respondents had the most consistent need for software to improve reading comprehension, such as identifying story elements as well as the ability to organize story elements in preparation for writing. In addition to this, teachers report a need to integrate technology into content areas.
Figure 4. Mean Responses with Variations

The largest disagreement between respondents, based on most variance, was on questions 4, 5, 10, and 19. This indicates a disparity between respondents’ perceived needs for standardized test preparation. This disparity may be indicative of differing philosophies of education. Since all of the respondents were elementary teachers, the disagreement on the use of software to improve student synthesis of expository material from textbooks or Internet resources may be due to different emphases for primary (K-3) versus intermediate (4-6) grade levels.
The second method of analysis for the results from the questionnaire was the frequency of responses. The most frequent response of 1 (Strongly agree) was for questions 13, 15 and 16. Based on these results, 59% of the respondents strongly agree with the need to integrate technology and manage technology resources within the classroom. Also, respondents perceive a need to learn ways to help students publish their results using technology.

Responses to questions 1, 3, and 7 provide a strong indication of perceived needs of respondents. On those questions, between 84% and 89% of respondents indicated they agree or strongly agree with the need to use software to help students with reading comprehension, story planning and vocabulary acquisition. Conversely, the responses to questions 4, 19 and 21 showed the strongest perceived lack of need. On these questions, 22% of respondents disagreed or strongly disagreed with a need to use software to prepare students for standardized tests. The results also indicate nearly one fourth of teachers responding to the questionnaire disagreed or strongly disagreed with the need to both read and send responses to a bulletin board for professional collaboration.

Based on these results, teachers who responded to the questionnaire need software to help them teach reading
Finally, based on interviews with end-users and education leaders, the attitudes of learners towards technology in-service ranged from enthusiastic to skeptical. Many teachers expressed a need for more time to learn, plan and implement technology into their curricula. The most common impediment reported during interviews was lack of time.

Contextual Analysis

One consideration of contextual analysis is the orienting context. The orienting context includes the learners' goals, perceived value and accountability for training. Based on interviews, questionnaire results and research, the learners' goals for technology include the following. First, the training needs to be easy to understand. Second, it needs to be relevant to the teaching context. Third it needs to employ the technology at hand. Finally, it needs to offer unique strategies.

Since 59% of respondents reported a desire to integrate technology into their curricula and nearly 90% report a desire to learn to use software to improve student reading comprehension, vocabulary and story organization, it seems clear the respondents perceive value in a training that will help them achieve these goals. Interviewees reported they value a quick, hands-on
training to show them how the basic functions of the software work and at least one follow-up training. In addition to follow-up training, 65% of respondents agreed or strongly agreed they would like to read postings to a bulletin board to support their integration of software into lessons. Approximately half (49%) of the respondents reported they agreed or strongly agreed they would like to contribute to and read bulletin boards for integration support. Accountability for the training is indirect, relying on anecdotal evidence of use. Nearly all of the respondents and interviewees reported a belief that they would not be held directly accountable for technology integration.

Finally, the transfer context for the training was considered. Nearly all of the interviewees reported a lack of support as they attempted to transfer learning from in-services to the classroom in the past. Some used the term, “drive-by trainings” to derisively describe training that was forgotten within days of the in-service due to lack of follow-up support. Most agreed they would value a website to help them answer questions as they integrate the software.
Design

During the design portion of development, three facets were considered: Instructional sequencing, instructional and support strategies and the design of the learning environment, in this case a website. Specifically, the information architecture and navigation were considered to optimize user satisfaction.

Instructional Sequencing and Organization

The sequencing of the material was designed to be non-linear. Users will rely on the navigational features of the website to help determine the sequence of support. The instructional organization of the material was determined based on needs analysis and user feedback. Some users expressed a desire to have a step-by-step tutorial for the basic features of the software application. Other users preferred to look at examples of work first. The main navigation bar allows users to select the order of these processes. The navigational features include persistent hyperlinks, which are a set of identical hyperlinks on each page, structured preview menus and both traditional and graphical site maps. A search function is also available to allow learners to search the site using key words or phrases.
Instructional and Support Strategies

The website provides support to learners in four ways. First, it provides basic step-by-step tutorials to orient learners and help them learn the basic functionality of the software. Second, it provides exemplars of cognitive maps used in a variety of pedagogical contexts along with explicit connections to content standards. Third, it provides bulletin boards for discussions and questions. Finally, it offers a frequently asked question page.

