

Working Within: The Pedagogy and Practice of Technology Professional Development

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By

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ABSTRACT

Many researchers have been critical of teachers' failure to implement computer use effectively in the classroom. In order to question the role that pedagogical issues may play in the success of the implementation process, this study looks at the beliefs of professional developers who are responsible for helping K-12 teachers learn to teach with computers. Five professional developers from Saskatchewan were asked to describe their professional practice by focusing on what they thought effective use of computers was and how they thought their beliefs affected their practice. The heart of the study was the story of the professional developers' experiences and the way in which their practices evolved over time to meet needs they saw.

The professional developers were a diverse group of former teachers. They had taught in a wide variety of settings and for varied lengths of time. They were purposefully selected for involvement in provincial initiatives and providing professional development around computers in their home divisions. The participants shared their experiences through an informal semi-structured interview and follow up questions. The transcripts of the conversations comprised the data, and their examples, statements of belief, and experiences formed the basis for the interpretation of the results.

The findings revealed that the professional developers identified both first and second order barriers to the use of computers in classrooms. Each person described a transition from traditional professional development practice to a personal style with the deliberate addition of pedagogical emphasis. They concluded that the current practice of teaching with computers generally did not meet their definition of effective and emphasized the need to question why computers are being used the way they are.

The findings from this study indicate that the professional developers believed their pedagogy and practice as professional developers to be intertwined. They also confirmed Coopla's (2004) argument that pedagogy is the critical first element for effective teaching with computers. From the prospective of the participants, pedagogy, not technology defines how effective the process of integration is in K-12 classrooms.

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*Pedagogy and Practice: the Effective Use of Computers through the Eyes of
Professional Developers*

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CHAPTER 1
INTRODUCTION

“I go into workshops and I say to people, ‘I love technology because technology is going to replace teachers.’ And they look at me in anger because that’s always been the fear, and that’s blasphemy. I say, ‘I mean replace as in reposition. You’re removed from being center stage and you are now repositioned to the side of the student – you are now the coach, the partner on the adventure.’ ”

Karen Schmidt Henderson (personal conversation, Nov. 29, 2005)

Karen Schmidt Henderson is one of a relatively small group of people in Saskatchewan with an unenviable and exciting task. Part of her job description is to be a professional developer whose goal is to train teachers how to integrate computers in the classroom. The research says that Henderson faces a number of major barriers in her work. These factors include support, time to learn, professional development, hardware and software , which are known as hard factors.

Soft factors, or second order barriers like pedagogy, are the other side of the coin . Henderson was the participant in a mini-study to inform the direction for my main study. She describes a strong passion for her work, and a clear vision for how we transform our teaching using computers. The reality of how difficult that task is becomes clear when Henderson tallies up the frustrations. They start with basic issues like availability of computers and persuading educators that computers have value beyond productivity, and move to complexities such as which forms of the professional development she delivers are most effective. The expectations for what teachers will do with computers and the facts of their practice intersect in the task of the professional developer. The role of the professional developer may become an important new avenue for examining how we can best support integration of computers in the classroom.

The use of computers in classrooms is supported in a variety of different ways throughout Saskatchewan. In many cases, teachers learn about computers independently. Teachers can also attend a variety of formal learning experiences from sessions about specific software or hardware to workshops on ways to integrate computers in general. Some divisions offer support programs like Mentorship or Catalyst Teacher programs, and some organizations offer release time to learn. At the center of most of these offerings is a person or group of people who delivers the professional development. Henderson is a part of this group of professional developers who form the core of my investigation for this thesis.

The role of this group has become increasingly important as some of the issues impeding teaching with computers are reduced. Ertmer (1999) defined first order obstacles as those that are external – things like access, time or support. Similar barriers have been found in Saskatchewan (Henderson et al., 2003). Ertmer’s second order barriers are internal, and include beliefs about teaching and learning or learning practice. As many first order barriers begin to be resolved and

classroom practice has remained largely unchanged, Ertmer's second order barriers have recently become a focus of research . In this context, an examination of the relationship between pedagogy and practice is critical.

Like Henderson, other professional developers inject their work with their personal visions of effective computer use in the classroom. It is "teachers' attitudes towards technology, their beliefs in teaching and learning, as well as their styles of teaching that effect how students use technology and what sort of learning experience they will have" (Lai, 2001, p. 10). By focusing on teacher skill level, software training and methods of professional development, we have neglected a vital element, the pedagogy of the professional developers and the teachers themselves.

Professional developers must wrestle with the major questions about the integration of computers in classrooms in order to do their jobs effectively. They must ask themselves what type of teaching with computers is effective and they must determine what the key factors in effective use are so that they can plan their work. In order to answer these questions, they must decide what outcomes demonstrate effective use, and what is the best starting point for teaching about integration. As reflective practitioners, they must examine which methods of professional development are most likely to encourage effective use, what resources are needed, and how they will assess outcomes. In short, they must wrestle with content and process in the same way that any classroom teacher does.

Need for the Study

A need for an increase in the beneficial use of computers is clear. Researchers have noted a marked gap between what is currently perceived as good integration of computers and what occurs . Lai (2001) contended that both pre-service and experienced teachers feel unprepared to

integrate computers in their teaching because little training has been provided. Saskatchewan teachers identify both the professional development process of learning about how to use computers and knowing how to integrate computers as an instructional tool as barriers to integration . Teacher skill level is often too low for meaningful integration on the large scale to be possible, and Saskatchewan does not have a critical mass of teachers with the skills to use computers effectively in instruction .

The need for an understanding of how to increase effective use of computers in K-12 is particularly strong in Saskatchewan given the changes in school divisions. Many school divisions are being restructured this year as part of a mandatory process, and the goal is to move from 81 divisions to less than 30. As numerous smaller divisions are merged into larger ones, the diversity of technology planning and technology professional development practice among the different smaller divisions amalgamating into a large one must be discussed, and some common values and practice must be established. Divisions are restructuring their informational technology and curriculum departments, and they are looking ways to establish and measure best practice. Understanding the role of professional development, and in particular the beliefs and practices of professional development personnel, is key to making that change productive.

Purpose of the Study

The purpose of this study is to understand the personal framework of formal professional development for computer integration that occurs in the K-12 setting in Saskatchewan. Formal professional development of groups may occur at the school, division, or provincial level. For the purpose of this study, I will open conversations with people whose responsibility includes educating others about effective ways to teach with computers. While much professional learning occurs because of individual study or through informal mentorship or support, these

types of professional development is rarely preplanned, and are typically informally structured through evolving need. Since I wished to look at the structure and context of professional development planning that is shaping practice in Saskatchewan, my participants were people who regularly planned how they delivered professional development.

Research Questions

Individuals who instruct groups about how to integrate computers in the K-12 system are the focus of this study. Through a series of semi-structured interviews with professional developers, I explored the following questions:

1. What abiding views about the role of computers in the classroom underscore professional developers' beliefs?
2. How do professional developers believe their personal epistemology affects their practice?

Assumptions

The following assumptions were used in the study:

1. The use of a qualitative research paradigm, specifically narrative inquiry, is an effective way of assessing data regarding how professional developers view and conduct their practice.
2. The professional developers selected to participate are knowledgeable and able to articulate their experiences and their epistemologies.
3. Using purposeful sampling to select participants is a valid way to gain access to the expertise of the same group of computer-related professional developers in K-12 education in Saskatchewan.

Delimitations

This study is a narrative inquiry about the perceptions of a specific but varied group of educators. The participants came to a professional focus on the use of technology in the classroom for different reasons and have diverse professional experiences. This study does not represent the views of all K-12 computer professional developers in Saskatchewan, let alone the perspectives of a wider study group nationally or internationally. The number of participants was deliberately kept small to facilitate depth of data over breadth of evidence.

I am a member of the group I surveyed, and bring the perspective of an insider. I viewed what my participants said through the lens of my own experiences, and weighed the importance of particular findings in that context. I believe computers are a valuable addition to the classroom and my participants did not challenge that view. As a result, we may have excluded meaningful information because it might undermine that belief. When I was first pressed to use computers in my teaching, I was very doubtful of their value. Only professional reading, research studies and years of experience have taught me otherwise. It is difficult for me to give credence to opinions I formerly held, but have now rejected. This bias makes me a subjective narrator.

I also had some pre-conceived ideas that framed this study. I was uncertain whether teaching pedagogy or current models for instruction with computers is the key factor in effective integration, but I already believed that pedagogy was important in some way and was a largely unexplored issue.

The clarity of my findings is complicated by the phrase "integration of technology". Both professionally and academically, it most often means the use of computers in everyday teaching. However, the word technology actually means far more than computers and their peripherals, particularly to educational technologists. In addition, some educators in Saskatchewan use the

phrase integration of technology to mean the effective use of computers to meet curricular objectives, while others mean the use of computers for professional work, administration, co-curricular endeavors. Since my study will refer specifically to the use of computers in face-to-face K-12 classrooms, I asked for my participants' comments from that perspective. However, there were many times where I was forced to interpret the intent of my participants and sources when they use the phrase "integration of technology" or simply the word "technology". I found all of my participants used the word technology to mean computers, making the specific form of technology they were discussing implied rather than explicit. I was continually interpreting the word or phrase, and that interpretation may have affected the quality of the data I collect and the way in which the data was understood.

Definition of Terms

Integration of Technology

There are many phrases associated with the use of computers in education from Computer-Assisted Learning to Technology-Enhanced Learning. The phrase "integration of technology" was employed to mean the use of computers and related devices in instruction to support curricular objectives.

Learning From Computers

Learning from computers is the process of using computers to deliver learning, for example a tutorial. Computers become the vehicle for instruction.

Learning With Computers

Learning with computers is the process of using technology as a tool to support learning or using technology as an instructional approach. Computers become a vehicle for collaboration and generation.

Professional Development

Professional development is defined as the learning gained through formal experiences designed to alter teaching practice. The designer of these experiences can be the teacher, a group of teachers or an external authority. My focus was professional development practice or structure designed by an external authority such as a consultant, coordinator, teacher librarian or educational technologist.

Professional Developers

Professional developers are people who plan, deliver and support the learning experiences of others, specifically the learning experiences designed support the use of computers in classrooms. In Saskatchewan, these people may or may not be teachers, but they have spent a number of years learning about and working with computers in K-12 education. Professional developers might include school division staff, consultants with Saskatchewan Learning, members of the Educational Technology Consortium, or employees of the Saskatchewan Teacher's Federation.

Technology

While many things can be defined as technology, for the purpose of this study, I will be looking at computers and related peripherals. I will also include devices that interact with personal computers, like digital cameras.

Transformational Computer Use

Transformational use of computers occurs when computers are used to change the way students learn or the way curriculum is constructed.

Structure of the Project

In the five remaining chapters, I have explained the context of the question, reported on my results and discussed my conclusions and recommendations. In Chapter Two, I completed a review of the related literature on teaching with computers and the characteristics of professional development for technology integration. I connected the literature about effective use with the literature about effective professional development to support use and underscore the role of the professional developer. In Chapter Three, I provided a detailed account of the procedure used to collect my data. In Chapter Four, I discussed each participant's story as garnered through our interview. I reported my findings in Chapter Five and drew conclusions from my findings in Chapter Six.

CHAPTER 2 REVIEW OF THE LITERATURE

The debate about the role of computers in learning frames our classroom practice, our training, our epistemology and our assessment. It is also at the core of the experiences of professional developers. Each professional developer must decide what use is effective and why it is effective in order to frame his or her instruction for teachers. I have chosen to discuss what the research says about how we use computers and why we use them because it provides an essential backdrop to frame the discussion of the pedagogy of professional developers. At the core of the pedagogy of the professional developers is a personal assessment of the impact and potential value of computers in education.

Assessing of Impact of Computers on Student Learning

Cuban argued that the introduction of computers in schools was propelled by business uses, not educational ones (Woodward & Cuban, 2001). Many factors have been used to justify the use of computers in education, including motivation, unique instructional opportunities, new ways to approach curriculum, skill development, and increased productivity (Roblyer & Schwier, 2003). Many of these rationales are directly linked to the learning process.

In order to assess the legitimacy of these justifications, scholars have measured the learner-related justifications against outcomes for students with little agreement. Studies have found important, quantifiable improvements in test scores (Butzin, 2001; Mann & Shafer, 1997). However, opponents contend that computer use stunts fundamental skills (Wenglinsky, 1998) or

damages literacy (Armstrong & Casement, 1998). In the end, “the number and quality of studies on educational impact has been disappointing” (Roblyer & Schwier, 2003, p. 10). The number of potential variables makes accurate findings difficult, and the focus on standardized test scoring is best suited to assessing only a few uses of computers. Ringsaff and Kelly (2002) noted that computer use beyond simple tutorials is difficult to measure. In addition, changes in the way we use computers are making measurement increasingly difficult. The debate about how to assess the impact of computers on student learning continues.

For professional developers, this debate is at the core of their work lives. They must justify and defend their choices without clear, empirical evidence. In many cases, lived and subjective experiences become the foundation for the belief that computers benefit students. For many professional developers, it is the potential of computers to transform teaching, not the current practice that drives their beliefs. Henderson says simply, “I dwell in possibility” (personal conversation, Nov. 29, 2005). The current value of the computer, but more importantly its potential future value, is entwined in her pedagogy as a professional developer.

Hokanson and Hooper (2004) contended “the future of computer is not to make education easier, but rather to make learning more effective” (p. 250). They noted that teaching with computer, not teaching from computer is the key to educational success. Hokanson and Hooper asserted that generative uses would result both in better outcomes for students and stronger adoption by teachers. This concept is reinforced in the literature (Jacobsen, Clifford, & Friesen, 2002; Means, Penuel, & Padilla, 2001). However, methods of assessing the value of these generative uses tend to include interview, observation, or ethnography, so the value of particular practices tends to be highly contextual. For professional developers, experiences and the assessment of them form the basis for evolving pedagogy and practice.

Classifying the Relationship between Computers and Teaching

Hokanson and Hooper (2004) based their argument on a distinction between two philosophical approaches: teaching from computers and teaching with computers. Teaching from computers includes things like computer-based instruction, computer-assisted instruction, and integrated learning systems. It can be a tutorial, game or independent learning program. It values transmission of information and is supplantive in nature. Its goals focus on more effective delivery of knowledge and increased skills (Ringstaff & Kelley, 2002). Hokanson and Hooper (2004) argued that teaching from computers alone could only improve access or efficiency.

In contrast to teaching from computers, teaching with computers has a wide variety of impacts. Because the values embodied by teaching with computers are generative and transformative, the nature of the goals and the resulting impacts can be felt in many areas (Ringstaff & Kelley, 2002). Means (1994) argued that teaching with computers develops problem solving and critical thinking skills and that computer is a tool used across diverse curriculum. Others contend that teaching with computers holds the power to transform curriculum and more importantly, teaching itself (Hokanson & Hooper, 2004). Some go as far as to contend that computer alters self-concept or self-esteem when used as a tool (Sivin-Kachala, Bialo, & Langford, 1997). When computer are used as a *with* not a *from*, another group beyond students stands to benefit – teachers. Teaching with computer does not just remove fear of replacement. It also transforms both teaching practice and the learning itself (Jacobsen, Clifford, & Friesen, 2002b).

The distinction between teaching from a computer and teaching with a computer is at the core of many educational debates about computer use, but the distinction is much clearer in theory than in application. While those who teach with computers value constructivist theory, they also

use objectivist practice in meeting their goals. And as distance education, which embraces teaching from computers, has evolved, it uses a number of tools designed to foster virtual learning communities. These tools include a number of elements related to teaching with computers. The distinction between *from* and *with* is further complicated by the question of measurement. Evaluation of constructivist computer projects focuses on indicators assessed through observation and case study, where the data collection and analysis occur simultaneously (Jacobsen, Clifford, & Friesen, 2002a).

For professional developers, the construction of training environments is reliant on their view of the computers. Teaching from or with computers impacts the learning teachers experience and the opportunities they have. Moreover, each use represents a separate (although not mutually exclusive) philosophical position about what uses of computers are effective. Terms like teaching with computers and teaching from computers not only give a clear vocabulary for discussing pedagogy, they also distinguish how a person views and assesses what is best practice.

