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Negotiating the integration of new literacies in math and science content: The lived experience of classroom teachers

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NEGOTIATING THE INTEGRATION OF NEW LITERACIES IN MATH AND SCIENCE CONTENT: THE LIVED EXPERIENCE OF CLASSROOM TEACHERS

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ABSTRACT

Negotiating the Integration of New Literacies in Math and Science Content: The Lived Experience of Classroom Teachers

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The purpose of this phenomenological study was to investigate the lived experience of integrating new literacies in math and science content by upper elementary and middle school teachers. This study highlights the lived experience of six teachers including two elementary math teachers, two middle school math teachers, and two middle school science teachers. Data sources included five in-depth interviews, teachers' weekly reflection journals, weekly classroom observations, and one principal interview at each of the three high-needs schools. Data were analyzed through an analytic and thematic approach. A reconstructed story was created for each teacher which provides insight into the teacher as an individual. Additionally, a thematic analysis resulted in the identification of five essential themes across all six stories which included: technology exclusively, rethinking who they are as teachers, stabilizing rather than challenging content, rethinking student learning, circumstances, and futures, and serving official context and discourse. The findings indicate that the teachers' lived experience of integrating new literacies in math and science content was filled with uncertainty and a

search for stability. A key implication of this study is the need for quality professional development that provides teachers with the opportunity to learn about, question, and rethink the intersection of new literacies, content area literacy, and teacher knowledge.

To my mom and dad,

who always believed it was possible.

I love you.

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CHAPTER 1

INTRODUCTION

Purpose of the Study

I remember the day that it arrived. It was a fall morning in 1999. Anyone who looked into my first-grade classroom would not have noticed it. The desks were neatly grouped together, the day's agenda was posted on the board, and students' work was displayed on the walls. It looked like a typical classroom, but as I walked into the room nothing was typical about it. There, sitting on the table next to my desk was my very own classroom computer. I had spent time imagining all that I could do with this great piece of technology. I would keep track of grades, write letters home to parents, create portfolio pages; the possibilities seemed endless. At the time, just over ten years ago, my only thought about technology was how it would make me more efficient and more organized as a teacher. I had not heard of the term "new literacies" or "multiliteracies" or given any thought as to how technology could impact me as a teacher or my teaching. In 2002, when I turned off the lights in my classroom for last time and prepared to enter graduate school, that same computer sat at the table near the desk. If I were to tell my story of how technology impacted my classroom teaching, it would be short.

Fast forward ten years, and the classroom I am standing in looks familiar. Desks are neatly grouped together, agendas are listed on the board, student work is displayed, and there next to the teacher's desk sits a computer. However, the agenda is not written in chalk, it is projected on an interactive whiteboard; at the front of the room there is a cart full of laptop computers, and on each student desk sits a student response clicker. Yes, this classroom is different. The teacher walks into the room and I wonder, what is her

story? Is this technology used for more than keeping her organized? Has it changed her instruction? Does it influence her planning? I want to know her story.

The purpose of this study was to develop an in-depth understanding of teachers' lived experiences as they integrate new literacies in their curriculum. Specifically my question was: What is the experience of upper elementary and middle school teachers as they integrate new literacies in their math and science content?

Background

In the late 1980s and into the 1990s, a transition from a cognitive to a sociocultural perspective occurred in literacy education (Gaffney & Anderson, 2000). While this shift in perspective did not ignore the cognitive abilities of the individual, it did begin to acknowledge that the social and cultural conditions of society had an impact. With this change came expanded views of literacy and what it meant to "read." Prior to that shift, literacy had been viewed as "a general and self-contained ability to write and read" (Gee, 2000b, p. 412). Reading was viewed as a set of isolated skills that one could master (O'Brien, 2006). Within this view, the text was held superior and strategies were taught that enabled the reader to find meaning in the text (Alverman & Moore, 1991). In contrast, the sociocultural paradigm shift acknowledged an expanded notion of literacy. Nixon (2003) argues that "literacy is more complex and involves learning a repertoire of practices for communicating and getting things done in particular social and cultural contexts" (p. 407). Furthermore, literacy was viewed as multiple knowledges that were developed and shared in social contexts (Alexander & Fox, 2004).