Website Design

The website design included several considerations. The information architecture employed hierarchal organization. First, information was organized by general categories. Examples of general categories are: tutorials, examples and communication. Information was further organized by subcategories. Examples of subcategories under the general category of examples are: K-3rd Grade, 4th - 6th Grade and 7th - 12th Grade. The information was further organized into subcategories of subcategories when it was appropriate. For example, the subcategory 4th-6th Grade has the following subcategories: reading, writing, content.
Structured preview navigation helps users navigate and find the information easily. Persistent navigation and Ecological Interface Design (EID) concepts were considered to keep the cognitive load on the user low (Proctor et al., 2002). EID describes the design philosophy that seeks to keep the cognitive demands on the user as low as possible. This is done for two reasons. First, the user is better able to comprehend the content of the website when he or she does not need to concentrate on structure of the website. Second, low spatial ability or inexperienced users may not be able to overcome the cognitive demands placed on them by poorly designed interfaces. Navigation bars at the top and left of the page remain consistent.
throughout the site. In addition, a site map provides an overview of the site by category.

Development

The development phase of the design process involved the building of the website and assuring its functionality. This phase also included the design of the instructional support items and artifacts. The website was developed using Microsoft FrontPage and Inspiration. Three main considerations were the website structure, navigation and the development of instructional content.

In addition to site structure and information architecture discussed previously, the development phase considered several other elements. Although the structure of the website was the main consideration, including navigational features and content, the design process took into account fonts, colors and graphics as well. The font used throughout the site remained consistent. Verdana twelve or fourteen point black letters on white backgrounds were used. Verdana was chosen for its readability, being a font specifically designed for the Internet. To enhance readability further, each page of the website is manually set for a white background so as not to rely on browser defaults. White background with black
letters maximizes the readability for all users, especially those with visual impairments such as difficulties distinguishing colors.

Another design feature that supported users was the Hyperlink colors, which were consistently set for blue, underlined letters. This provided a consistent cue for users, letting them know through both color and underline cues that more information is available.

During the design phase, both a logo and a motto for the website were developed. The purpose of the logo was to provide a consistent visual cue, on virtually every page of the website, letting users know they were still on a page within the website. The nonlinear nature of the Internet often causes users to move from one website to another, without realizing they have moved to a new website. To lessen this tendency to feel lost, the website has a picture of an echidna with a globe resting on its back using a computer. Besides offering a consistent visual cue for users, the picture represents technology integration and a world-wide community. The motto for the website, "Learn, Think, Live," represents the connection between learning and real life.

A final design consideration was the page layout. The presentation of each page was designed to minimize
horizontal scrolling, while providing predictable locations for navigation structures and content. The pages were placed within tables, the width of which were set to fill the screen, regardless of pixel width of the viewers’ monitor. When setting the width of cells in a table embedded in a webpage, FrontPage offers two options: pixels or percent. Using percent allows the page to adjust its width depending on the size and settings of the users’ monitors. This design consideration significantly reduces the variability of appearance of pages viewed on a variety of browsers and monitors.

Implementation

The implementation of this project will take place in the future. As it was envisioned during the development process, the website will serve as a model for extended communities of practice supporting teachers as they integrate technology into their curricula. The full-fledged implementation, therefore, will be left for future projects.

For the purpose of this project, a beta test was conducted using a small group of end-users and experts to determine usability and assure objectives were met. As is common practice in software application development, the
beta testing is designed to simulate implementation. The users were observed as they interacted with the website. This stage of development was iterative. Throughout the process, various volunteers proffered opinions about navigation and content.

Several changes were made to the website based on feedback from these users. First, the menu structure was changed to offer a more intuitive preview of the information architecture. Most teachers expected content examples to be arranged by grade level. The main navigational bar, therefore, was changed to reflect this. Several users expressed a desire to see student examples on the website. Based on this feedback, a limited number of student examples were added. The website was designed to accommodate further additions from teachers and students. Many users requested pictures on the splash page designed to help users differentiate the four main parts of the website: tutorials, examples, discussions and contributions. Pictures were added to help users visualize these main portions of the website. Some of the users requested a dynamic tutorial with narration. This was left for a future project.
Evaluation

Three types of evaluation were proposed: formative, summative and confirmative. Due to time constraints, only the first two were implemented.