Models of Stages of Computer Use

The debate about the effectiveness of how we use computers to support our students' learning is complicated not only by how the computer is being used, but also by the teacher who is using it. Researchers use various models to assess the ways in which teachers use computers, the technical skills those teachers have, and the ways students' learning is affected. Teachers move through a number of stages according to Sandholtz (1991). In Entry level, teachers have little or no interest in computers, but in Adoption, teachers' interests shift to learning skills to support text-based instruction. By Adaptation, teachers are experimenting with new technologies and using computers for higher level thinking processes. With Appropriation, teachers are using

computers in project-based ways to meet student needs and observing changes in student behavior. This is extended in Invention, where teachers pair diverse computer use with constructivist philosophy and altered ways of thinking about curriculum or teaching and learning.

Teachers are both a professional developer's students and end users. Their pre-requisite knowledge, attitudes, experiences and ideas are essential to the development of learning experiences. When the professional developer designs the instruction, his or her perceptions of the learners are important. Since many professional developers deal with a group of unfamiliar teachers at a variety of stages, developing ways of generalizing the teachers' abilities and experiences connects pedagogy and practice.

Barriers to Use

Hokanson and Hooper (2004) noted that Integration and other more advanced stages exist on the continuum from available to effective. They used Ertmer's (1999) levels of integration obstacles to focus problems in integration beyond first order obstacles and onto second order ones. The intersection between second order barriers and teacher skill levels in integration has brought the role of pedagogy in computer professional development sharply into focus. The heart of work to support effective integration must now center on changing teacher beliefs (Hokanson & Hooper, 2004). In addition, a focus on the pedagogy of those who teach about computers is now essential in understanding how to create the meaningful use of computers in classrooms (Bai & Ertmer, 2004). The meeting of professional developers' practice and their technology epistemologies is an important new frontier. For the professional developers themselves, pedagogy is a construct that their instruction is build on and it is also a tool for reflection. It provides a potential instrument for understanding teacher practice, and for changing it.

Meeting the Goal of Professional Development

In order to understand the role of the pedagogy in the work of a computer professional developer, one must first look at both the nature of professional development and the value of professional development in effecting change. According to Fullan and Mascoll (2000), professional development is “the sum of learning through formal and informal experiences” (p. 38). Professional development is tool used to help teachers grow and change in ways that are perceived to be beneficial for students .

Lai (2001a) contends that we need to start professional development about computers with the question of why we would use a computer at all. Once the why is established, he contends we can move to the question of how to use that computer. Since the major focus of teacher professional development is creating meaningful growth that benefits the whole school community, particularly the students, we must begin with questions that ground the process of professional development. Coppola (2004) argued that teachers ask, “How will this affect my students’ learning?” as the main question before deciding whether to use computers at all, then make decisions based on how effective or ineffective as educational tools computers are perceived to be. Professional development that does not persuade teachers that the computer is a useful tool for students will not result in use in the classroom; a point that clearly highlights the need for computer-related professional development to focus on student outcomes. If we fail to make professional development effective, the expensive computer investment will yield little return for students.

Understanding the goal of professional development provides a way of assessing the pedagogy and practice of professional developers themselves. Pedagogy and instructional goals are linked to each other and to the instructional approaches selected by the professional

developer. Research is starting to articulate that professional development that is not linked to the pedagogy of teacher-learners does not change practice. I will be looking to see if the professional developers in the study confirm this idea. Since the reason they are conducting professional development is to change teacher practice and benefit students, it will be fascinating to see if professional developers believe they meet those goals. It will also be interesting to see what parts of their practice they perceive as critical in trying to impact student and teacher experiences.

Professional Growth

Effective professional development is longitudinal process, not a one-time staff development event (Guskey, 2002). If the desired outcome is change in practice, then we must define professional development as a process and assess its relative effectiveness in that context.

Coppola (2004) found that teachers who successfully used computers did not merely incorporate new software in classroom practice. Rather the computer use and the pedagogy of the teacher become entwined: “When asked about their philosophies on how to use technology, the teachers wove pedagogical theories into their responses. When asked about their philosophy of teaching, use of technology was often a prominent feature in the answer” (Coppola, 2004, p. 114).

Coppola’s observed outcomes match the highest levels of use in models like Sandholtz’s 1991 Stages of Integration, where seamless, appropriate use is accompanied by pedagogical and actual classroom change. If Coppola was correct, then the connection between pedagogy and practice should be explicit and continual in the professional development that the developers in this study perceive as effective.

Guskey (2002) articulated five measures for assessing the effectiveness of professional development. Initially he suggested that the reaction of the participants be scanned to see if they

enjoyed and valued their experience. Then he proposed that their learning as a result must be assessed. If levels one and two are met, he recommended looking at organizational support and change to see if it will aid in the professional development effort and sustain the learning. Then Guskey suggested that the application of the learning be assessed in level four and the outcomes for students be assessed in level five. From Guskey's (2002) perspective, achieving Coppola's (2004) observations of effective integration involves far more than any one workshop, and requires far more than a feedback form to assess the quality of the experience. If Guskey and Coppola are correct about the key elements of effective professional development and computer integration professional development does not reflect their principles, much of the professional development currently offered in Saskatchewan may be largely ineffective.

Waves of Professional Development Practice

Jacobsen (2001) argued that there have been three clear waves of professional development to support the integration of technology. She contended that early professional development efforts focused on helping teachers develop technical skills and that this type of professional development is largely ineffective. 'Sit and get' sessions like these remain common place in Saskatchewan . Jacobsen (2001) noted the second wave of professional development focused on the marriage of pedagogy and technology. However, she contended that this professional development was centrally located and still typically in short workshop form. Again, she characterized this work as largely ineffective. She noted that third wave of technology professional development is delivered in the teacher's school and includes mentorship and support for the teacher. Henderson et al. (2003) confirm that this form of professional development results in much greater use of technology by teachers. This third wave of profession

development is also more likely to meet Coppola's and Guskey's criteria for effective professional development.

Jacobsen's waves of technology professional development do not appear to be a linear process in the Saskatchewan context. While all three forms of professional development she discusses appear to exist in Saskatchewan, there is no compelling evidence that a large-scale progression from one-time skills workshops to mentorship models is occurring (Henderson et al., 2003). Mentorship programs exist in some divisions. In addition, release time to learn, like that provided by the Web-based Learning Resource Development, has resulted in more diverse use of technology in classrooms. However, the need for substantive change in professional development practice to support teaching with technology is clear (Henderson et al., 2003). The experiences of the professional developers in this study may provide additional information about the types of professional learning offered in Saskatchewan.

Problems with Current Professional Development Practice

Much of the available professional development falls far short of creating the desired change. Researchers attribute the discrepancy between our goals and our practice (Lai, 2001b). They contend that change is always difficult to create, and that computers are always changing, so the process is never completed (Cuban, 2001). In addition, they note that insufficient professional development is available, decision-making regarding types of professional development is flawed, many of the common forms of professional development do not meet teacher needs, and supports for computer use remains low. A number of factors play a role in the problems surrounding professional development.

Change is always present in schools. The teacher who is not learning new computer skills is likely reading a new text, conversing with parents about how to change a program to meet

student needs or altering instructional approaches. Pressure to change and little time to do it in is reality (Cuban, 2001). Moving towards effective computer use is not merely just another change – it is a massive shift in how schools function. Cuban contended that changes that result in effective computer use “entail fundamental shifts in the teacher’s and student’s roles, the social organization of the classroom and power relationships between teacher and students” (2001, p.134). It is unsurprising that after school sessions on the use of PowerPoint have not resulted in the wide-ranging shifts that Cuban describes. Even when a professional development session convinces a teacher that PowerPoint might help students, the use of tool can often result in what MacKenzie described as powerpointlessness .

The problem lies in fact that effective uses are sometimes at odds with teacher pedagogy, so skills training does not encourage classroom use that meets the need for student learning. Ultimately, computer use following professional development is not creating the changes we hope it will: “Technology alone does not change school practice. Curriculum goals and materials, assessment policies, and teacher development must shift as well. Without these changes, a new technology will merely be used to enact traditional practices” (Wiske as cited in Gordan, 2000, p. 70). Cuban (2001) reinforced this sentiment and contends technical innovations are typically being used to reinforce traditional practices in our schools. Craft (1996) drew similar conclusions and contended that professional development must be ongoing to have any significant impact on teaching or learning.

Over seventy percent of teachers in Saskatchewan believe that general technology use is valuable (Henderson et al., 2003). However, in order for that belief to translate into a significant impact on student learning, teachers must believe specific technologies match a clear student need. Speck (1999) said that professional development must be clearly relevant to daily activities

and problems, or it will not be applied. In the case of computer-related professional development, this means that the pedagogy associated with the computer should be accepted as valuable before the learning can focus on acquisition of specific skills: “The teachers’ decision to adopt classroom technology should therefore be considered an early part of their learning. Essentially, they have to decide whether the computers are worth learning using before they can learn how to use them in the classroom; otherwise they do not focus sufficiently on the learning process to work through all the barriers they encounter” (Coppola, 2004, p. 111-112).

The decision to focus professional development on increasing computer skills is an understandable one, since most Saskatchewan teachers do not have the skills to use computers effectively in their classrooms (Henderson et al., 2003). And while computer skill acquisition should not be the first step in professional development, it is often a key component. Craft (1996) argued that teacher professional development must be based on a careful assessment of teacher needs and prior learning, using a process like the one a teacher uses to meet the learning need of each student. Jacobsen (2001) noted that professional development focused on increasing technology skills is ineffective unless paired with pedagogy and situated in the classroom.

Availability of Professional Development

Even if professional development regarding computers was on-going, focused on the goal of improving student learning, starting with pedagogy and appropriate to teachers’ needs, it might not be effective. The current availability does not meet the level of the need. Lai (2001a) commented that the problem stems from insufficient funding. Researchers recommend spending thirty percent of the technology budget on training, an amount echoed in calls within Saskatchewan (Henderson et al., 2003). However, school divisions in Saskatchewan spent an average of 1.7% of their technology budgets on professional development in 2003 (Harkness et al., 2004). Sufficient funding becomes an even larger issue in the context of current trends in

professional development. If researchers are correct that we need to shift away from traditional one-shot professional development and into long term plans with on-going supports (Guskey, 2002; Jacobsen, 2001), then the cost to create professional development will be greater. Already inadequate funding for meeting professional development challenges will now be beyond insufficient .

Traditional Computer Professional Development and Adult Learning Needs

Sullivan noted (1999) that traditional practices in the integration of computers are criticized because they make connections to classroom learning almost accidentally. Cuban (2001) described common forms of computer professional development for teachers as “generic training” that is “often irrelevant to their specific and immediate needs” (p. 98). Such professional development may be driven by prior computer purchases and not by a stated teacher or student need.

A comparison between Speck’s adult learning theory (1999, p. 62) and the traditional workshop or session on an application of computer reveals clear disparity. Many of the traditional forms of professional development like workshops, conferences and after school sessions tend to focus on methods of learning that do not meet the need articulated in adult learning theory. For example, Speck stated objectives must be relevant to student learning, and sit and get sessions are often focused on teacher skill acquisition and divorced from student learning (Sullivan, 1999). Speck’s other principles include: adults want to be in control of learning; adults will oppose learning where competency is attacked; adults need direct application; follow up support needed to transfer learning to daily practice; structured feedback after practice is essential; opportunity to work collaboratively improves application of materials; professional development must meet adult learners where they are because prior experiences are diverse; and adults enjoy a novel learning experience. Many of the principles Speck suggests are

simply not present, or are infrequent, like follow up (Sparks & Hirsh, 1997). With the possible exception, traditional sit and get sessions about an application accomplish none of Speck's principles.

The divergence between the common forms of instruction and the preferred methods of learning has not created the ideal learning environment. Combined with high levels of change and low levels of funding, the results have been far from laudable. Traditional forms of computer professional development do not result in high levels teacher application of learning, and therefore do not typically achieve their goals. Surveys of twenty percent of Saskatchewan's teachers revealed that they could not even remember what their technology professional development was about, let alone apply their learning (Henderson et al., 2003). Henderson et al. commented that much of the learning comprised traditional forms, and Rodriguez and Knuth (2000) confirmed that "traditional sit-and-get training sessions or one-time-only workshops have not been effective in making teachers comfortable with using technology or adept at integrating it into their lesson plans". Sandholtz (2001) noted that we must follow the principles of effective teaching for students if we want success when we create professional development for teachers.

For the professional developers in the study, the barriers to effective professional development represent a real and pressing problem. When teachers find a type of professional development ineffective and the topic irrelevant to their beliefs or beyond their skill sets and ambitions, the professional development is unlikely to meet its goals. At the center of this problem is the professional developer, who believes the use of computers to help students learn is important, and is tasked with changing teacher practice.

Many forms of professional development are better suited to supporting the integration of computers in the classroom. Professional Growth Plans where teachers select integration topics

and learn about them independently can be very effective. Teacher with moderate to high skill level often report that learning on their own is very effective, provided they are given sufficient time (Coppola, 2004; James et al., 2004). Mentorship, modeling, partnerships and catalyst teachers all meet the needs of adult learners and are sources of skills application and integration .

Conclusion

Ertmer's (1999) first order integration obstacles such as access, time or support can be met by professional development that is effective by most common definitions. Newer forms of professional development have begun to reduce many of them. However, Ertmer's second order barriers, such as beliefs about teaching and learning or beliefs about learning practice, are more difficult to satisfy. They require that professional development meet Cuban's (2001) challenge for school change and that professional development transform not only skill level, but also teaching style and pedagogy . To meet Guskey's (2002) levels of effective professional development, the changes must be systemic and measurable in student outcomes. Guskey and Cuban presented a difficult challenge that professional developers must face in the context of all barriers suggested by Ertmer (1999) and Jacobsen (2001). Research suggests that to date, professional developers have been unable to overcome both first and second order barriers on a large enough scale to help teachers significantly impact students as a group.

The professional developers in this study know first hand how many barriers have yet to be met. They live or have lived in a world described by Jacobsen's first and second waves of professional development to support computer integration (2001). Many of the teachers that professional developers work with do not have computer-related planning skills or use skills, and they are unsure how to integrate computers in the classroom. There is insufficient time for working with curricula and computers, and many things must be done on a teacher's own time.

Jacobsen (2003) noted there is limited support for implementation or assessment, and that teachers struggle with the new ways their students understand and demonstrate learning through various media. Teachers have had insufficient prior professional development and most of that professional development was training about how to use applications . This is a reality that strikes to the heart of what professional developers do.

All of these barriers are realities for most professional developers, and yet the developers continue to work towards integration. Their persistence in computer professional development and their own beliefs about integration play a role not only in what they teach about using computers, but how they teach about using computer (Bai & Ertmer, 2004). If second order barriers are to be reduced, it is not sufficient to merely conduct professional development over time or provide additional supports. Internal conditions like appropriate pedagogy must be addressed through the professional development experiences teachers have. Beliefs about integration may underscore professional developers' practice and we need to start assessing what role this plays in meeting the goals of professional development about the use computers in classrooms. Because these issues are elusive and difficult to assess, dialogue provides a reasonable method to examine the role of pedagogy in professional development and ultimately, the integration of computers in K-12 classrooms.

CHAPTER 3 A METHODOLOGY OF MAKING MEANING

The ways in which we come to understanding are as important as the things we think we understand. These ways of understanding are filtered through the lens of the research design, the subjective views of the participants, and the experiences and perspectives of the researcher. Because I am exploring the philosophies of professional developers through the ways in which those views are experienced, I selected a qualitative methodology for this study.

Methodology

In its broadest sense, qualitative research explores how individuals and groups understand the world. Because qualitative research allows participants the opportunity to explain how they have constructed meaning from their specific experiences, it is best suited to exploring how professional developers think computers should be used in the classroom and why they hold those opinions. In particular, this study focuses on the way in which the participants have made their own definitions of effective technology use meaningful, and how that meaning was constructed through experiences.