The definition of literacy was not only broadened because of this paradigm shift, it was also broadened due to the advances in technology and the impact of those advances on teaching and learning (Bruce, 2004; Durrant & Green, 2004; Gee, 1996; Hagood, Stevens, & Reinking, 2004; International Reading Association, 2002; Leu, Kinzer, Coiro, & Cammack, 2004; C. Luke, 2004; Nixon, 2003; Street, 2003). With access to the Internet becoming readily available to students both in and out of school, literacy could not continue to be defined in relation to print-bound textbooks (C. Luke, 2000).

Given the expanded definition of literacy, a text was no longer limited to printed words on a page. The explosion of information and communication technologies (ICTs) including word processors, cell phones, and MP3 players necessitates the broadening of the definition of text. Therefore, scholars began to define text as anything that conveyed meaning (Kress, 2003; Wade & Moje, 2000). As a result, the traditional skills used to read in a print-centric world were no longer sufficient. In fact, Luke (2004) stated, "It has been widely argued that book-based print literacy, and industrial model schooling built around book culture, is no longer adequate in today's changing information, social, and cultural environment" (p. 132).

In an effort to acknowledge the paradigm shift, as well as advances in technology, scholars began to use the term new literacies (Lankshear & Knobel, 2006; Leu, Kinzer, et al., 2004). What constitutes new literacies is discussed in detail in Chapter 2; however, most simply stated new literacies include the social practices that continuously evolve due to technological advances (Lankshear & Knobel, 2006). These practices allow persons to question, construct, and participate in producing knowledge through multiple modes.

Acknowledging the importance of technological advances on society, the federal government called for schools and classrooms to incorporate more technology by encouraging states and school districts to take action such as providing greater broadband access and digitizing content (Department of Education & Office of Educational Technology, 2004). Moreover, the call for the use of technology in the classroom has been raised by many national organizations (see National Council of Teachers of Mathematics, National Science Teacher Association, International Reading Association).

The National Council of Teachers of Mathematics (NCTM) lists technology as one of the six principles of mathematics and also argues that it should be used to aide students' learning (2000). Furthermore, NCTM (2000) reports that "the existence, versatility, and power of technology make it possible and necessary to reexamine what mathematics students should learn as well as how they can best learn it" (p. 24).

Additionally, the National Research Council lists science and technology as one of the eight National Science Education Standards (1996). However, instead of integrating the two areas, the council proposes that students come to understand how the two areas benefit one another. As students engage in scientific inquiry, they will find that technology and technological designs are tools necessary for problem solving (National Research Council, 1996).

Lastly, a report from the Alliance for Excellent Education titled *Reading Next—A Vision for Action and Research in Middle and High School Literacy: A Report to Carnegie Corporation of New York*, listed fifteen elements of effective adolescent literacy programs. One of these elements was the incorporation of technology. In the report, Biancarosa and Snow (2006) state:

> Technology is both a facilitator of literacy and a medium of literacy. Effective adolescent literacy programs therefore should use technology as both an instructional tool and an instructional topic. As a tool, technology can help teachers provide needed supports for struggling readers, including instructional reinforcement and opportunities for guided practice. For example, there are computer programs that help students improve decoding, spelling, fluency, and vocabulary, and more programs are quickly being developed to address comprehension and writing. As a topic, technology is changing the reading and writing demands of modern society. Reading and writing in the fast-paced, networked world require new skills unimaginable a decade ago. (p. 19)

While professional organizations, as well as the federal government, promote the use of technology in the classroom, very little information is available to teachers regarding how to meaningfully incorporate new literacies in teaching practices (Pahl & Rowsell, 2005).

Statement of the Problem

In the spring of 2008, the *Handbook of Research on New Literacies* was published. This landmark publication addressed a variety of new literacies topics from the perspective of many leaders in the field. However, within the thirty-eight chapters of this handbook, only one chapter was devoted to the experiences of teachers in the classroom. This finding was not surprising to me. In fact, through my readings on new literacies I found that teachers' voices are often underrepresented. While there is a growing amount of research on the topic of new literacies, little research is available that describes what

these new literacies might look like in classrooms (Cervetti, Damico, & Pearson, 2006; Karchmer, 2008; Kist, 2005). Furthermore, as noted by Robert Tierney (2009), "the talk of new literacies in schools far exceeds their presence" (p. 336).