Formative

The formative assessment took the form of interviews and questionnaires administered to end users and experts. The results of these assessments helped determine the goals and structure of the website. Based on the results of questionnaires discussed earlier, the website had four main goals. The first goal was to provide on-going support to teachers attempting to learn and integrate Inspiration®. This support included tutorials and examples. The second goal was to provide explicit connections between the use of technology, specifically this software, and student acquisition of skills. For example, most teachers reported a need to improve student vocabulary acquisition, so several of the examples focus on vocabulary improvement and expansion. The third goal was to provide an extended community of practice for teachers implementing Inspiration®. Since relatively few teachers incorporate innovative strategies at a single school site, the extension of the community of practice beyond the school site offers another way for teachers to
provide mutual support. Finally, the fourth goal was to provide a forum for discussion. The specific goals for the forum may evolve over time, but initially focus on the alignment of pedagogical philosophy and technology use.

Near the end of the development process, a small group of users was observed during a beta test and interviewed as to usability and content issues. In addition to this, six volunteers viewed the website and provided feedback by e-mail regarding the extent to which the website met its objectives. Based on feedback from these observations, final adjustments were made to the design of the website. They included the addition of more student work samples in the primary grades. Mouse-over colors for the structured preview menus were changed to reflect categories. On the examples pages, bookmarks were added to hyperlink readers to the discussion, standards and research sections of the page to highlight their existence and to avoid the need for users to scroll. Finally, several questions with answers were added to the frequently asked questions page. For example, users asked, "Why use the NETS standards?" Another question asked by users was, "What is TappedIn?"
Summative

Due to insufficient time, the outcome of the project was not measured. Several possible methods could be used to measure the outcome. One possible method would be to measure the change in attitudes of teachers, based on post-treatment answers to the questionnaire, who implemented the strategies on the website to determine if any attitudinal changes occurred as a result of training or on-going support. Alternatively, a test could be developed to measure the change, if any, of technology efficacy of teachers who participated in the training and support. Finally, a pre and post-test could be used to compare student work in the classrooms of teachers who participated in the training and support. All of these were beyond the scope of this project, and so left to future studies.

Confirmative

After posting the beta version of the website to the Internet, feedback was sought from end-users. Two forms of confirmative feedback were designed. First, a brief, on-line questionnaire was posted on the website. Second, a feedback form, designed to gather more open-ended responses was added to the website. Insufficient responses were received to draw any conclusions. The confirmative
feedback will be analyzed periodically to determine need for modifications to website and to assure alignment of website with goals.

Summary

The project design relied on research, feedback from end-users, content experts and website design experts. Based on perceived needs of end-users, the site provides examples to support using the software to improve students' reading comprehension, vocabulary development, story organization and content area synthesis. The site employed structured preview navigation and a variety of organizational strategies, such as site maps and search options to assist users. Based on research and user feedback, the site provided an extended community for collaboration in the form of persistent bulletin boards.
CHAPTER FOUR
CONCLUSIONS AND RECOMMENDATIONS

Introduction

This project was designed to help teachers improve their technology efficacy. In so doing, they become more efficient users of technology, better able to provide an integrated curriculum, employing technology, based on current research, to deliver and support standards-based lessons. A possible benefit of this is more efficient teaching, freeing up time for teachers. The teachers involved in this project all reported a need for more time. They reported a need for more time to learn and implement appropriate technology strategies. They need more time to plan technology infused lessons and more time to teach content. One major obstacle to thorough implementation of technology is a lack of follow-up training after initial in-services. This project was designed to overcome this obstacle. By providing a forum for an extended community of practice, the website offers one way to extend communities of practice beyond the classroom and beyond the school.

In addition to providing an extended community of practice, the project offers concrete examples of how to
use Inspiration®, a commercial software package, to support student learning in a variety of educational circumstances. The majority of teachers involved in this project reported a need to use software to help students improve reading comprehension, vocabulary development and plan narratives before writing. Additionally, teachers reported a desire to integrate technology more thoroughly into their curricula, as opposed to teaching technology as a separate topic.