I considered three basic approaches to answering my first research question that asked what abiding views about the role of computers in the classroom underscore the professional developers beliefs. I initially considered an ethnographic study, but decided that my focus was

more strongly on understanding what views the participants have rather than understanding their daily lives. I also considered grounded theory, since I wanted to look beyond the experiences of one person and into the philosophical commonalities of the group in general. I ultimately concluded that I found the story of the participant in my pre-study compelling, and I wanted to give public articulation to other people who had similar work experiences. I continue to value voices of my participants and have allowed their words and lives to dictate the ways in which their stories unfolded with in the study. I wanted to know how professional developers believe their epistemology affects their practice, so I needed to understand their individual views, beliefs, assumptions and values around the use of computers. As a result, I decided to ground my research design in narrative inquiry.

Research Design

My basic procedure for conducting the research was based on Creswell's (2002) summary of narrative inquiry. Creswell notes that narrative research "seeks to understand and represent experience through the stories individuals live and tell" (p. 525).

Step One – Focusing the Narrative on the Problem

The role of narrative inquiry is to examine meaning of the individual's experience as told through a story. Narrative inquiry allows for the discussion of the richness of context, and allows for the depth of experiences to surface through the participants' eyes. I found common elements in the lived experiences of my participants and tried to see how their views about the role of computers in education have been shaped. I also assessed how their pedagogy played out in their practice to see if their pedagogy was as critical in their perceptions as literature is beginning to articulate it might be.

Step Two - Process Development

Because I am exploring how professional developers think computers should be used in the classroom and why they hold those opinions, I have directly examined their philosophies and their self-described thinking processes. In my second research question, I looked at how my participants said they applied their philosophies during their professional development work. By looking at their application processes, I was able to determine how their pedagogy and practice are intertwined. I also hope to be able to connect places where pedagogy and practice are markedly different to the barriers discussed in the literature. Narrative inquiry in general “seeks to minimize the use of literature and focus on the experiences of the individuals (Creswell, 2002, p. 525). However, it is important to situate those stories not only within Saskatchewan educational experience (Creswell, 2002), but also to frame those lived experiences in the context in which they are currently presented in the literature.

In particular, I strived to avoid co-opting the voices of my participants or imposing themes on their experiences. In response, I used active coding to help my analysis during the collection of data, and paid special attention to the words and constructs employed by my participants. I have tried to tell my own story interwoven through the stories of my participants, but I have focused my story on them.

Step Three - Approval and Access

Because I worked with people and investigated their perceptions and lives, I worked to reduce risks to them and approach the research in a clear, appropriate manner. I applied for and received ethics approval from the University of Saskatchewan. I developed a *Consent to Participate* form for my participants based on the University’s guidelines (see Appendix A). This form explained the voluntary nature of participation, the right to withdraw and the way in which data would be used. It also provided contact information for the researchers and information about how the data

would be collected. Participants were able to select whether or not they wished to be identified, and all of them chose to be identified.

I had one pre-study participant and four study participants. In total, I contacted seven people to invite them to participate. Once the study participant indicated an interest in participating, we discussed the process for obtaining permission from the school divisions. If there was a process in place, a formal letter was sent to the appropriate person (see Appendix D) and the division's process was followed.

Once participants agreed to participate they were given the *Consent to Participate* (see Appendix A), a copy of the semi-structured interview questions (see Appendix C) and a copy of the transcript release form (see Appendix B) to preview before the first interview.

Step Four – Collecting Data

I conducted an initial interview with each of my four study participants, and then had my participants review and modify smoothed partial transcripts of our conversations. Smoothed and partial transcripts are ones that have been edited to remove paralinguistic utterances, unintelligible comments or irrelevant material like interruptions from third parties. Participants modified their transcripts and added additional commentary to their original comments. I only used material from the participant approved transcripts and comments as the transcript data. Next I provided my participants with a copy of their personal section in Chapter Four. A narrative seeks to tell the story of a participant using the words and perceptions of the individual. I asked my participants to look over the section and provide me with comments about story of their interviews so the chapter could more accurately reflect their stories.

Step Five - Interpretation

Because a constant comparative methodology will be used, my coding categories were open and not pre-determined. Where possible, I will use in vivo codes composed from the exact words

of the participants. Because it was my intent to capture the experiences and philosophies of my participants without imposing my own words and perspectives where possible, I used the phrases and constructs from the interview transcripts in reporting the findings. Following each interview, I made comparisons to previous data and analysis, and search for common themes and areas of dissonance. I made a series of reflective notes connecting the experiences of the participant to the other participants and to my own experiences. Through this process and the act of re-telling, I saw some themes within the stories of professional developers.

I considered the use various programs to help me with the data sorting and decided that I would like to sort the data by hand this time. While I have used various programs in the past, I had a small number of participants, and wanted the tactile experience of sorting data in addition to the mental one.

I will begin the data collection process by transcribing each interview and arranging the material chronologically (Bogdan, R. and Biklen, C., 2003). This is a critical first step to help me track my own emerging thinking process as I wrote and reflected. I watched for terms or phrases that are unfamiliar or repeated. When I found unfamiliar terms or references to ideas I am unfamiliar with, I investigated them and added them to my notes. When a speaker who is very fluent in a topic repeats ideas, the repetition often reveals the importance of a concept to the speaker (Bogdan, R. and Biklen, C., 2003) and can be viewed as emphasis. I made note of these repetitions and checked for correlations with other participants as a part of the emergent theming. This process helped me begin to think about coding categories (Bogdan, R. and Biklen, C., 2003).

Step Six - Development of Over-arching Themes

I used the emerging trends in the data to support an explanation of what the participant professional developers believed about technology in the classroom and how those beliefs

affected the way in which pedagogy was integrated in their practice. I collapsed over 30 initial codes into 18 categories and then into a few predominant themes. Then I focused on the relationship between those themes and over-arching themes that respond to the research problem. Finally, I placed the insights of the participants in the context of research about teacher practice with technology and the research about effectiveness of various professional development methods to look for similarities and differences.

Participants

Participants in the study were purposefully selected for involvement as K-12 professionals in computer professional development and they were also selected as members of provincial organizations. They were not selected for diversity of gender, age, or race. Six people, two men and four women, were approached as participants in the study and four accepted. The four individuals who accepted, together with the pre-study participant, are experienced, involved professionals. All five are former teachers, although it was not a criterion for selection, and all of the participants been involved in education for at least 10 years. Some have worked as teachers, and then took on a professional development role when they accepted positions at the division office or with Saskatchewan Learning. Others have been teacher librarians, distance educators or principals. Some of the participants have worked as Technology Coordinators.

One of the criteria for selection was involvement in provincial decision-making or initiatives. Four out of five of the participants have completed post-graduate work and the final person is starting in the fall. The participants include a past-president of SACE, and a past winner of awards for research in this area and a teacher-librarian.

The participants were not vetted for diversity of experience, but they did bring a wide range of teaching practice. They have taught grades from Kindergarten to Grade 12, with subjects ranging

from Home Economics to Physics. In addition, they have taught in First Nations Schools, K-12 schools, K-8 schools, virtual schools, and high schools. Some participants have taught in large urban comprehensive schools, and others have taught in small rural ones. In short, despite being a small sample of people, they have a wide range of teaching experience to base their observations and understanding on.

This purposeful sampling will allow me to select participants with both experience in professional development and a provincial perspective. While I believe this method to be effective, I also believe it had some inherent problems. My sampling method is not designed to be representative of the diversity of viewpoints among the professional developers. In addition, my sample size is relatively small, just five individuals, which could further effect the generalizability of my findings.

Data Collection and Analysis

The interviews with participants were conducted at a location that was convenient for each participant. The initial interviews took between one and two hours to complete, and there were follow up email exchanges. The participants were given the option to be anonymous and they all choose to be identified, except Tom German, who asked to be identified if it was consistent with the other participants. In each case, the participant and I had a conversation, not a strictly proscribed formal interview. I selected a semi-structured interview both because I wanted the participants to be able to direct the discussion within the bounds of the topic, and because I had generally had some prior contact with the participants. People who are provincially active in this setting K-12 are a small group, and are largely familiar with many others in the same role. A conversation was less stilted way of verbalizing the key ideas given that relationship.

This study relies primarily on interviews that construct the story of the participants. Since it is my goal to examine what professional developers perceive and compare those perceptions, I selected interviewing as the best way to garner those opinions. The interviewing process was semi-structured. Where possible, I encouraged the participants to describe their perspectives without my interference. I conducted five interviews over the course of this study. One was a pre-cursor study with Karen Henderson to help me frame the study. It was conducted in November 29, 2005. My interview with Henderson helped to set the tone for my later interviews with my participants. Although there were pre-established questions (see Appendix C), we referred to them only when we needed to. Henderson's ideas, examples and reflections set the direction for the conversation around her professional development practice. I used the same process to build dialogue when I interviewed my other four participants in May of 2006.

Each participant chose the time and location for his or her interview. The interviews ranged from around two hours to just under one hour. The participants were given the option to be anonymous and they all choose to be identified, except Tom German, who asked to be identified if it was consistent with the other participants. In each case, the participant and I had a conversation, not a strictly proscribed formal interview. I selected a semi-structured interview both because I wanted the participants to be able to direct the discussion within the bounds of the topic, and because I generally had some prior contact with the participants. People who are provincially active in this setting K-12 are a small group, and are largely familiar with many others in the same role. A conversation was less stilted way of verbalizing the key ideas given that relationship.

CHAPTER 4 RESULTS

The interviews with the professional developers featured in this study form the backbone for this chapter. The context of each semi-structured interview and the data those interviews provided will be discussed. In Chapter Five, the development of the emerging coding categories and the emergent themes will be discussed. The conclusions regarding the research questions and the recommendations for further study will be discussed in Chapter Six.

Researcher's experiences

The genesis of this study is difficult for me to trace. Unlike my participants, my job description to date has never included a formal professional development role. I am a teacher - more specifically an English/Language Arts and Drama teacher. I am not an early adopter and I did not develop an interest in computers because I love them. The opposite is true. Despite having what many people would describe as a strong skill set, I often find computers frustrating or ill-suited to the task at hand.

I started using a computer because it was the only thing that made sense for me personally. I have Dyslexia, and my spelling is worse than bad. Although early spell checkers struggled to decipher what I had written, they usually identified the incorrect words. At least I did not need to re-write the whole thing or white-out to fix the problem. Computers were helpful because they were more expedient than handwriting or a typewriter.

A number of the people in my family are earlier adopters of a wide variety of technologies. Although I do not ever recall seeing computers used in a meaningful way in my early teaching

situations, I watched my family members continue to expand the way they used computers past word processing and gaming to communication, composition, research, and collaboration. And because I am always looking to improve my classroom practice, I began to think about the ways in which a computer might be valuable for my students. I started by doing what I saw other teachers around me doing, getting students to word-process and search the Internet. I tried basic drawing and desktop publishing with my students. In the end, I concluded that how the technology was used was critical, and that I was not seeing the results I wanted for student learning.

Around this time, I began to seek the help of a teacher-librarian in the school I was teaching in. She made a point of learning software and supporting teachers in instructional endeavors with computers. She helped me branch out in a variety of areas, and with the encouragement of another colleague, I applied to develop teaching resources to put on-line. My computer skills were far from excellent, but the application said I needed to be a subject matter expert, not a technical one.

I taught half-time the next year and developed on-line learning resources to support the Drama 30 curriculum with the other half of my time. When I look back at what I created, it is embarrassingly bad. However, the resources were the start of my development of a pedagogy around computer use in the classroom, and they mark the year when I began to study how computers were used in other teachers' classrooms and why they were used that way. I was fortunate enough to teach in a division that had invested in technology, but I could not see much educational benefit for the investment. With two other teachers, one of whom I interviewed as a pre-study for this thesis, I began a research study called *Beyond the Mouse and Modem*.

The study was based on Becker's Teaching Learning and Computing and our study revealed that computers were used for Internet searching (but not advanced searching), word-processing, and games or tutorials. It found that professional development had little impact and that teachers wanted to learn how to integrate computers. We learned that teachers did not have high levels of skill, but generally thought they had access to technology. The study galvanized my need to understand what was happening. I did another study with the same team, attended major conferences, and joined technology and professional development groups and committees. I began delivering a wide variety of professional development opportunities focused on using computers in the classroom. As each new professional experience unfolded, I was left with the same question: Why aren't many teachers using computers to provide effective learning opportunities?

Better understanding of the issues lies in what we are teaching teachers who are already in the field. I turned to experts within my field in Saskatchewan for answers; K-12 educators who regularly deliver professional development focused on teaching with computers in a typical classroom. I wanted to know what they believed was effective and how their professional development practice was shaped by their beliefs.

Perspectives of the professional developers

Karen Henderson

Karen Schmidt Henderson works for Saskatchewan Learning, and has been in education for almost two decades. Before starting to formally support technology use at the provincial level, she taught Home Economics and Chemistry, and then was an on-line developer and an on-line teacher. Her Masters was focused in leadership, although her project was focused on technology integration. At the time of the interview, the department Henderson worked for was called the

Learning Technology Department (LTU), and her job took her regularly around the province. Although it was hard to find a time to sit down with her in Regina, her level of travel made it easy for us meet in Saskatoon at my home.

Henderson and I have known each other for a number of years and worked with each other on a number of projects, which made me hesitant to select her for the study. As an insider in the group of professional developers I am studying, however, it would be very difficult for me to find a subject that I had no prior relationship with. Henderson has won the SACE's Award of Excellence and the McDowell Foundation Award for outstanding contributions to teacher-centered research. She has developed web-based resources, taught on-line, and served on the eLearning Committee of the ETC and co-chaired the PD Committee. One of the major focuses of her job with the LTU was providing professional development to support teaching with technology. I had to overlook my friendship with Henderson because she was the person best positioned to give me the richness of perspective and context that was the focus of my precursor study. I also hoped that the diversity of her experiences might increase the generalizability of my findings and reveal potential issues before the main study.

Construction of self

Henderson is offended by being called a change agent, but she referred to the need for change or critical thought over forty times in our two-hour interview. Her recollections of herself focused on how her teaching changed over time, and her thoughts about her current practice touched on changes in learners, changes needed in teaching, changing how we think about access to technology and changes in professional practice. And while Henderson found the phrase change agent distasteful, she admitted that the desire for change is at the core of her personality: "I have always embraced change. I am not afraid of change. I dwell in possibility. That's not technology, that's personality – it's who I am."

Transitions and technology use

Henderson's experiences with computers both embrace and defy common assumptions about female teachers in the middle of their careers. And while she identified herself as part of the community of practice of professional developers who support the use of computers in education, she continually referred to herself as a teacher. Henderson says she was not a "techie" or an "early adopter". She described being angry about being asked to use e-mail and word-processing in her lessons because it was efficient and professional, but not using the computer in the classroom. She noted: "I had support at home, because my husband really used computers. I think that home support is critical." Henderson started using computers for learning in a circumstance where she found they were the "best tool for the job."

Beliefs about the role of computers

Henderson's desire for change in the school system is inextricably linked to her belief that learning must be constructed by students, not transmitted by teachers. She sees technology not as a vehicle for change in particular, but rather as a tool and a reality that compels change. She discussed technology as a tool for inquiry and for putting learning into student hands, placing herself as a professional developer who articulates value in teaching with, not from technology. In addition, she believes technology needs to be omnipresent in education. Henderson argued that "technology is ubiquitous in the real world; it needs to be ubiquitous in education. We need to have technology immersion."

Henderson's concept of immersion is, as far as she knows, unique to her community of practice in the LTU. It stems from her beliefs about how computers should be available and is typical of her desire to think about and grow ideas and people. Henderson contended that

students should be able to use computers whenever they are educationally appropriate: “We don’t have a pencil lab. We would never consider having a pencil lab because we need pencils and pens to do our work all the time.” Henderson acknowledged that this view may seem utopian, but then contended that computer use, when appropriate, can improve the way students communicate with each other, think, and learn.

Pedagogy

Henderson’s personal philosophy is also evident in her thinking about education. She sees adaptability and growth as keys to effective learning. Henderson says that her “description of a good teacher would be a coach. Someone who isn’t trying to fill a pail, but is trying to ignite the passion for learning and really understands that they [the teacher] can’t do the work.” Her focus is student development of knowledge through a critical lens, not effective teacher transmission of information. She related this to her own experiences teaching Chemistry 20:

I walked in one day and I said to the kids “I’m not your teacher anymore.” And they cheered and gave high fives all around. They were really taken aback.