While much of the research on new literacies has focused on students both in and out of school (Alvermann, 2004; Lankshear & Knobel, 2003, 2006; Leander, 2007; O'Brien, 2006), a small group of scholars provide a glimpse of what new literacies looks like when integrated in the classroom curriculum. William Kist, a pioneer in classroom-based new literacies research, sought to define and characterize classrooms implementing new literacies across the United States and Canada. Kist's (2005) book contains multiple case studies that describe new literacies classrooms and practices. In order to characterize new literacies, Kist (2005) identified the following classroom characteristics:

1. Daily work in multiple forms of representation.
2. Explicit discussions of the merits of using certain symbol systems.
3. Metadialogues by the teacher who models problem solving.
4. Mixture of individual and collaborative activities.
5. Engaging contexts where students achieve flow state.

Using these characteristics, Kist identified and observed classrooms where teachers were drawing upon students' knowledge of technology and extending their learning through collaboration, creativity, and higher level thinking skills. Kist (2005) discussed one classroom where students were engaged in creating an advertisement campaign. The students worked in groups and followed a planning sheet, provided by the teacher, to complete the project. As Kist interviewed the students, many of them spoke about learning new technologies. Although the students could not articulate why they were

engaged in many of the assigned projects, they did feel that learning "how to use all those gadgets" (Kist, 2005, p. 56) would help them in their futures.

Kist's work highlights the classroom as a whole entity. While the teacher is part of that picture, he or she is not the focus. However, Karchmer (2000; 2008) broke ground in the field of new literacies as she focused on teachers' perspective. Karchmer is the author of the single chapter in the *Handbook of Research on New Literacies* that focused explicitly on teachers. The purpose of Karchmer's study was to investigate K-12 teachers' perspectives on the internet and how it influenced literacy and literacy instruction in their classrooms. Karchmer (2008) collected data from thirteen teachers across the United States through email. She found that teachers defined literacy only in terms of reading and writing and focused on a) the appropriateness of internet material, b) evaluating the accuracy of internet material, and c) publishing student work on the internet. While the internet did not radically change the teachers' practices in this study, Karchmer's work highlights the complex nature of the interaction of literacy and the internet. But, most importantly, this study focused on the teacher. Karchmer (2008) argued that teachers' stories "provide the type of intricate information needed to understand the reality of technology use in the classroom" (p. 1243). Along this same line, in a response to Karchmer's article, Marsh (2008) states:

> One of the most important means of informing research, policy, and practice as they relate to new literacy practices in schools is to offer teachers a voice in order that their strategies, questions, and concerns can be heard loudly in the debates that surround this issue. (p. 1295)

While curriculum, context, materials, and students make up a classroom, it is the teacher that brings them all together. At the heart of the classroom is the teacher and the daily choices that impact the curriculum, context, materials, and students (van Manen, 1994). Therefore, it is essential that teachers become the focus of study (Karchmer, 2001, 2008; Kist, 2005; Stolle, 2007; Unsworth, 2008). At the conclusion of his text, Kist (2005) stated "Another entire book could be written just about the teachers' stories" (p. 138). What is missing from the literature are specific examples of teachers' stories, their lived experiences as they seek to integrate new literacies in their content areas.

Significance of the Study

While it is easy to jump on the technology bandwagon, Cuban (2002) cautioned that the integration of computers and technology into schools has not transformed teaching and learning. More technology does not equal improved education. Rather, the key factor in classrooms, as mentioned earlier, is the teacher. Therefore, it becomes important to study not only what teachers are doing, but why. What is needed is further insight into the "gains and losses" of integrating new literacies in the classroom (Kress, 2005) from the perspective of the teacher. Further research is necessary in order to gain greater insight into how teachers are grappling with these complex ideas.