As a result of this project, teachers have a website designed to help them integrate technology into their teaching, communicate with other educators and seek answers to questions.

Conclusions

Based on the findings of this project, there are four main implications for technology in-service. First, teachers value explicit connections between the technology capabilities and their perceived needs in their classrooms. For example, if a teacher needs to help students improve vocabulary acquisition, then he or she will be more receptive to technology that specifically helps with this need. Technology trainers, therefore,
should ensure the perceived needs of teachers are met by the technology integration training.

Second, teachers have significant demands placed on their time, which increases the likelihood that technology integration will be placed on the back burner to make room for more pressing needs. In other words, the transfer context needs to provide continued support for technology integration. This project provides one form of support to improve the transfer context for technology integration. By providing an extended community of practice, the perceived accountability increases.

Third, more than half of the teachers would value reading comments or questions posted to a bulletin board designed to support their integration of technology into the curriculum. This project provides a way for teachers to share their questions, answers and comments with each other. The bulletin boards, mediated by a website provide a forum for discussion.

Finally, technology integration does not occur in a pedagogical vacuum. Rather it takes place in the practical context of the classroom. One of the most important aspects of the context is the educational philosophy of the teacher. If the teacher does not view technology as a constructivist tool, then he or she will probably not use
generative software with students. The implication for trainers is clear; consider the pedagogical philosophy of the teachers. Provide ample opportunities for them to see examples of how technology, in this case generative software, can help students meet specific educational goals and they will be more likely to integrate it into their curriculum.

The following conclusions are based on results from questionnaires, interviews, informal observations and feedback.

1. Teachers want to learn how to use software to help their students improve their reading comprehension.

2. Teachers want to learn how to use software to help their students improve their vocabularies.

3. Teachers want to learn how to use software to help their students improve their planning of narratives as a prewriting strategy.

4. Teachers value technology more when they readily connect its usefulness to a perceived need they have in their classrooms.

5. Teachers are strongly divided about using software to help students improve their performance on standardized tests.
6. Most teachers reported a desire to read messages posted on an electronic bulletin board regarding the implementation of technology.

7. Most teachers are not willing to post responses or questions to an electronic bulletin board.

The first three conclusions indicate the emphasis placed on language arts instruction in this group of elementary schools. The acquisition of vocabulary is an indicator for improved reading comprehension. In addition to vocabulary development and reading comprehension, composition organization is heavily stressed. An important conclusion to be gleaned from these results, therefore, is conclusion four: teachers value software applications, and by extension, all technology, only to the extent that it helps them address key needs for students. An important implication for technologists is the need to design learning environments and professional development so as to clarify in teachers' minds the explicit ways the technology can help them meet their needs. In other words, make it clear and readily understandable how the technology will help them meet an immediate, perceived need, such as vocabulary development.

The last two conclusions are based on results that might not surprise anyone who listens to talk radio
stations. Clearly, most of the audience does not call; they generally prefer to remain inactive listeners. The results of this project support the same conclusion for teachers considering the use of a bulletin board to extend the community of professional development. Most teachers in this situation would value an inactive role, such as reading the postings on the bulletin board. Relatively few of the participants would want to take an active role.

The implications for designers of extended communities of practice are twofold. First, there is a need to nurture and support a small number of active participants at each worksite. Second, a relatively small number of active participants probably indicates larger numbers of inactive participants are interacting with the material. If a designer views the website and bulletin board as a virtual extension of the physical community of practice, then the active users might be viewed as emissaries between the real and virtual world.

Recommendations

One of the volunteer teachers in this project, with more than twenty years teaching experience, made a candid remark, “I have all this technology (while waving her hand around her room, indicating nine Internet-connected
computers) but no software to help me use it." During the course of the interview, it became obvious she was referring to a lack of self-monitoring software, designed to elicit responses from students and provide feedback to them. The large amount of constructive software available on each machine, including publishing, word processing, spreadsheet and cognitive mapping software, among others, was not used in her class.