I said, “You know what a coach is?” And they said yeah. I said, “Well, what does a coach do?”

They said, “The coach helps you do better,” and that kind of description.

“What does the coach not do?”

“The coach doesn’t play the game. The coach doesn’t run the laps, do the sit-ups.”

Then I said, “Why am I now not your teacher? Why am I now your coach?” And they got it. They weren’t happy because it switched from me working harder to them. They didn’t like it, but they understood. And it really changed the paradigm in the classroom.

Henderson did not think that her paradigm shift was typical of other teachers in general. She said that teachers “feel like the learning is their responsibility and they’re going to try every way that they can to force information into kids’ heads in ways that they hope students will retain it

until they are tested.” In addition to characterizing the classroom practice of a good teacher as constructivist, Henderson thought a good teacher was creative and cared about students.

Professional development practice

Henderson reported that the subject of her professional development has shifted, but the style was basically similar because of the nature of her job. Although she reported that teacher skill level is higher than it was when she began this work four years ago, she was doubtful about the transfer to education: “Whether there is more use in the classroom or more effective use, I’m not convinced of that necessarily.” When she joined the LTU, many of the session focused on how to use specific applications or tools. Henderson thought this was effective for “high end users”, but characterized a one-day session to learn an application as largely ineffective for less experienced users who make up the majority of teachers. She framed this point in the context of the in-service she delivered the day of the interview:

By the end of today, there were people who walked out that door and nothing stuck. Even though we did reinforcement, and we did one on one. We did all the things to make it work. It’s just too much to learn in the time span. Other people who have come in with other web design experience – it’s more effective for them.

Now, she said, the LTU pairs instruction about technology with exploration of pedagogy. She noted that when they taught Blackboard, learning *how* to use it was easy; “it’s the *what* and *why* that we learn” that became the focus (author’s emphasis).

As Henderson described the professional development session she was working on during her trip, she said the *how* is merely the starting point for the big discussion of *what* tool is used and *why* that use occurs. She noted the session she had completed that day had only some of the overall participants and was designed to help those who needed to brush up on using the application, Dreamweaver. The next two days would work on the main focal question: “How can

we use Dreamweaver with your students in a way that would support constructivist learning?” She noted that work of day two started when the teachers “dig into the curriculum and look at what they are trying to accomplish.” Then she had teachers look at *Plugging In* indicators, a research model that works from Means’ work in constructivist use of technology (Jones, Valdez, Nowakowski & Rasmussen, 1995). Henderson said, “Tomorrow we are going to talk about how everything we do in the next two days has to meet those indicators. Then we are going to talk about the choice of tool.” She argued that the real issue was how the kids used the technology and the next several days of professional development continued to return to this concept.

Barriers

Henderson articulated many barriers to effective professional development like mandated methods and topics, lack of access, security restrictions, time to learn, teacher expectations, and mismatch of tools and pedagogy. Henderson perceived these as large barriers, but far from insurmountable ones. She contended that the perception was largely based on her personality: “I am not smart enough to understand that there are barriers. I am persistent enough that those barriers come down - I make them fall or I go around them.”

Tom German

Of all of my interview subjects, I knew German the least. While we served in some of the same organizations, I have never sat on a committee with him or even watched him present at a conference. I approached him because his name is so often linked to initiatives, and like Henderson, he has dabbled in so many different areas. German and I met at my office at the University of Saskatchewan, since we were both presenting at the same conference and were in the same location.

German has worked with computers since he got his teaching degree in 1979, but initially he had no formal role. German worked as a senior Physics and Math teacher for his first six year in the profession, and soon became an administrator. He worked as a principal in a number of small rural schools, and eventually accepted a half-time teaching, half-time technology position. He has worked as a Technology Coordinator in several different divisions, is the STF representative on ICTAC (the Information and Communications Advisory Committee of the ETC) and is the Past-President of SACE (Saskatchewan Association of Computers in Education). Tom is currently the Coordinator of Schools and Learning in Learning Technology for a newly amalgamated rural division.

Construction of self

German talked about learning in every phase of the interview. He noted that “throughout my career, I have always strived to do something more.” It was never enough to play with something on the surface, he needed to learn how something worked and what potential it had as a tool. He describes repeatedly switching platforms and setting up labs long before it was a part of his job description: “I liked doing new things. It wasn’t just sitting down and working with Apple Works – I wanted to try something in the background a little bit.”

German described himself as a “math/science” person and a “linear thinker.” He said, “Computers fit that mode. I can understand some of the things that go wrong.” He described himself as learning by doing, by making mistakes and by working with others, while at the same time joking that his “left-brain” dominance was “no brain.”

While characterizing himself as a classic logical, objectives driven person, German was very focused on good relationships. He described “a really good teacher” as “a relationship builder and the curriculum itself is taught seamlessly within that relationship.” He added that working with people is critical to his own learning: “I am able to work with a lot of people there

and I always learn. I find that I am getting a whole lot more out of those relationships than they are.”

Transitions and technology use

German credited his release time early on as an administrator with helping him develop an interest in educational technology, but noted computers were never a part of his assigned duties in his early years. In 1998 during a return to the classroom, a conversation with his director of education gave him his first formal role. German was offered additional duties because he was “the go-to guy” and he was able to handle the rapid changes of direction:

The director said ‘Listen, could we give you 20 days every year and go around and work on our computer labs?’

I said, ‘No. If you make it half time I will do it, but I am not going to do it for 20 days. I would have to prep for my students and it would be waste for my students and for me, for no reason.’

He said, ‘Okay, make up a proposal.’

I said, ‘When do you need it by?’

He said, ‘I need it in an hour.’”

German credited an innate ability to understand how the computer was interpreting things and a love of learning with his transition into his various jobs as a Technical Coordinator. He noted that “it was a challenge and I enjoyed that. I am sure if it was the same role for 10 years I would be bored with it, but technology changes.” That interest in change and learning saturates all of German’s comments about his career and computers: “My career before my current job was developmental. If people asked me what I did for a living in the last few years, I would have to say that I learned for a living. I could live with that.”

Beliefs about the role of computers

German tests everything he tries with computers against his objectives for use and each technology must prove itself the right tool for the job. German was quick to note a teacher does

not have to use computers to be effective, but he stated, “Technology is a very effective tool.” He said computers could be a time saver, but were not always efficient. He also qualified his assertion that computers might give a better product by saying they could do so with ‘certain tasks.’ He felt technology gives “different opportunities” not better ones, and discounted technology solely as motivation or because students find it fun.

Pedagogy

German’s pedagogy is strongly rooted in a relativistic perspective. He resisted attempts to discuss learning on a theoretical footing during the interview and consistently asked about the goals and circumstances of the learning. His view of computers in the classroom is rooted in this perception of learning and in the questions he asks, which strike right at the core of the issue of how we learn: “What do we want students to learn? How do we want them to learn that and how can technology help with that?” When he first started to articulate what good teaching is, his definition was relative to the teacher’s strengths. However when asked to characterize what is bad teaching, his views became more clear. He argued that each good teacher understands the context and his or her own strengths, and teaches within that context. Curriculum objectives are naturally covered through the learning context and are an expression of a strong relationship between the teacher and the students.

German argued strongly against the inclusion of technology because it is technology, and argued that the presence of a drill and practice math game is far from “innovative teaching” or “using technology effectively.” He said that drill and practice could be appropriate if it “is going to work with the students I have, the concept I am teaching and the results that I want to achieve.” But he contended “just take the class to the lab, throw the Math Blasters on, and think you are teaching math” was not effective. Nor did German perceive the common use as effective by his standards. He characterized most teachers as trying to acquire literacy skills and,

therefore, far from understanding technology well enough to know when and how it was appropriate.

Professional development practice

German characterized the school system and teachers as having traditionally engaged in types of professional development practice that are ineffective for learning about teaching with computers:

Teachers have PD time available to them on certain days and they want an in-service. That's what they want and they think 'Tom will do it.' I've done it and I actually will continue to do it because there is that 10% that I am going to hit. Really I think the 10% is an exaggeration. It is less than 10% that really walk away with something they are going to use effectively in the classroom.

He argued that his early professional development was set up in traditional sit-and-get sessions because that was the way that most professional development was set up. He still does sit and get sessions but prefers not to. He noted he had "evolved" into a practice that works much more successfully; working "with teachers in a practical setting of their classroom with their students." He laughingly noted that what he learned was effective through practice was called the 3M model. It is used when he models effective practice, team teaches with the teacher and then the teacher is able to teach with computers independently.

German noted that in his newly amalgamated school division, the whole focus of professional development would be different. He will be responsible for five learning support facilitators who will work as just-in-time mentors in the schools. They will come complete with release time to help teachers learn and will stay while they are needed. Most importantly, he felt, their focus is on learning, and the "whole role in helping people use technology in the classroom is kind of a sideline."

German argued the change in professional development practice is critical because “you have to have it set up in such a way so that the teachers can experience what they are going to do during their professional development.” He stated that teachers “can see that it is going to be beneficial to their students, and not only that, but they see that they can do it.” He also feels it adds to the comfort level that teachers feel with something new. His confidence in the new method he will be using is palpable:

Today I feel much more comfortable because I see that we have the opportunity of going in the right direction. I *believe* this is the right direction now. Before we were doing PD in a certain way because that is what was always done; it wasn't that we were going in the right direction. You needed something; you had an in-service.

Barriers

German identified two key barriers, access and time. He felt time was greatest barrier to effective teaching with computers, both for technology coordinator and for teachers. German also noted teachers have limited access, which contributes to technology being an event rather than a tool.

German was equally concerned about the focus of professional development. He felt that while teachers might acquire the skills from common Professional Development sessions, it was unlikely the skills would transfer to the classroom: “I have so very, very rarely seen a transition of someone able to take their understanding of how Power Point works . . . into the classroom and have their students use the product. Very rarely do they make the transition.” He argued that there is a good reason we teach the skills, because “we are still at the point where people are mostly at the literacy level.” However he argued the skills must be taught in context, and with proper supports. Part of the problem he articulated was that teachers themselves know their skill levels are low and are focused on skills acquisition to the exclusion of application in the classroom: “If you were to ask a teacher in a staff room what they wanted an in-service in

technology to be about, it's going to be 'about Word'. It's about a product or tool, not 'I want to learn more about how this can help my students with the writing process.'”

Michelle Faucher

I met with Michelle Faucher at her home in Regina. Faucher is a member of InTech (Integrating Technology in Every Classroom) subcommittee of the ETC. She is also the vice-chair of the Professional Development Committee of the ETC. Faucher has been working in education for a decade and she was a middle-years teacher in rural Saskatchewan before she became a Program Services and Technology Coordinator. Due to amalgamation of a number of rural school divisions, Faucher's title and new job description may shift next year. As we sat down to begin our discussion, Faucher reminded me that she plans to start her Masters in Educational Technology at the University of Regina in the fall.

Construction of self

Faucher described herself as “very organized, very planned and very tidy” person. She likes to have clear, negotiated goals and wants things to be demonstrably effective because they meet those goals. As a result, Faucher identifies herself as a “synthesizer” and “generalist”. Faucher said she became a coordinator because she “found the classroom to be somewhat limiting and rigid.” She also did not feel like she was “empowered to make radical changes in the way things were”, despite believing change was necessary.

Faucher's dedication to technology use stands in stark contrast to her desire for structure and following a well-laid out plan. Like Henderson, Faucher balked at being described as motivated by change. She noted, “Some people would accuse me of not being a change person, of being afraid of change and not really valuing change and liking predictability.” However when she described her job, Faucher talked about how much she valued being able to define it herself, and

she celebrated technology because “it is changing, it’s fluid.” This love of fluidity is contrary to her love of predictable structure. She said she valued changes, particularly educational reforms, but resisted rapid changes without warning or consultation. However, her interest in technology comes from its force as an agent of change: “Technology is new, novel and exciting. We are always moving and changing. The wheels of change move so much more quickly in technology than they do in any other area in teaching and learning.”

Transitions and technology use

Faucher was far from an early adopter, but she was a risk taker with technology. She described her first real brush with technology as a time when she scheduled individual work time with each student in her class. They met over lunch to research on the Internet, although Faucher knew so little that she did not understand how to search for something because the Internet was alien: “Nobody had Internet at home on the farm at that time. It was unheard of.” Her motivation was a lack of resources in her school library, but the process was so frustrating that she recalled giving up on the Internet.

Faucher returned to computers when it became part of assigned duties from a principal she respected: “She told me that was what I was going to do and so I had to figure out how to do that.” Faucher was converted because in her technology related classes, she was able to transform her pedagogy: “I learned constructivism in the computer lab. No one else in my school knew all that much about computers, and therefore, no one tried to infringe upon what I was doing.”

One of the most interesting observations Faucher focused on was how she naturally incorporated technology to meet her objectives. She discussed how she recently realized many teachers do not see technology as a tool for meeting curricular objectives, but rather as a separate additional obligation. Faucher found that “the vision of how to incorporate technology objectives

with curriculum objectives crystallized for me very early on.” When she realized most teachers she works with did not see technology that way, she recalled feeling shocked.

Faucher highlights this point by looking at the failure of sit and get sessions to transform teaching practice. As a teacher she joined a staff where teachers had many sit and get sessions on how to use technology and initially felt very intimidated:

So they were at a certain point, because they had had these sit and get sessions, and I had to play catch up to get to the same point. But then once I got there, I just took off, and they didn’t necessarily all just take off. Most of them just stayed closer to where they were, and didn’t necessarily change their practice radically.

Faucher conjoins her dedication to technology with her belief in constructivist teaching and meeting objectives, making the failure of others to alter their practice seem unnatural and even “unprofessional” to her at times.

Beliefs about the role of computers

Faucher’s beliefs about the natural way computers support teaching and learning are underscored in the dual goals she thinks early adopters have for using technology – pedagogy and a love of new toys: “One of the things I knew about technology early on was that technology would be in my teaching to facilitate learning. For me, technology is not about gadgets.” She articulates that all teachers should use technology as a tool to support learning and is frustrated about teaching with computers because they are cool or technology is an extra you must get through. In addition, she noted, “I have always viewed it [technology] as a vehicle to get teachers to rethink their classroom practice.”

Pedagogy

Technology, teaching and learning were continually linked in Faucher’s comments because “technology allowed me to construct my own ideas of what teaching and learning should be.” She did not separate her philosophy of teaching from her beliefs about the role of computers in

the classroom. She identified herself as “constructivist,” but noted that identity was linked to teaching with computers first and then transferred into her other teaching. When she is discussing the use of technology in classrooms with teachers she asks about objectives and pedagogy: “Exactly what do you want to know and where do you want to end up and what do you want to be able to do and what are you going to do with your kids?”

Faucher’s descriptions of her beliefs about teaching are learner centered and “responsive to the learner.” She noted that she “didn’t know that when I started [teaching], but I know that now. Good teachers construct learning with multiple entry and exit points for their students.” She also said that “good teachers are enthusiastic and knowledgeable about what they are doing, but they are also not afraid to be learners with their students.” Her constructivist views are also rooted in her idea that learning and goals or visions are achieved through consensus. She says good teaching “encourages kids to find out what their potential is, as opposed to telling kids what their potential is, and helping them to get there.” She also notes that her views of good teaching continue to change and evolve, and are subjective based on her experiences and community. She said she would now reject some of her former beliefs: “What I wrote when I applied to be a teacher is ridiculous now. I think ‘Why did you ever say that?’”

Professional development practice

Faucher said that the opportunity to do the type of professional development she values often hinges on her relationships with teachers and school communities: “I have built a good enough relationship with them over the last two years, that they felt they could engage me in intensive professional development.” She values group work followed by individual follow-up and support. She noted that teachers often request workshops on particular technologies, and she delivered those in-services while asking questions about objectives for students and vision of learning. Faucher commented that teachers at early stages of integration of computers need her to

help them construct connections between curriculum and technology, while teachers who are more comfortable teaching with technology do not need this type of support.