Teachers possess vast amounts of both professional and practical knowledge (Fenstermacher, 1994) of teaching and learning. Professional knowledge is gained through formal university coursework, professional development, and inservice trainings. However, the practical knowledge that teachers possess comes from experience, from the

day to day interaction with students and curriculum. Fenstermacher (1994) described practical knowledge with the following statement:

> We see personal practical knowledge as in the person's past experience, in the person's present mind and body and in the person's future plans and actions. It is knowledge that reflects the individual's prior knowledge and acknowledges the contextual nature of that teacher's knowledge. It is a kind of knowledge carved out of, and shaped by, situations; knowledge that is constructed and reconstructed as we live out our stories and retell and relive them through processes of reflection. (p. 10, citing Clandinin, 1992, p. 125)

Acknowledgement of teachers' practical knowledge is recognition of the time spent in the classroom and the lessons that have been learned. Further, the decisions teachers make about students and curriculum are based on both professional and practical knowledge.

In a review of two new literacies texts, authored by leading scholars, O'Brien and Bauer (2005) argued:

> What is limiting in both of the texts is that they criticize schools, offer learning principles, and showcase some ICTs in some settings, but they fail to adequately problematize the complexities involved in changing the institution of public education while understating the future directions that educators should take. (p. 129)

While this statement was made about specific new literacies texts, I argue that it also describes a large portion of the research in new literacies. While research has suggested that teachers could better embrace and integrate new literacies (Lankshear & Knobel, 2006; Leander, 2007), very little is known about teacher experiences and how teachers

are making sense of the integration of new literacies. In a conversation I had with a group of elementary classroom teachers, one teacher stated in frustration, "Just tell me how. Stop giving me technology unless you can tell me how to use it." While the goal of this study is not to create a "how to" guide for integrating new literacies in content area classrooms, it has the potential to influence practitioners' understandings of new literacies because of the detailed examples of the teachers' lived experiences in the classroom. Furthermore, the detailed experiences of classroom teachers have the potential to demonstrate "the complexities and even the contradictions inherent in teaching and learning" (Cervetti et al., 2006, p. 383).

Teachers are facing turbulent times. High stakes testing, an increasingly diverse student population, and limited professional development are just some of the challenges teachers face. Yet, even within these challenges there are teachers who seek to integrate new literacies in their curriculum. In a highly unstable time in education, when school failures make national headlines, teachers are quietly forging ahead. However, rarely are these efforts brought to the forefront (Pahl & Rowsell, 2005; Karchmer et al., 2005). But I believe, if given the opportunity to share, teachers have something important to say. Teachers' stories are vital in the field of new literacies. Karchmer et al. (2005) argued that given the rapid changes in new literacies, teachers' daily experiences and stories become the greatest resource for moving the field forward. Therefore, it is essential that teachers are provided with a voice. Brandi Carlile (2007) poetically captured the importance of listening to teachers as she wrote:

> All of these lines across my face
>
> Tell you the story of who I am

So many stories of where I've been

And how I got to where I am

But these stories don't mean anything

When you've got no one to tell them to (n.p.)

Using phenomenological methods to guide data collection and analysis, the purpose of this qualitative study was to provide a voice to an underrepresented population within the new literacies studies—the voice of the public school teacher. The public school teacher is the one best equipped to provide the educational community with a better understanding of what it means to integrate new literacies in the classroom curriculum (Karchmer, 2001; Karchmer et al., 2005; Stolle, 2007). Specifically, this study describes the experience of integrating new literacies in math and science from the perspective of the classroom teacher. Gaining an understanding of the meaning teachers make of the integration of new literacies will aid in the development of deeper and more meaningful professional development that can potentially improve classroom practices.

Theoretical Framework

I framed this study with the theory of literacy as a social practice. This lens was of particular importance as I sought to understand and make sense of the teachers' lived experiences of integrating new literacies in math and science content through their words and actions. In the sections that follow I provide an overview of this theory and how it frames my study.

Literacy: it is only one word, but it is laden with meanings and implications. Therefore, as I begin this study, it is essential to articulate my understanding of literacy.