The teacher in question offers an example of how pedagogy and computer use compliment or contrast each other. In other words, she had a hard time imagining the students in her class using the software on the computers to generate products. Rather, her vision of computers was similar to her vision of the rest of her class work, namely a preprogrammed list of prompts followed by responses to be evaluated by the computer as either correct or incorrect. She viewed the computer as an electronic teacher.

Over the course of several meetings and trainings, she came to change her view. Ultimately, near the end of this project, she confided, "I really never thought there was so much here. I didn't think the students could do so much with these programs." She had seen the results of student work using generative software and the depth of
understanding it fostered in the students. Several of the student examples were used on the project website as exemplars of student work. More significantly, the teacher in question has changed her view of what learning is. She has a more constructivist view of education and places more value on students generating work products based on their evolving understanding.

This success story started with one application. When asked what she really needed to have happen in her classroom, she replied, "I want the computers to drill the students on vocabulary from the story while I meet with small groups for guided reading." After meeting this need, she became interested in what else she could do. She needed to see one concrete example of how the computers could help her, instead of standing unused in the corner.

Effective integration of technology often requires a close examination of pedagogical practice and the philosophical views of teachers. Any tool, including technology, can manifest the philosophy of the user. The strengths of technology, such as computers, Internet, digital cameras and a variety of constructive software packages lie in their flexibility and powerful communication capabilities. Successful integration requires teaching strategies designed to exploit their
power and flexibility in pedagogically appropriate ways. These strategies will always be mediated by teachers. Teachers, therefore, are the gatekeepers to technology.

When seeking to increase the amount of technology integration in elementary classrooms, the recommendations, based on results from this project are:

1. Create explicit connections between the unique capabilities of the technology and the teachers' perceived needs.

2. Provide teachers with basic introductory training on functionality and application of new software.

3. Offer extended opportunities for support including follow-up trainings and an on-line community of practice.

4. Increase teachers' perceived accountability for training. One way to do this is to provide on-going, systematic training and feedback.

5. When creating an on-line support community mediated by a website, keep the interface simple and provide the content teachers perceive they need.

6. Future projects can seek to find ways to increase teacher participation.
Summary

The results of this project indicate teachers perceived a need for training in integration of technology. Specifically, teachers want to learn how to integrate technology into lessons designed to improve reading comprehension, student vocabulary and narrative planning. Teachers recognize the need for integration versus isolation of technology, but often feel they lack the time or training to meet the need.

In addition to this perceived need for integration, many teachers recognize a need for on-going, systematic training for technology integration. The need to support teachers extends beyond training designed to facilitate the use of a single software package. Teachers recognize the need for an extended community of practice mediated by a website.

This project provided teachers with technical support for implementing Inspiration®, a commercial software package. Additionally, it offered specific examples rooted in content and technology standards, as well as research-based justification for the strategies employed. Finally, it provides a forum, through which teachers may dialogue, creating an extended community of practice.
APPENDIX A

CD OF PROJECT
APPENDIX B

INTERVIEW QUESTIONS
Interview Questions

(These questions will be answered during a face-to-face interview with 6 staff members selected based on familiarity with technology. For example, choose 2 members with strong technology skills, 2 with moderate and 2 with few technology skills.)

1) Tell me about your teaching situation. (Possible prompts: Do you have a lot of ELL students? Do you have a large number of RSP students? Do you think your students need support with the writing process?)

2) What would you consider your biggest success / or frustration integrating technology into your daily routine?

3) What do you know about a program called Inspiration?

4) Have you ever used cognitive maps, sometimes called idea webs? If yes, how?

5) How do you feel about technology? (Responses are completely open ended, this question is intended to get some context for the interviewer as well as help the interviewee feel more at ease.)

6) What features would help you most on a website designed to support your use of a software application, which helps the user build dynamic cognitive maps? (Some explanation of dynamic cognitive maps and possible features may be necessary.)

7) As the expert curricular designer in your classroom, what would you most want to see on a website to help you integrate concept maps into your curriculum? (Possible prompt: Would you like to see the pedagogical theory for the strategy? Would you like step-by-step instructions about how to build cognitive maps using a software application? Would you like to see an on-line community to answer FAQ's and share experiences from other teachers? Would you like to see examples of concept maps used in various pedagogical contexts?)