Faucher perceives teaching with computers as a continuum of practice and described how she conducted different types of professional development to meet teachers at different stages. She did not see particular uses as ineffective in the short term, but was frustrated with teachers who do not continue to grow. Faucher articulated that many teachers were starting to use technology a lot at home or doing administrative tasks in their teaching, but noted that she does not “see a majority of our teachers who are using technology to permeate their teaching and learning.” She described the transition from some personal skills to imbedded computer use in learning as a “gigantic leap” and thought the transition may need to be mandated or clearly articulated by administration or Saskatchewan Learning.

Barriers

A lack of a clear mandate for the use of computers is one of the barriers for use, according to Faucher, who said, “Some teachers that I have worked with have no desire or mandate to learn about technology.” She also saw the need for a vision for where technology is going, and noted that big changes in technology have the potential for major effects in the classroom: “We are moving to the phase where the Internet is not going to be the destination, it’s the platform.” She also felt the lack of vision or mandate results in low levels of funding, which seem to drive ineffective practice. Faucher noted that, “One of the obstacles created by administration is inadequate funding, all around. Because the funding is inadequate, the lion’s share of it is devoted to hardware and software.” Faucher perceived the allocation of funding as limiting the effectiveness of professional development and the potential for change:

Faucher was the most vehement about the issue of time. She sees it as a problem in both retention and application of what is learned in professional development. Although Faucher

understands the frustrations of time, she is also wary of people saying they did not have the time because she said, “Time can always be an excuse for everything.”

Donna DesRoches

DesRoches was my third interview in the main study, and we sat down after school in the library of the large urban comprehensive high school where she has been the teacher librarian for the last 19 years. She has also been a teacher, an on-line teacher and developed on-line learning resources. DesRoches is currently completing her Masters with a focus in Educational Technology at the University of Saskatchewan. She is a member of the InTech subcommittee of the ETC, which is working on developing a provincial technology mentorship program for technology coordinators and lead teachers. DesRoches is also working on developing an information literacy pilot program for her school.

Construction of self

DesRoches identified herself as a reader and thinker. She laughed at being 49 and in pursuit of her Master’s, but her love of learning was the subtext for many of her comments. Her own professional development was just as self-directed and reflective: “My best professional development right now is my blog-lines account. I go from work and I curl up with my computer in my lap, and perhaps a glass of wine, and away I go.” She loves to wrestle with ideas and values in-depth thinking and “intellectual discussion about educational technology and where it is going. What uses can facilitate educational change, what the perfect educational system would be like. That’s kind of fun too.” DesRoches loves to learn.

DesRoches articulated the value of being “open to a wide variety of experiences” and thinking critically using “higher order thinking skills” in both a professional and personal arena.

She noted that she asks why a lot, and cites major turning points in her pedagogy as revolving around key questions she thinks deeply to answer.

Transitions and technology use

DesRoches noted that she has no typical days and “every day is very, very different.” She sees her job as having various roles where computers play a natural part:

I see the role of a teacher librarian as having three areas. There is the manager of the facility. Then there is the teaching role; the collaborative teaching that comes with the planning, teaching and the evaluation. Then there is the instructional leadership, which is providing professional development for teachers in a wide variety of areas.

DesRoches did not articulate a time when she started to use technology. Rather she cited technology use as inevitable, given her job: “I am in educational technology because I am a teacher librarian. You *cannot be a teacher librarian without being intricately involved with technology*, because you can’t find, use or share education unless you are using technology!” (author’s emphasis). She noted that many teacher-librarians would not have agreed with her in the past, but she found that position unfathomable.

DesRoches saw technology as having changed how present the library must be in the school. Because the school she teaches in has so many labs, it is easy for kids to access the Internet and just “Google it.” However, DesRoches feels both teachers and students have a lot to learn about how to find information, what information is useful and how to use it. Because of this, she said “the library, then, has to have a presence that is not necessarily a physical presence.”

DesRoches’ main focus as a teacher-librarian is helping students to “find, use and share information” and that means working to have influence within the school:

It means constantly being one-on-one with teachers and talking about the resources and what is available. It means keeping resources available on a virtual library page. It is making sure that teachers understand how to use those

resources, and are comfortable using those resources, so that they take their kids to things like the on-line databases rather than just Google.

She feels that many teachers “equate kids’ comfortableness with technology with kids’ comfortableness with information,” which means the teachers do not understand how much the students still need to know.

Beliefs about the role of computers

DesRoches sees technology, particularly computers, as a way to improve learning. When DesRoches valued any type of learning, including the best types of projects in technology, she “liked the thinking process that was involved” the most. She believes “the technology isn’t the most important thing; it is just a way of displaying the learning.” Good computer use is always equated to thoughtful learning from DesRoches’ perspective.

DesRoches used examples like Web 2.0 to explain why she is excited about the impact of new innovations on learning: “I think these applications have the potential to have an incredible impact on what we do in the classroom, and how our students interact with technology and with each other.” Yet she also feels the education system is not prepared to take advantage of changes in technology. She noted “teachers are just learning to use a slide show” and wondered, “How do they now go to where kids are using wikis and blogs and social book marking?” She said great technology use often focused around things Web 2.0 has to offer because “it is so collaborative.” DesRoches believes the opportunity for students to work together is very important in transforming how we learn.

Like the other participants in this study, DesRoches clearly distinguishes between using technology because you can and using technology because it meets a specific goal. She characterized using technology just to use computers as “the least successful ventures. When you use the technology because it accomplishes a specific goal, it is much more effective.” And like

the other participants, DesRoches said technology has the potential to transform instruction, specifically to “reduce the amount of direct instruction.”

Pedagogy

As much as DesRoches might like computers to change the way we teach, she does not believe that they have. She noted that the greatest inroads are made in computer applications that reinforce traditional instructional practice, like slide shows. This bothered her, because she feels that excellent teaching has students discovering the learning, not teachers transmitting it.

It is the teachers who really think about how to structure a lesson to lead kids to either answer a question that the teacher has posed or take the kids through the process of answering their own questions. There are not many teachers like that whom I have worked with. That is another thing that I think we have to change. We really, really have to teach kids how to ask questions, because they can't find answer if they can't ask questions. They can find information but they can't always find answers. I don't see many teachers doing that.

Like the other participants, DesRoches focused on establishing clear objectives for instruction and like the others, she articulated it in a series of questions about what you are doing and why you are doing it. She was frustrated that, “sometimes teachers have an activity, but they don't really know why.” For DesRoches, good instruction has clear goals for student learning, which she contrasted sharply with a list of content provided by the teacher.

Professional development practice

Like each of the participants in the study, DesRoches observed that there has been a clear progression in her professional development practice. She stated that participants attended because “they were told to be here that day” and what she was teaching in sit and get workshops “had no meaning for them.” When she looked back on a STF workshop she attended she said, “I came to understand my own dissatisfaction with traditional professional development at that time.” She contrasted her sit and get workshops with her preferred style, which closely resembled the mentorship style explained by German: “We sat down and did it one-on-one, then

I did the class, then she did the class and I helped her with the class. We worked together with the class. I think that is the most effective form of professional development.”

Like Faucher, DesRoches believed her relationship with the school and the teachers was very important in terms of gaining access to teachers: “Relationship is absolutely critical. It is too bad that it is the personality of the teacher-librarian that the program has a tendency to rest on. It is very wearing. You have to be able to adapt to many personality styles as well as many teaching styles.” She also noted that “many teachers don’t want to share what they are doing with anybody”, which can be a barrier to helping teachers.

Barriers

DesRoches saw more second order barriers than she did first order barriers. While she repeatedly said “teachers don’t always know what they don’t know” she also stated that teachers develop knowledge when they value it:

I think lack of knowledge is a barrier. And yet is amazing what teachers can do. A teacher who barely uses technology in any way in the classroom has this amazing phone. It can take pictures and text message. She knows that phone inside out and can do a thousand different things with it.

She noted that “Learning something new and using it with your students is a big commitment – in both time and risk taking. Many teachers are unwilling to take the risk and try something new.” And even as she was critical of teachers not learning new things she also questions ethics of “experimenting on our students.” However, she did not say teachers rejected new methods because they learning about them and then decided not to use them for pedagogical reasons.

Like other participants, DesRoches felt both professional development methods and time were key barriers. And like German, she thought that it was not just the system that embraced traditional professional development; teachers did too: “It is so interesting that people complain

and complain about convention days and how there is never anything there to suit them, but they never want anything else. 'Give us a motivating speaker' so that we can do nothing with it."

DesRoches observed that time was another barrier and said "Teachers are reluctant to give up that curricular time." She also agreed with Faucher that, "Teachers need something that clearly says, these are the skills your students must have by the end of Grade Nine" to make taking the time to learn about computers essential.

Michelle Morley

Like Henderson, Michelle Morely is often thinking about technology professional development practice. Morely is currently completing her Master's degree at the University of Regina and working as the Technology Coordinator for a division in southeastern Saskatchewan. Morely first start teaching in 1995 as a Kindergarten teacher in a First Nations school, and has taught a wide variety of elementary and middle years grades. She is a member of You're It, an ETC sub-committee of Technology Coordinators which plans professional development and conducts research.

Construction of self

Morley looked at things she learned and was always trying to apply them to herself by asking "What does that mean to me?" She thinks about many things, sometimes simultaneously, and focuses on what her vision is while building foundations of practice, reading and research to assess that vision against. She thinks about the way to get around barriers and problems, and is always looking for a way to improve: "If things aren't going right, I like to make some changes to make it better. Even if they are going right, how can you improve it? You are never going to be perfect."

Morley has a quick sarcastic wit, a ready laugh, and a desire to see students and teachers succeed at investing in education. Throughout the interview she always referred to issues she had been thinking about “this morning” or recently. Morley continually assessed about how to make things relevant and how to help others build their own relevance.

Transitions and technology use

Morley characterized herself as an early adopter. In her first teaching position she was asked to deliver some computer-aided instruction in addition to teaching Kindergarten. Morley noted she had “taken a few courses in University” and “had a computer myself,” so starting teaching and using computers were “natural” companions. She said “Internet had just started coming around then, and I was one of the first people in Yorkton to sign up for it” and recalled asking her director for a pod of computers for her Kindergarten classroom. There was no point in Morley’s teaching where she began using computers; she did not conceive of computers as an addition to her teaching in any way.

Beliefs about the role of computers

Morley’s descriptions of that classroom show how natural she perceived the fit to be when computers are used in a “center-based” classroom. Morley used computers as an instructional tool or tool for learners to use; she contended that in “everything we did, I just incorporated the computer.” Morley used computers because she valued “learning in communities”, the “instant response”, and the way some students learned one thing while she worked with others. Like Faucher, Morley noted that she did not see computers as an add on, and even from the start of her career she “never thought of it [technology] as a separate thing.” She was undeterred by the lack of “guidance” from a division or the university she had attended. Confident that her use of computers was positive for student learning, Morley continued to use computers constantly in her own teaching.

Morley believes her use of computers is not typical. She argued that the presence of ubiquitous access through the pod of computers in the classroom was critical for her practice. She also said that even when teachers use computers in their personal and professional preparation, there is little transfer to effective classroom practice. Morley defined effective as naturally integrated in the instruction and connected to learning goals. She also noted that technology exposes students to “different ways of learning: tactile, audio, and visual. Not just one method.”

One of the critical issues Morley highlights is that technology cannot be an add-on either in schools or in post-secondary institutions where we train teachers. She argued computers must be a seamless part of post-secondary teacher training and used Mathematics as an example: “It has to be part of the Math methods. It can’t be a separate thing, because when you leave that area of learning and get into a school, you see it as separate.” Morley noted she has a “long way to go” in helping teachers to understand computers are an integral part of instruction.

Pedagogy

When discussing her own practice, Morley described the value of students making meaning for themselves and relating things to “the real world”. She valued experiential learning and variety to meet all learning needs. Morley saw technology as a “natural” way to accomplish these goals, but extended the argument even farther: “If you move the computers and have them in your classroom, it is a totally different thing. You have to change your teaching practices.” Morley saw learning in small groups, students constructing knowledge, and variety as key to meeting objectives and students’ needs.

Morley highlighted her own views by contrasting them with how she was taught, and she emphasized that the different learning styles of students were not addressed:

The way I was taught was all direct instruction. The teacher stood up at the chalkboard and said, ‘Blah, blah, blah. This is what you do, go do it.’ A couple questions in your book, and that was the end. Hope you get it. There was no using manipulatives in Math, or going out and doing Math Trails. Realizing that there is math all around you.

Professional development practice

Morley noted that in her early professional development, she taught skills-based workshops because teachers had low skill sets and wanted to learn about various applications:

They [teachers] are just hungry for how-tos. ‘I don’t know how to use Microsoft Word and PowerPoint.’ So I got pulled with that group and sucked into teaching them all technology skills, all year. At the end of the year, yeah, maybe some of them knew how to use Microsoft Word but they weren’t applying it to their classrooms.

Like all the other participants I interviewed, Morley concluded sit and get workshops on skills alone did not change teacher practice. And like DesRoches, German and Henderson, she noted that teachers preferentially choose sit and get workshops over forms of professional development she believes are more effective.

Morley decided to do her own research to find out why teachers did not transfer the information they learned, and what she could do to make the professional development more meaningful. She concluded that pedagogy played a critical role and knowing how to use the technology was not automatic for other teachers.

Barriers

One of the biggest barriers Morley identified was teachers’ understanding how to use computers in instruction and learning. She quoted the teachers who are her research participants as saying “We knew you should use technology with the curriculum” and noted that “they didn’t know *why* they were doing it.” Morley used many examples to illustrate that much of the learning she sees happening with computers is “incidental” rather than purposeful.

Like all the other participants in this study, Morley identified time for teachers to prepare as “a big barrier”, and she also argued that planning and instructional support were critical tools in reducing time as a barrier. Like many of the other participants she identified low skill level as a problem for a large of group of teachers, but not all teachers, and cited a variety of skill levels as an issue that professional developers need to face. Like Henderson and Faucher, she noted that teachers’ different skill levels and attitudes needed different types of professional development.

Morley stated that there are some systemic barriers. She used the example of the amount of time she has “as an IT Coordinator” as an example, and like German, stated that network management concerns often took precedent over instructional ones because they were more immediate. Morley also observed that plans with the best intentions have sometimes had negative effects. She gave the example of a skills checklist and noted in her division the checklist said that “in Kindergarten you had to know where the mouse was.” Morley laughed that once you had looked at a computer for a minute, you were done with computers for the year. She saw the document as a problem, because it implied technical literacy was the only goal for the use of computers in schools, and stated that teachers “became hung-up on kids learning the technical skills.” She contrasted this view with her own view of student learning of technology skills: “I think they learn the technical skills when you are teaching the curriculum.” Morley’s systemic barrier is a pedagogical one.

CHAPTER 5 FINDINGS

This chapter will look at the findings from the data to examine what abiding views about the role of computers in the classroom underscore the participants' beliefs and how these beliefs inform their practice. I will start examining beliefs by looking at the common assumptions that underlie the participants' goals for computer use. Then I will look at their diverse goals and perceptions of what is effective and ineffective use of computers in the classroom. I will examine their views of effective use in the context of what they perceive to be current practice, and will summarize how they believe technology can transform practice.

In order to understand how their personal epistemologies affect their professional development practice, I will examine their diverse ways of knowing, including primary research, experience, communities of learners and professional reading. All of my participants described their current practice as a part of an evolutionary process, so I will look at their perceptions of barriers and problems with technology, and their experiences with traditional professional development, in the context of their transformed practices. I will also look at the effects of their personal pedagogies, learning styles and perceptions of the pedagogies of other teachers before concluding with a look at descriptions of their current practice and the implications of their stories in Chapter Six.

Assumption one: 'Technology just is'

For many years, I have been a part of debates about why we should use computers in schools and I thought the participants would have many arguments about why technology should be

used. The question ‘Why are we using a computer?’ was critical to all of them, but for the participants in the study, the emphasis was on ‘why’, not on ‘computer’. Both DesRoches and Faucher said outright that the debate needed to stop because “technology just is.” They perceived computers as clearly present in daily life and the debate about whether they should be used in schools to be obsolete. DesRoches remarked “*You cannot be a teacher librarian without being intricately involved with technology*, because you can’t find, use or share information unless you are using technology!” (author’s emphasis). Faucher said “Technology just is. And it is incumbent upon us to figure out how to harness the power of it to impact teaching and learning. It behooves us to do it in the right way. Why would we say it’s just something you do at home, kids?” German was more succinct: “Why are we having this discussion? We should be just doing it.”

Computers are omnipresent in our society, but the participants in this study believed computers are not value free. They continually raised the implications of computers in the classroom. However, the professional developers in this study have moved beyond justifying the use of computers. They are thinking about steering those “inevitable” uses to maximize positive impacts, a line of thought that focuses their thinking in two areas: change and pedagogy.

Assumption two: ‘We need ubiquitous access’

Henderson pointed out that “Technology is ubiquitous in the real world; it needs to be ubiquitous in education.” Morley stated that the access to technology whenever you need was critical in transforming technology use from an “event” to a “natural” learning practice, an idea that Faucher, German, and Henderson all echoed. Their arguments noted that having some access to technology means that technology can only be used to enact traditional practices, and the transformational potential of computers in education is not realized. Morley noted that the

amount spent on computers is too large if they are merely used to reinforce what we can already do for less.

DeRoches established the fact that easy, natural access is more than readily available computers. “Natural” use is also dependent on the way we conceive of and enact our learning. DesRoches characterized access in her high school as “labs all over the school.” And while she thought it was excellent availability, she noted that it has not really changed computers into a genuinely integrated learning tool, because the pedagogical framework is absent. As the labs became omnipresent, DesRoches noticed a change in the nature of her work. Her library needed to be “more than just books” and “extend beyond” its walls: “The library then has to have a presence that is not necessarily a physical presence.”

DesRoches discussed those changes as fundamental shifts in the structure to support learning. Her role as a keeper of information shifted from being the manager of a collection of books and media to the manager of books, library web pages, sets of links and, most importantly, an information literacy plan for the whole school. DesRoches noted that the easy access to the Internet has lead to students simply citing Google, doing cursory searches for information, plagiarizing and other issues. She saw the need for all educators to be thinking about the implications for our students as people and as learners. She believes effective use of computers in schools must transform the nature of the learning, just as the technology has transformed the access to information. DesRoches’ comments highlight the perplexing puzzle that Cuban (2001), Ertmer (1998), and Hokanson and Hooper (2004) have focused on; the reason why information about computers and access to them has not changed what happens in our schools.

Participant goals

The participants in the study universally articulated that computers must be used in the classroom to help students learn. In order to accomplish this, they all felt teachers needed to have a specific learning or skill objective, then ask if technology was a good tool to use in achieving that objective. All of the participants identified technology as a powerful and flexible tool that continues to change and grow, but they all gave numerous examples of technology use where no intentional learning occurred.

Four of the five participants also saw teaching with computers as a chance to make major changes in teacher epistemology. They identified specific ways they hoped learning could be viewed and selected computers as a tool to create that change because they believed it could or would change teacher practice. Two of the participants expressed transformations of their epistemologies as they were learning to use computers, and two of the others saw clear pedagogical differences between their technology use and the way their peers used technology. For the participants, their personal epistemologies about how we learn shaped their views about how computers should be used, and formed the foundation for their belief that technology could transform how we broker learning. Each participant communicated this foundation through asking teachers a simple question during professional development. Why?

Goal one: Helping teachers answer ‘why’

One of most startling findings for me in this study was how strongly each person connected the use of technology to the question ‘why’. The participants in the study framed their own professional development practices and epistemologies around a series of questions about why technology was used in the classroom. Each participant defined what effective use of computers was and how their professional development practice had changed by discussing why:

DesRoches: I think that is my role as a teacher librarian, too. It is to say, ‘We’ve got all of this wonderful technology that teachers want to use, but why?’

James: Do you ask that ‘why’ a lot?

DesRoches: Yeah.

James: You’re a ‘why’ person?

DesRoches: Why do you want to do that? What do you want to accomplish? What are the outcomes? What do you want to see your students actually have when they’re done this?

All of the participants in the study echoed German’s questions, “How do we want them to learn?” Only after that was answered did they ask, “How can technology help with that?” The professional developers advocated that computers were used where appropriate, not as a pre-selected method of supplantive or generative instruction. Faucher summed up the need for those questions by stating, “Teachers, and professionals in all fields, need to be reflective practitioners, constantly revising their philosophy and practice.” German noted that there are “so many appropriate places to use it [technology]. But that’s the key. It has to be used appropriately and effectively.” For each of the participants in the study, the first step in helping teachers to use technology effectively was getting teachers to ask why.

All of the participants noted that there are a number of their colleagues who want to use “technology for technology’s sake” and they were as negative about that practice as they were about using technology as a reward, using technology to fill time, or simply never considering technology carefully. Faucher argued that there are two types of people who regularly use technology in the classroom, people who just love technology and people who have learned to use technology because it filled a need, but have never developed a strong inherent interest in it. German connected that thought clearly to the question of why we use technology:

There are so many people who are in the technology area who push technology for technology’s sake. They are ‘Here’s something new, let’s do it.’ I ask the question ‘why?’ If they could show me why, I’d be behind it 100%, I am in. But I’m not just because it is neat. I like doing the neat stuff. I’ll do it for myself, and I’ll drag a few other people along with me. That’s a personal use. The ‘why’ is more important [in the classroom]. Why are we doing this?

Goal two: 'Unleashing learning'

One of the clearest differences in participant responses came in a discussion of the goal of using computers for learning. Like many in the educational technology field, the participants in this study came from different epistemological traditions. Henderson, Faucher and DesRoches emphasized student construction of knowledge through active learning, inquiry, collaboration and critical thinking. They all noted that learning should be a student driven activity and contrasted effective and transmission repeatedly. Morley made similar comparisons and mentioned the same learning characteristics, but teaching for different learning styles and making material relevant to students were more important for her. And while she stressed a variety of learning styles, she emphasized learning by doing or experiential learning. Each of these four participants talked about how the use of computers in the classroom could change learning. Henderson noted that it “repositioned the teacher” at the side as a facilitator, Faucher said using computers in her classroom transformed her to a constructivist teacher, and Morely argued that if you have computers in your classroom, “you have to change your teaching practices” to include less direct instruction to the whole group.

German's comments were different than those of the four female participants. He was reluctant to identify overtly with any specific style of teaching but said that all good teachers build relationships. German noted that a constructivist teacher or an objectivist teacher might be strong, and he focused on internal cohesion between objectives and classroom practice. For German, excellent teaching and learning are always contextual. He wants to know “what tasks” are being considered and “who will be doing” them before he thinks about what might work relative to the situation. In his understanding, computers are important tools you can use in the context of teaching and learning. However, he did not state they had the power to transform teaching.

Perceptions of effective and ineffective use

In general, the participants found it easier to identify ineffective uses than effective ones. And while there was universal agreement about which uses were clearly bad, some participants identified uses as effective while others did not mention them. Interestingly, none of the uses labeled as 'ineffective' by one participant were labeled as effective by another, even though there were only a few absolute agreements about which specific practices were effective.

Perceptions of effective uses of computers in the classroom

All of the participants defined effective use of computers first and foremost as use that meets curricular objectives. While the value of things like software to enhance instruction and access to information were discussed, they were mentioned in the context of curriculum objectives. The same was true for benefits like building life or technical skills and creating a quality end product. Both as a group and individually, the participants focused on objectives over potential benefits.

With the exception of German, all of the participants also stressed the value of computers in generative process. They emphasized student use of computers and student construction of knowledge rather than teacher transmission. For the women in the study, one of the attractions of computers was that it moved teachers towards the belief that students construct learning and make it meaningful.

The lack of clear agreement about what is effective is an interesting one. In my study, the weight of the idea that computers could transform education split along gender lines. However, I gathered no evidence that lead me to believe the split was correlated to gender because the study was not designed to assess the role of gender in participant perceptions.

Perceptions of ineffective uses of computers in the classroom

Morley described ineffective use as use where the learning is “incidental” rather than purposeful. Both German and Morley used drill and practice games as an example. They argued that even well made games are poorly used if they are not directly connected to what the teacher is currently teaching. They argued in order for that drill and practice to be effective, it must be used to reinforce a concept that has just been taught, but they stated that often such games are used as reward. All of the participants built similar arguments about various applications and they all emphasized an epistemological framework for practice.

The participants contended that technology access needs to be ubiquitous and they characterized technology as an “event” as the common by-product of spotty or scheduled access in combination with pedagogy. Faucher and Henderson noted that computers as an event have little value because they do not allow the technology to be selected when it is the best tool for job; rather it is a hammer you use every Wednesday at two o’clock, whether you are building something or not. They noted that in many elementary schools, a class goes to the lab at a scheduled time and is supervised while their teacher gets some preparation time. Using an example from her career as illustration, Morley noted that such uses actually compound a series of problems:

The first year I was full-time, half my time was spent supervising kids in the computer lab so the teachers could get prep time. It went against everything I believed in. I don’t know what they are learning in the classroom. That was totally taking it [technology] out of context. The kids probably gained a bunch of technology skills, which wasn’t the worst thing. But because their teacher wasn’t with them in there, they were never applying them anywhere else.

Perceptions of current practice

The participants noted that current practice was generally ineffective. All of the participants noted that computers are primarily used for games or tutorials, word processing and Internet searching in classrooms. Morley noted, “We know things aren’t good.” The participants in the study noted that teacher skill level was generally low, and all of them noted that even when teacher skill levels improved, teachers did not generally use computers effectively. All the participants traced the issue to teachers needing to think more about how and why they were using technology and less about what to do. German was very specific about the nature of the problem:

If I were to sit in a classroom all day long, almost any classroom, I would find that there was very limited use of technology in terms of making it fit into the teaching strategies that the teacher was using that day. It seems like most of the focuses are ‘Let’s go to the lab’ as an event, as an outing. It doesn’t have to do with what they were teaching that day in their unit plans.

The participants in the study were all focused on their own objectives when they were teachers and instinctively used technology to meet them. They all expressed shock, dismay, frustration and confusion when they described realizing that other teachers did not think about computers in the same way. Faucher noted for her, pedagogy and use of computers were always interrelated; however, she noted that for many teachers she works with, the connection must be explicitly made and reinforced. Morley discovered the same thing working with a focus group of teachers for her masters.

In our conversations, the participants were very clear about what effective practice was, and how far current practice was from what they believed to be effective. They also described how difficult it was to change teacher practice through professional development. And while they articulated a number of Ertmer’s first order barriers, they returned again and again to her second order ones. The participants all stated that teachers’ understanding of why technology is

used is the key to changing practice; in short, the participants believe pedagogy is the critical component in changing *some* use of computers into *effective* use of computers.

‘Transforming teaching and learning’

The professional developers in this study all expressed frustration with their work. Each one gave me examples of failed professional development to illustrate discoveries they made about how to help teachers learn. They raised systemic problems, resource shortages, and lack of time to do what they needed to do. Despite that, each of the participants expressed a lot of excitement about their work, and specifically, an interest in learning.

Each of the participants described working with computers as an opportunity to be a part of a changing and growing environment. German described his job as “learning for a living” and DesRoches discussed “facilitating educational change” and then noted that “it’s not so much the change that intrigues me, it’s the learning.” Faucher stated that “technology is new, novel and exciting. We are always moving and changing. The wheels of change move so much more quickly in technology than they do in any other area in teaching and learning.” For Morley, Faucher, DesRoches and Henderson, advocating the use of computers in classrooms was about advocating for change. Faucher said, “Whether it is classroom management, the role of the teacher, or assessment and evaluation, it is a good way to say, ‘Hold on, let’s look at what we are doing.’” Henderson used stronger language and said, “I want a revolution with technology.”

Understanding the effects of personal epistemology on professional development practice

In order to understand the far-reaching effects of the professional developers’ beliefs about the use of computers in the classroom on their practice, I needed to understand what comprised their epistemologies of professional development. For each professional developer, I

asked myself a simple question “How do you know what you know?” and looked to the data for the answer. I looked at their ways of knowing, their primary research, the role of reading in their learning, the influence of colleagues, and effects of their experiences.

Types of barriers and problems with technology

The participants in the study articulated an interwoven mix of primary and secondary barriers to computer use. All of the participants identified primary barriers like ubiquitous access to technology and some form of lack of time, frequently, lack of time to learn. They unanimously identified teacher technology skill. In addition, the participants identified secondary barriers like teacher perceptions of lack of time in the curriculum, teacher pedagogy and teacher perceptions of learning.

Even as the professional developers identified primary barriers, they linked them to secondary ones. Henderson’s goal for ubiquitous access was changing pedagogy and Faucher linked technology skill to understanding of why to integrate computers. The participants indicated that their experiences taught them that second order barriers are critical and often entangled with first order ones. In addition, the participants articulated the fact that resolving second order barriers was critical in moving the computer use from occasional and incidental use to a frequent and valuable tool for teaching and learning.

Ertmer (1999) noted that simple uses enact existing classroom practice, but “extensive uses challenge traditional classroom culture and as well as teachers’ beliefs about the teaching learning practice” (p. 48), and the professional developers in the study articulated similar views as they discussed barriers to technology use. DesRoches, Faucher, Henderson and Morley discussed seeing the potential of technology and assessing the value changes to classroom practice and views of teaching and learning. Each of the women articulated a clear epistemology and related her views about the role of computers in the classroom. In addition, each of them

talked about the change in her professional development practice when it became clear that professional development style and frequency were additional barriers.

Belief that traditional professional development does not meet the need

Every participant in the study discussed a transition from sit and get sessions about how to use a computer or application to practice that involved explicit pedagogical elements. For each person, the transition was deliberate and related to a perception that the sit and get sessions were not resulting in altered teacher practice. Henderson described the process of providing professional development that does not meet teacher need as “heartbreaking” and DesRoches described it as “disheartening”. Each person continued to evolve his or her professional development practice to better meet teacher need, and in the process, the participants developed views and practices that were more similar to each other than the views and practices they held when they first became professional developers.

Each of the participants was negative about traditional forms of computer professional development. They noted these forms had little imbedded pedagogy and little impact. German hypothesized traditional professional development met the needs of less than 10% of his teachers, DesRoches described it as “one of the least effective forms” and Faucher noted everyone erroneously assumed the sit and get sessions meant “automatic transfer.” She said teachers learned the applications some of the time but rarely applied it to their practice. In addition, all of the professional developers indicted that teachers actually request sit and get sessions preferentially, compounding the problem.

German connected these requests to teacher lack of knowledge: “If you were to ask teachers in a staff room what they wanted an in-service in technology to be about, it’s going to be ‘about Word’. It’s about a product or tool, not I want to learn more about how this can help my students

with the writing process.” German went on to say that the problem is a result of low technology literacy levels.

Each of the professional developers explained how their practice changes as a result of early sit and get sessions. German’s description of his current view of sit and get sessions illustrates the process of changing pedagogy and practice. He established his belief that “one of the worst things I can do is sit down and have an in-service on something, like PowerPoint for example. If I have to have one of those in-services, what I try to do is re-focus it.” He noted that he specifically focuses the in-service on how to use a tool with students, what objectives you might have and why you might do specific things. German stated he had a very specific justification for the shift:

I have so very, very rarely seen a transition of someone able to take their understanding of how PowerPoint works – I am using PowerPoint as an example – into the classroom and have their students use the product. Very rarely do they make the transition. If you talk about how do we use these tools, and PowerPoint is one of the tools they can use, they will say ‘Okay, I will try PowerPoint.’ There is more of a chance of making that transition if you approach it in that way.

Both German’s belief and his justification for those beliefs found validation in the beliefs of the other participants. Each person described a transformed practice of professional development and minor modifications they made. Then each person discussed advocating for major shifts in the provision of professional development that radically alter what teachers might learn or do.

How professional developers acquired beliefs

How the participants’ views develop and evolve is critical in understanding how their epistemology shapes their practice. In each case, the participants stated they had learned about how to structure their practice predominantly through trial and error. Each of them noted that they became an advocate for change because what they were doing by default did not work. The participants noted that the practice of teaching with technology in schools continues to evolve,

and as a result, the structures are fluid. Each participant mentioned being attracted to being able to learn and then change things based on what they were learning.