8) If you knew of a piece of software to help students but you did not know how to use it, what kind of support would you need to integrate the software? (Possible prompts: Would you value a face-to-face training? Would you like a website with pictures and examples? Would you want a hands-on training workshop with a follow-up training?)

9) If you could request any kind of curricular support involving technology applications, what would it be? (For example: Would you like to have support developing ways to include Internet resources in a unit you
already have? Would you like to learn how to use an application to improve student writing?)

10) As the curriculum expert in your classroom, in what area could your students use the most support? (For example: Do they need help organizing an essay? Do they need help synthesizing information from their textbooks? Do they need help responding to literature?)

11) Under what circumstances would you be most likely to use an on-line forum? (Some explanation of on-line forums might be necessary.)

12) Why would you use a forum?

13) What would make you not want to use a forum?

14) What would make you want to use a forum?

15) How could a software application most benefit you? (Open ended answers, but possible prompts: Would it help you most to create customized graphic organizers? Would it help you most to have students use an application to organize their writing?)

16) How could a software application most benefit your students? (For example: As a research tool? As a skill builder? As a motivation?)
APPENDIX C

QUESTIONNAIRE
Questionnaire

We will use your responses to these questions to design a training program to help you use technology applications more effectively. We want the training to reflect your needs. We value your responses because technology applications cannot help our students if they do not help teachers. You are the experts on what you need.

1 = Strongly Agree  
2 = Agree  
3 = Neither Agree nor disagree  
4 = Disagree  
5 = Strongly Disagree

1) I would like to learn how to use a software application to help my students organize a story.
   1  2  3  4  5

2) I would like to learn how to use a software application to help my students organize an expository essay.
   1  2  3  4  5

3) I would like to learn how to use a software application to help my students recognize elements of a story.
   1  2  3  4  5

4) I would like to learn how to use a software application to help my students improve their scores on standardized tests.
   1  2  3  4  5

5) I would like to learn how to use a software application to help my students synthesize material from their textbooks.
   1  2  3  4  5

6) I would like to learn how to use a software application to help my students develop their oral language skills.
   1  2  3  4  5

7) I would like to learn how to use a software application to help my students improve their vocabulary.
   1  2  3  4  5
8) I would like to learn how to use a software application to help my students gain understanding of structural components of words, such as prefixes and suffixes.

9) I would like to learn how to use a software application to help my students organize a report of information.

10) I would like to learn how to create pre-selected lists of Internet resources for my students to use by clicking on a hyperlink (Possible uses include lists organized by topic and grade level, for example second grade resources for dolphins or sixth grade resources about Greek Mythology).

11) I would like to learn how to help my students use an application to improve their writing by creating class newsletters or other documents to stimulate interest in writing.

12) I would like to learn ways to include content from the Internet into lesson plans I already have. In other words, I have a lesson I love, but I could always use more resources to make it better.

13) I would like to learn more about integrating technology into my curriculum. I don’t want to teach technology as a separate subject, but would like to use technology to help my students learn content, such as social studies, language arts or science.

14) I would like to learn how to use my computer to make things like brochures, newsletters, banners, calendars, gift certificates, etc. (Teacher desktop publishing).
15) I would like to help my students learn to use the computers in my classroom to design and publish their work (Student desktop publishing).

1 2 3 4 5

16) I would like to learn ways to manage the technology in my classroom. For example, if I have three computers, what is an effective way to schedule their use so students have equal access?

1 2 3 4 5

17) I would like to have a class web site where I could post my calendar for homework and some brief messages.

1 2 3 4 5

18) I would like to learn to use a software application to help students build their own idea maps to help them improve reading comprehension.

1 2 3 4 5

19) I would like to learn to use a software application to help students build their own idea maps to help them improve their standardized test scores.

1 2 3 4 5

20) I would like to read but not send comments or questions, and responses posted to a website designed to help teachers develop ideas for integrating concept mapping software into their curriculum.

1 2 3 4 5

21) I would like to read and send comments or questions, and responses posted to a website designed to help teachers develop ideas for integrating concept mapping software into their curriculum.

1 2 3 4 5

22) I would like to join a group and receive regular e-mails regarding questions and responses from teachers in my grade level who are integrating concept mapping software into their classrooms.

1 2 3 4 5

23) What I really need is (Please tell us briefly what would help you)...

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