Praxis alone was not the sole factor in evolving epistemologies. Other things like reflection and discussion have been key learning tools for the participants. Morley noted that thinking about her “own beliefs, pedagogy and how I did things” have been critical in her transition to effective professional development to support teaching and learning with computers. Henderson talked about the critical role of her learning community at work: “We started talking about the research we had been doing and the flaws in PD.” She described a lot of time on the road spent in professional dialogue. DesRoches described an ongoing conversation with a colleague about the potential of computers, the nature of teaching and learning and how to change education.

In addition to the dialogue of practitioners, the dialogue of academics also shaped participants. Formal learning shaped Morley through her thesis, and some of the other participants also discussed classes or formal reading. DesRoches talked about her professional development practice changing based on sessions from the Saskatchewan Professional Development Unit. German and Faucher discussed hybrids of practitioner and academic learning. They talked about learning from those they sat on committees with or met through professional organizations, and both of them laughingly mentioned theories they had developed by experience only to learn from colleagues that they were academic theories developed from studies.

Transformation of professional development practice

The professional developers in the study characterized their views of effective professional development as very different than those they started with. DesRoches observed that she probably would not have called her current practice professional development some years ago. She described her “most effective form of professional development” as the professional

developer planning with the teacher, demonstrating with the students, and then the teacher working with the students. German, Morley, and Faucher noted the value of similar models in their divisions and expressed excitement about them. Henderson noted that “extended periods of time to learn, follow up support, opportunities to come back together to share” and other similar elements have made practice much more effective. The other participants were also specific about the need for support. German noted that we are in “transition right now” in our provincial practice of professional development to support teaching with computers. Each of the participants, even those who came to professional development just a few years ago, noted that they had come to understand how to shape professional development to make it much more effective.

I questioned my participants about systemic barriers to the professional development they believed was effective, and they named some like funding and release time. However, they generally felt empowered to change what they did, and many described successfully making the case for change in their work places. As a group, they generally felt free to make minor changes and also felt empowered to try to create change on larger levels. My study did not establish if the barriers were minor, or if the participants perceived themselves as having high efficacy in creating change based on personality. The participants said things that contradicted each other and sometimes individuals attributed things to multiple causes.

Addition of pedagogy

The participants’ movement to different forms of professional development was tied to their personal pedagogies and learning styles, and to their perceptions of the pedagogies of other teachers. Coopla (2004) noted that teachers must decide “*whether* the computers are worth using before they can learn *how* to use them in the classroom; otherwise they do not focus sufficiently on the learning process to overcome all the barriers they encounter” (p. 111-112, author’s

emphasis) For each of the professional developers in this study, the use of computers was clearly linked to pedagogical analysis about why computers were worth using, and their responses about why computers should be used in the classroom were often indistinguishable from answers about what good teaching and learning look like. The participants discussed the benefits of using computers as relative to circumstance and situated in an effective context. Their beliefs about good teaching and learning were intellectual, created through experience, and evolving. German, Faucher and Henderson reported that they approach each new thing critically, including computers, and each use is predicated on an educational need being met. Pedagogy, not available technology, was the key factor for each of the participants in the study.

Each of the participants in the study used technology differently. Their descriptions of how they used software, how they framed professional development and their motivations for using technology were dependent on their values and epistemologies. Morley, who values learning by doing, expressed the value of the computer in terms of experiential learning. Henderson and Faucher, who learn by constructing their own understanding, talked about the power of the computer as a tool for generative, student directed learning. For DesRoches, understanding information through inquiry is key, and she focused on computers as tools for information and disinformation. Each participant framed the value of computers in the classroom in the context of his or her personal learning style.

While personal learning style was strongly correlated to the uses of computers advocated by the professional developers, there were uses they advocated that transcended style. All of the participants stressed the value of computers in terms of collaboration and communication, and the value of the Internet as a source of information that could be accessed through the computer. Certain values of the technology appeared to be independent of learning style, and participants

perceived certain benefits of computers independently of their learning preferences. In addition, participants talked about the future of computers with a much more unified voice than they had when they talked about the present. While their perceptions of the current value were strongly rooted in their own learning styles and personal pedagogies, their perceptions of the future seemed largely dependent on intellectual conversations and research they were “playing with”. Many of the participants talked about the Web 2.0 and how it might transform teaching and learning. They speculated with one voice about the transfer of ownership of the learning to students and how the Internet would become a place to construct rather than transmit knowledge. They also saw this transition as student driven, and thought that teachers would harness it or become less relevant.

The issue of the role of teacher in the learning process was a major part of the conversation I had with the professional developers. They often chose to contrast their own pedagogy with the pedagogy of other teachers and characterized teachers as needing to be more rigorous or shift their thought. Faucher, German and Morley were critical of what they saw as an artificial separation between what we do with students and our goals in doing it. They were impatient with teacher and student activity that did not meet specific learning goals. Both Henderson and DesRoches thought teachers needed to be critical thinkers about their practice and understand that students need to be doing their own learning. For each of the participants, carefully considered pedagogy was absolutely essential for effective teaching and learning, and they all felt teachers needed to think more carefully about practice. However, many of them articulated that they understood how the daily demands of teaching made that difficult. Every participant in this study was an advocate for reflective practice and felt that more critical reflection was an essential part of making computer use in schools effective.

Changing professional development

The professional developers articulated a gradual transition towards professional development that meet Specks' characteristics of adult learning, although none of them mentioned his or other similar theories. They all mentioned at least six of the nine characteristics, and at least three of the five participants mentioned each of the characteristics, except the enjoyment of a novel learning experience, which no one spent much time on. With the exception of Faucher, each participant described a recent and more successful model of professional development they were moving towards which met all of Speck's nine characteristics. Faucher noted discovering the same characteristics but connected them to multiple examples rather than one recent one.

German's description of his new division's model of technology professional development highlights marked evolution in the practice and assumptions of professional development. He noted the model is teacher driven and "the teachers will request professional development help from one of our learning support facilitators." He also noted that teachers are given time to learn: "When they [learning support facilitators] first meet with a teacher in a school, they will bring a substitute and provide release time for that teacher to step out of the classroom and do some planning." German noted the time to learn is critical because the computer learning demands more time effort than teachers have for planning. As a result, he noted the time is not "after school time, outside of school time or a noon hour thing where you have to meet with the teachers. That doesn't work. You have to provide the time. Once you are through that planning stage, I don't think you need to provide the time after then because it is the same as any other planning or instructional day." The form of professional development German will be using is specifically designed to reduce the barrier of time he identified through his practice.

German noted the planning time has additional benefits, because the teacher's informational and pedagogical needs are met: "This will allow the learning support facilitator to determine where that teacher is in their teaching and in the kinds of teaching strategies that they use, and their use of technology and their ability and perception about technology. They will get to do some planning about how to change their teaching and make it more effective." The method German's division is promoting addressed Speck's (1998) principals directly, but is most focused on the ones needed to help the teacher make pedagogical transitions. German pointed out that the focus is on experience with the technologies in the exact context where they will be used so the teachers can see "it is going to be beneficial to their students, and not only that, but they see that they can do it." He notes the critical component is the transition, which according to the professional developers in this study, is a very difficult element of the learning process for teachers: "We want to do this model in their classrooms with their students. We want to demonstrate what it is that they can do in the environment in which they could do it – with their students. Then allow them to make that transition to doing it themselves."

Each of the professional developers was very clear about the critical nature of the pedagogical element of their practice, and German was very specific about how central that role is when he summed up his division's model.

Their [the learning support facilitator's] whole role of helping people use technology in the classroom is kind of a sideline, the focus is on learning and how can technology support that. It's not here is some technology and let's learn it. It's about how can we support teachers in their teaching and students in their learning.

The focus on the craft of teaching and the definition of learning permeated all of the professional developers' examples. Henderson discussed specific epistemological positions as a part of her professional development and Morley discussed the development and codification of her own personal theories about the pedagogy of technology professional development. For each

participant, personal epistemology became a part of professional development practice because they came to believe it was an essential ingredient for teachers in order to reduce second order barriers.

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

The last decade has seen the gradual reduction of clear barriers to the use of computers in Saskatchewan schools. More machines are available, Internet access and speed are better, and teachers have access to more information. Yet despite these changes in first order barriers, computers remain peripheral to learning in school. Many teachers now have the resources to use computers with their students but elect not to. I spoke to professional developers because they are tasked with tackling the issue of computer use and each one works with many teachers in a year. The professional developers in this study discussed many reasons why teachers do not use computers, but their observations highlighted the fact that both first and second order barriers must be addressed for teachers to use computers effectively with students. Their responses drew attention to the key role that pedagogy plays in shaping teacher practice and also established exactly how significant the professional developers' views about learning and computers were in shaping what teachers tried to do.

The perception that technology has the potential to help us grow through teaching and learning was related to all of the comments the participants made. It was deeply rooted in their assumptions that technology just is and must be seamlessly available to students. It was the foundation for their goals of facilitating learning and changing educational practice. The perception that computers can be effective tools in the classroom, but currently are not, compelled the professional developers in this study to not only teach how to use computers in the classroom, but more importantly, teach why to use them. The role of pedagogical reflection and discourse in the process of professional development to support teaching with computers K-12

cannot be understated. It permeates everything the professional developers believed in and worked to achieve.

For the participants in this study, the connection between pedagogy and practice was explicit and continuous. Their beliefs not only played a role in how they constructed experiences about teaching with computers, they also influenced what the professional developers taught. Their abiding views about computers and their professional development practice were difficult to break into constituent elements because the professional developers considered the relationship symbiotic.

Abiding views about the role of computers in the classroom

The professional developers in this study believed that computers could be very important teaching tools if used correctly. They were not advocates of universal instruction via computer, although they were advocates of universal access and believed technology is a reality of life in our society. They clearly articulated that computers should only be used in classrooms when they meet a specific educational objective. They characterized much of the use they see as incidental or not designed to meet specific learning goals. The participants expressed a single criterion for effective use of computers; technology in the classroom must be used to meet specific learning objectives. Each participant framed the role of computers in teaching and learning by asking why computers were being used.

According to the participants, computers could be tools for communication, access to information, constructing learning and collaboration. They all cited numerous examples of how computers could be effective in these roles. However, they also articulated that current practice does not mirror these ideals, and suggested that the large scale ineffective use they see is related to a lack of focus on why we are using computers to learn. The participants' convergence on why

we are using computers is significant for two reasons. First, it was the central point for each person and was emphasized repeatedly, even when it was only tangentially related to the topic at hand, indicating the issue was of critical importance to the participants and not something they assumed others just knew and acted on. Secondly, dwelling on the question why indicates the participants perceive pedagogical underpinnings as critical to effective use of computers in the classroom, and subsequently, critical to their work as professional developers.

Why we use computers and their role in education was also an evolutionary question for the majority of the participants. Four of the five participants expressed a role for computers that was focused on systemic shifts in educational practice rather than the role of a computer in any one lesson or project. They believed that computers had the potential to change how we teach and learn, and that the changes would make teaching and learning more effective. They articulated that the changed practice would make learning generative rather than supplantive, and focused the transformational potential of teaching with computers. This group of professional developers articulated an agenda of change. They expressed an ultimate goal of not merely more effective computer use when teaching and learning, but changing teaching and learning through the use of computers.

While this emphasis on systemic change was not universal among the participants, it resonated strongly with literature. Many researchers including Cuban and Guskey have focused their attentions on the difficulty and promise of change. The professional developers' emphasis on change and their personal affinity for change were interesting and unexpected findings worthy of further investigation.

Affects of personal epistemology on professional development practice

The view that computers could be effective tools and could change teacher practice was at the core of everything that the professional developers said about their practice and their personal epistemologies. They each expressed a change in their professional development as they discovered it did not increase effective use of computers with students. They discussed how their views of learning shaped what they taught and how they taught it. They related all the changes they made in their practice to their epistemologies, and discussed how they were able to change division policy. They also expressed the value of dialogue with colleagues in shaping and altering epistemological beliefs and corresponding professional work.

The professional developers represented their practice as a process of change. They articulated early failures with sit and get sessions and the addition of explicit pedagogical teachings when they realized teachers were not making the pedagogical connections between computers and teaching. Their universal rejection of traditional professional development echoes years of comments by researchers in the area (Jacobsen et al., 2002a; Coopla, 2004; King 2002; MacKenzie, 1999), despite the fact that some of the participants described no formal research or professional development experience that lead them to the conclusion. Experience led to them to the conclusion, and resulted in each of the professional developers advocating for changes in practice. A number of the participants described meeting with others who were advocating for radical transformations in professional development practice only to discover that their colleagues were making the case for a change which they already supported. The process of spontaneous, simultaneous discovery suggests that their experiences are valid in a wide variety of K-12 provincial contexts and starts to confirm speculation in the research.

The professional developers said their beliefs came from personal experiences with ineffective practice. Each of them talked about their early practice as a default position in the

education system. German noted that when you wanted teachers to learn something, “You had an in-service.” Each of the professional developers described an experiential process of matching their professional development practice to their personal epistemologies. In the process, they all stated that they discovered a series of beliefs about what effective instruction about teaching with technology is. Their personal epistemologies about both teaching with computers and teaching teachers literally transformed what they did professionally, indicating that their beliefs may be a very significant force in shaping provincial learning about teaching with computers. They articulated a clear desire to change teacher beliefs and a conviction that pedagogy was an essential element in technology professional development.

Except when prevented by external constraints, the professional developers in this study shaped everything about their practice around their personal epistemologies. They became forces for change in professional development practice in order to transform practice to more closely meet both needs they thought teachers had and their personal pedagogical positions. They changed the focus of the professional development, methods of delivery, duration, access, supports, level of teacher direction and locations. The participants made those changes based on their understanding of learning for both teachers and students, and they made those changes in the context of a climate where traditional professional development remains what German described as the default position. They articulated that they were able to make these changes much more rapidly and at more fundamental levels than they have been able to in other educational endeavors, and that their ability to make these changes motivated their work. They confirmed Lia’s (2001) gap between the stated goals of our professional development and our practice, but they believed they were making the case for change and gradually transforming the nature of practice to make it much more effective.

Implications

Professional development practice in general is starting to shift. Divisions are exploring professional growth plans and other tools to give teachers greater flexibility and ownership over their own learning. But if this shift is apparent in education in general, it is magnified in our experiences with computers. Many participants in this study hope that computers will help us transform how we teach and learn, and in the area of professional development, they seem to be doing just that. Perhaps it is the greater flexibility Henderson identified or the changing nature of technology that Faucher stressed, but for whatever reason, the professional developers in this study have had some power to change how teachers, as a profession, learn about computers. They have taken the opportunity to alter professional development, and they are transforming our experiences with computers to meet their goals and beliefs. The epistemological views of professional developers are critically important in shaping how teachers construct teaching with computers, and by extension, how teachers integrate technology in schools.

The power of pedagogy in computer professional development for teachers is both profound and troubling. The participants in this study were abundantly clear that teachers need specific pedagogical direction in order to teach with computers, and that the effectiveness of the teacher's practice hinges on both pedagogical and technical understanding. And while the professional developers were certain that pedagogy of effective computer use must be explicitly taught to teachers, the participants in this study did not agree about what effective use of computers was. While they identified common ineffective uses, their descriptions of effective uses were highly dependent on their epistemologies.

The professional developers in this study each believed pedagogy was critical and must be made explicit, but the participants did not articulate a common pedagogy. Our explicit

disagreement may serve teachers no better than a lack of pedagogical information, and our diverse pedagogies may make that barrier more pronounced. If the professional developers in this study are correct that explicit pedagogical information on how to teach effectively with computers makes the difference for teachers, then overtly contradictory epistemology has potentially devastating effects. It is possible that trying to solve the problem of lack of teacher pedagogy around computer use in classrooms may be pointing us to an even bigger issue, lack of coherent epistemology among leaders in educational technology.

The need for a clearer understanding of second order barriers is underscored by the participants' belief that they relative freedom to create change and that technology was changing and their practice was changing with it. They mentioned supportive environments where their ideas, research and innovative practice flourished. They linked the pace of change and the flexibility to the fact that they worked in technology professional development. The professional developers articulated a common climate of possibility in the face of need and common views of the issues, but they said the ways in which they reconciled these factors with their practice were different depending on personality and epistemology.

Recommendations for practice

Recommendations for professional development delivery

Pedagogy is the gatekeeper for the integration of technology in schools. Teachers who do not believe computers will help students learn will not take the time to learn about technology themselves. Professional development practice needs to continue to move away from training about applications and towards communities of professional learners. Professional development focused on learning with computers as a tool is more likely to impact practice, and therefore, have the potential to impact what students experience. The professional developers in this study

emphasized that the focus on pedagogy is an essential element in effective computer professional development, not an optional one.

The professional developers suggested that a number of other factors influence the effectiveness on professional development. Time to learn is critical to teacher success, as is planning and instructional support. Teachers at different levels of technology use have different needs, and computer professional development needs to be just in time for each person, not just in case for no one in particular. Learning needs to be both extended and applied. One-time sessions are not likely to be used even one time. Divisions need to explore alternatives to traditional professional development. Rather than division wide sit and get sessions, they could better invest in mentorship models, release time for projects, focus groups and other extended offerings.

The professional developers in this study discovered many of Speck's (1999) principles of professional development and have started to work to change what they do. Their past experiences taught them professional development needed more resources of every type and needed revision to be more effective. While the professional developers in this study can revise what they teach and how they teach it, they generally did not have the authority to define what was considered professional development or what levels of funding it required. Those are major division-wide changes that only one division in the study was in the process of making.

Recommendations for professional dialogue

The professional developers in this study shaped what teachers learned based on what they believed about computers. Their powers to shape what teachers learn means that their own learning has to be a high priority in division-wide technology planning. Until the last five years, little formal professional development was available for technology leaders, and even now, little

of the formal professional development focuses on pedagogy. The majority of professional developers are left to develop their understanding through trial and error or solitary reading. There is one form of professional learning that the participants identified as critical, although many division policies would not define it as professional development.

The professional developers in this study indicated that time to learn and discuss with others was the critical form of professional development for them. They engaged in this dialogue in a variety of ways, but the end effect was similar. All the professional developers discussed changing and shaping their understanding of computers and learning through discussions, chats, e-mail and other professional conversations. The time to do this with other colleagues in the division and outside was a major factor in shaping professional developers' practice. Because they are the technology experts, many professional developers are not allotted formally recognized time to learn through discussion with others. Divisions should seek to recognize such time as professional development although it may not be as formal as other forms of professional learning, because the participants reported it was the best way to stay abreast of changing technologies and changing pedagogy simultaneously.

Recommendations for technology planning

Provincial and local technology planning needs to include professional development, and that professional development must be sufficiently funded to be effective. A wide variety of organizations now recommend that at least thirty percent of technology budgets be spent on professional learning. While it is essential that infrastructure be functional to be used, teachers must know how, when and why to use computers for the functioning infrastructure to influence learning.

Sufficient funding is not enough; technology planning also needs to include pedagogical visioning. What effective computer use looks like and what supports we need to make that vision a reality need to be a part of the planning process. This research indicates that different people who work with computers have different views about how computers can impact learning. Because communicating a clear epistemological viewpoint is a part of effective professional development, it needs to be considered in the planning process and technical decision-making needs to reflect the educational goals of the process.

In addition to funding and pedagogical planning, assessment needs to be a part of the technology planning process. In general, the participants in this study assessed the effectiveness of professional development based on observed teacher behavior and skill set. While they can clearly establish what is not working, they do not assess what is working and how effectively it works. Two participants mentioned some form of professional development assessment but no one mentioned all five of Guskey's (2002) measures of effective professional development. Guskey's five measures educational institutions to assess if the professional development is engaging and valuable, what learning has occurred, if the organization supports the change, if the learning is applied and how much student learning occurs. Each element must be assessed so that potential problems in professional development are linked to the correct cause. The professional developer's observations are a critical element in assessing the effectiveness of professional development, but they need to be supported by other tools varied assessment. Three of the professional developers in this study mentioned the issue of assessment, but none of them mentioned more than two elements, indicating more formal planning and assessment support is needed.

Recommendations for research

The findings of this study are based solely on the perceptions of the professional developers themselves. Because this study was designed to look at how they construct their views, it does not examine the validity of those views in the context their day-to-day lives. While I asked each professional developer to describe their practice and use examples, my focus on the richness of the narrative excluded a study that tested the validity of the professional developers' understandings. A study that looked at how their views matched their actual practice rather than their perceived practices might find significant discrepancies between what they think is happening and what a researcher observes.

I expected to find that the professional developers believed certain things about how teachers learned, but the realities of their work prevented them from acting on these beliefs. I found that they articulated their beliefs and continued to transform their practice to meet those beliefs. However, I cannot confirm or refute the existence of those changes based on this study, and believe it is important to attempt to match the professional developers perceptions to researcher observation of their practice.

Other studies seem to confirm gradual changes in professional development practice in Western Canada (Jacobsen, 2003), and if the professional developers and these studies are correct, it raises two important issues for researchers. First, does the pedagogical emphasis of professional development reduce second order barriers? Secondly, do the differing epistemologies and pedagogies of the professional developers have any impact on the effectiveness of pedagogy-based professional development? Both questions are worthy of further investigation.

I choose my methodology for this study with difficulty. I am naturally more comfortable with easily quantifiable data and clear delineation. However, I believe that the role of second order barriers will require additional qualitative analysis. While such analysis is present in educational technology, it is not common. Despite my lack of comfort in the fact that my results are not generalizable, I have found the insights of my participants very valuable and they have taken me in many new directions. I think that further open-ended research in this area could yield a wealth of interesting ideas.

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APPENDICIES

APPENDIX A – Letter of Consent

You are invited to participate in a study entitled *Pedagogy and Practice: The effective use of computers through the eyes of professional developers*. Please read this form carefully, and feel free to ask questions you might have.

Researcher: My name is Wendy James. I am a master's student in Educational Communications and Technology in Curriculum Studies, College of Education at the University of Saskatchewan. You can contact me at (306) 244-1474 (home) or (306) 966-7670 (work). I am most easily reached by e-mail at jamesl@spsd.sk.ca. My thesis supervisor is Dr. Richard Schwier. He can be reached at (306) 966-7641 or richard.schwier@usask.ca.

Purpose and Procedure: The study will explore pedagogy of technology use and the professional developers who teach about the use of technology. In order to protect the interests of the participants, I will adhere to the following guidelines:

1. I will interview you for 1 to 2 hours on _____. I will interview you to discuss your perceptions of effective uses of technology in the classroom and how your practice as a technology professional developer has been shaped.
2. Your initial interview will be audio-recorded. Additional short follow-up questions may be sent via e-mail. You can withdraw at any time during the study without penalty, explanation and without repercussion. Your withdrawal will not result in loss of services at the University of Saskatchewan. If you withdraw, the data collected from interviews and audio recordings will be immediately destroyed. Your participation will not require more than 5 hours of your time.

Potential Risks: Because the participants for this study have been selected from a relatively small group of people, some of whom are known to each other, it is possible that you may be identifiable to other people on the basis of what you have said. I will attempt to remove identifying information and protect your anonymity in every way I can. If you are concerned at any time that anything we have discussed may compromise you, you have full authority to delete or rework that section of the transcript or withdraw your participation entirely, without explanation or penalty. I will destroy relevant material immediately and without question.

Potential Benefits: The study may be used to inform the construction and/or delivery of technology professional development, however, these benefits are not necessarily guaranteed.

Storage of Data: The original information or data including: interview audio-tapes, transcripts, consent forms and electronic files on disk will be placed separately in two sealed envelopes. These data, the research study results and other materials connected with this project will be safeguarded and securely stored in my research supervisor's office at the University of Saskatchewan for a period of five years according to the University of Saskatchewan guidelines.

Confidentiality: The data from this study will be published and presented at conferences; however, your identity will be kept confidential unless you chose to be identified. Although I will report direct quotations from the interview, you will be given a pseudonym, and all identifying information (name of your workplace or school, locations where you conducted professional development, committees you are a part of etc.) will be removed from the report. Consent forms will be stored separately from the individual interviews, so that your name is not connected with what you said. The contact sheet participants will be destroyed after all data is collected and all signed transcript release forms are received.

If you choose to identify yourself, all statements that might identify third parties (name of your workplace or school, locations where you conducted professional development, committees you are a part of etc.) will still be removed. Please check the boxes below to indicate if you wish to be identified in the study. If you do not select any option, I will assume you do not wish to have your identity revealed and your identity will be protected. If you make one selection and later chose to change your selection, I will immediately comply.

- I wish to be identified
- I do not wish to be identified

Right to Withdraw: Your participation is voluntary, and you may withdraw from the study for any reason, at any time, without penalty of any sort. You may refuse to answer individual questions. Interviews will be audio taped and you have the right to turn off the tape recorder at any time. You may withdraw your answers to individual questions or completely quit the research study for any reason, at any time, without explanation. If you quit, no one will be upset or angry and there will be no penalty. All the information or data you provided will be deleted and destroyed. If you withdraw, I will immediately open the large sealed envelope containing individual interviews, and delete and destroy the information or data you provided. The other remaining data will be placed in a new large envelope, which is then sealed. Next, I open the large sealed envelope containing all the consent forms. I will locate the contact sheet and your consent form. Your name will be removed from the contact sheet and your consent form destroyed. The remaining consent forms in their envelopes will be placed in a new large envelope, which is then sealed.

Transcripts: The recording of our conversation will be transcribed and analyzed to discover the patterns and themes discussed. You will be given a smoothed narrative version of the partial transcripts with false starts, repetitions, and paralinguistic utterances (like ‘um’) removed to make it more readable. I will check with you about your responses in the transcriptions. You can add, delete or change information to reflect what you want to say. Only the ideas and words in the transcript you sign will be attributed to you. You will be asked to sign a Letter of Consent for Release of Partial Transcripts.

Questions: If you have any questions concerning the study, please feel free to ask at any point; you are also free to contact the researchers at the numbers provided above if you have questions at a later time. This study has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board on March 30th 2006. Any questions regarding your rights as a participant may be addressed to that committee through the Ethics Office (966-2084). You may also contact my thesis supervisor, Dr. Richard Schwier at (306) 966-7641 or richard.schwier@usask.ca. Out of town participants may call collect. You will receive a copy of the study after it is completed.

Consent to Participate: I have read and understood the description provided above; I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I consent to participate in the study described above, understanding that I may withdraw this consent at any time. A copy of this consent form has been given to me for my records.

(Name of Participant)

(Date)

(Signature of Participant)

(Signature of Researcher)

APPENDIX B - Letter of Consent for Release of Transcripts for Study

I appreciate your participation in the research study: *Pedagogy and Practice: The effective use of computers through the eyes of professional developers*. I am returning the partial transcripts of your audiotaped interviews for your perusal and the release of confidential information. I will adhere to the following guidelines that are designed to protect your anonymity (unless waived), confidentiality and interests in the study. Would you please read and recheck the transcripts for accuracy of information. You may add or clarify the transcripts to say what you intended to mean or include additional comments that will be your words. You may also delete any information that you may not want to be quoted in the study.

The interpretations from this study will be used only in my thesis and related papers or presentations. Except for the researcher in the study, your participation has remained confidential unless you asked to be identified. Your name or any identifying descriptors will not be used in the final report or in any scholarly articles or presentations unless you asked to be identified.

In accordance with the University of Saskatchewan Behavioural Research Ethics Board, the tape recordings, writing samples, and transcriptions made during the study will be kept by the researcher in a locked file until the study is finished. After completion of the study, the tapes and other data will be kept for five years at the University of Saskatchewan and then destroyed.

Participation in the study is voluntary, and you may withdraw at any time without penalty. If this happens, the tape recordings and interview data will be destroyed immediately.

I, _____, have reviewed the complete transcript of my personal interview in this study, and have been provided with the opportunity to add, alter, and

delete information from the transcript as appropriate. I acknowledge that the transcript accurately reflects what I said in my personal interview with Wendy James, hereby authorize the release of this transcript to Wendy James to be used in the manner described in the consent form. I have received a copy of this Data/Transcript Release Form for my own records.

Name of Participant

Date

Signature of Participant

Signature of researcher

APPENDIX C - Interview Questions

Context Questions:

- Tell me about your career before your current job.
- If you have a typical day, what does it look like? If you have no typical day, can you tell me about why that is?
- Why have you chosen to work in educational technology?
- What is frustrating about working with teachers and computers?
- What is an example of a typical professional development event or experience that you lead? Can you describe it?

Main Questions:

- Teaching
 - What is a good teacher like?
 - What types of teaching helps learners the most and why?
 - How could you identify the classroom of a good teacher by looking at it?
- Technology
 - What types of ways can people use computers in learning?
 - What types of use of computers are most effective in your opinion? Why do you think so?
 - Do you think teachers use computers in the ways you think are effective? What examples can you think of for effective and ineffective use?
- Professional Development
 - How do teachers like to learn?
 - What methods are most effective when you try to teach about how to integrate? Why?
 - What prevents you from doing what you would like to do?

Concluding Questions:

- You told me about your role at work. Now I would like to now about the role of your work in your thinking. What role has the place you work had on your view of the value of computers in education?
- Has it changed your PD practice? If so, how?
- Can you recall any other groups that you were part of that affected how you think about the use of computers in learning? Tell me about those experiences.

APPENDIX D - Letter of Request for Permission for Employee Participation in Research Study

I would like to request permission for an employee of your school division,
_____ to participate in a research study I am conducting, entitled:
Pedagogy and Practice: The effective use of computers through the eyes of professional developers. My name is Wendy James. I am a master's student in Educational Communications and Technology in Curriculum Studies, College of Education at the University of Saskatchewan. You can contact me at (306) 244-1474 (home) or (306) 966-7670 (work). I am most easily reached by e-mail at jamesl@spsd.sk.ca. My thesis supervisor is Dr. Richard Schwier. He can be reached at (306) 966-7641 or richard.schwier@usask.ca.

Purpose and Procedure: The study will explore pedagogy of technology use and the professional developers who teach about the use of technology. I will interview _____ for 1 to 2 hours initially to discuss perceptions of effective uses of technology in the classroom. The Interview will be audio-recorded. Additional short follow-up questions may be sent via e-mail.

Withdrawal: Participants can withdraw at any time during the study without penalty, explanation and without repercussion. Withdrawal will not result in loss of services at the University of Saskatchewan. If a participant withdraws, the data collected from interviews and audio recordings will be immediately destroyed.

Potential Risks: Because the participants for this study have been selected from a relatively small group of people, some of whom are known to each other, it is possible that a participant may be identifiable to other people on the basis of what he or she has said. I will attempt to remove identifying information and protect anonymity in every way I can. Participants may select if they want to be identified.

Potential Benefits: The study may be used to inform the construction and/or delivery of technology professional development, however, these benefits are not necessarily guaranteed.

Storage of Data: The original information or data including: interview audio-tapes, transcripts, consent forms and electronic files on disk will be placed separately in two sealed envelopes. These data, the research study results and other materials connected with this project will be safeguarded and securely stored in my research supervisor's office at the University of Saskatchewan for a period of five years according to the University of Saskatchewan guidelines.

Transcripts: Participation is voluntary, and participants may withdraw from the study for any reason, at any time, without penalty of any sort. They will get transcripts of conversations and may change information to reflect what they want to say. Only the ideas and words in the transcript they sign will be attributed to them. They will be asked to sign a Letter of Consent for Release of Partial Transcripts.

Questions: If you have any questions concerning the study, please feel free to ask at any; you are also free to contact the researchers at the numbers provided above if you have questions at a later time. This study has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board on March 30th 2006. Any questions regarding your rights as a participant may be addressed to that committee through the Ethics Office (966-2084). You may also contact my thesis supervisor, Dr. Richard Schwier at (306) 966-7641 or richard.schwier@usask.ca. Out of town participants may call collect.

Please let me know what additional steps are necessary to request permission for an employee of your division to participate,

Sincerely,

Wendy James