Underpinning this study is the belief that literacy is a social practice. As discussed early, a paradigmatic shift, or "social turn" (Gee, 2000a, p. 180), occurred across disciplines that acknowledged the importance of social and cultural influences as opposed to "individual behavior…and individual minds" (Gee, 2000a, p. 180). It was during this "social turn" that scholars started to question traditional notions of literacy and began to ponder "'What is literacy?' and 'What is it good for?'" (Gee, 1996, p. 39) A group of literacy scholars began a line of research that is now identified as the New Literacy Studies (NLS). In the sections that follow I briefly outline the NLS and literacy as a social practice. Next, I describe Brian Street's two models of literacy that influence his work as a NLS scholar. I then discuss literacy as a social practice and its key tenets, and then I conclude by situating my study within this framework.

To further develop my understanding of literacy I turned to the work of Brian Street, David Barton, Mary Hamilton, and James Gee. Each of these scholars contributed to the NLS and support the notion that literacy is a social practice rather than a set of skills to be acquired in a classroom (Barton & Hamilton, 2000; Gee, 1996; Street, 1995). These scholars purport that literacy has no meaning outside of the social context (Gee, 2000a). Furthermore, Street (1997) argues:

> One of the major tenets of the New Literacies Studies has been that literacy is not a single, essential thing, with predictable consequences for individual and social development. Instead there are multiple literacies that vary with time and place and are embedded in specific cultural practices." (p. 48)

An acknowledgement of multiple literacies further identifies the complexity of the term (Pahl & Rowsell, 2005). Literacy as a social practice refutes a singular dominant literacy

and embraces literacy as a complex set of practices that vary according to cultural norms and social contexts (Street, 1995, 1997, 2003).

In an effort to further explain this theory Brian Street, a pioneer in the NLS, identified two models of literacy: the autonomous model and an ideological model. Traditionally, literacy has been thought of as an isolated set of skills to be mastered; a concept to be learned at school. Street (1995) identified this as "'Literacy' with a big 'L' and a single 'y'" (p. 2). Street (1995, 1997, 2003) argued that literacy separate from context implies an autonomous model of literacy. An autonomous model of literacy assumes that "literacy in itself—autonomously—will have effects on other social and cognitive practices" (Street, 2003, p. 77) regardless of the social context. Street used the example of bringing literacy to marginalized populations and the assumption that a set of skills will vastly improve all aspects of their lives. This model of literacy either ignores or obscures the social, cultural, and political ideologies "that underpin it so that it can then be presented as though they are neutral and universal and that literacy as such will have these benign effects" (Street, 2003, p. 77).

Street's autonomous model of literacy is taken up in many schools and classrooms, especially in an era of accountability. This model assumes that knowledge is stable and constant. It assumes that literacy can be imparted to students and that students will in turn apply it to their lives. An autonomous model of literacy disregards issues of culture, gender, and economics and asserts that if people (i.e., marginalized students) can acquire a set of skills "they will somehow 'get better'" (Street, 1995, p. 14). Street (1997) argues that schools should not be able to take up this model because the school itself is not a neutral context. Rather, the school is a social construct and therefore possesses "its own

social beliefs and behaviours into which its particular literacy practices are inserted" (p. 48). Because of the limitations of the autonomous model and a need to acknowledge the complexities of literacy practices in the everyday lives of human beings, Streets argues for an ideological model of literacy.

An ideological model of literacy acknowledges that literacy is a social practice and is only understood in relation to "cultural and power structures in a given society" (Street, 1995, p. 161). While it is easy to contrast the two models, Street argues that the ideological model incorporates aspects of the autonomous model. Street (1995) noted that the ideological model "does not attempt to deny technical skill or the cognitive aspects of reading and writing" (p. 161). Rather, it places these skills and abilities within a particular context and rejects any notions of neutrality and universality. Because of people's varying beliefs about the constructs of culture, society, and power, it is difficult if not impossible to name literacy as a singular and universal construct (Street, 1995; 1997; 2003). Given this belief, Street (1997) argues that it does not make sense for teachers to provide students with only one dominant form of literacy. Rather, literacy should be labeled as a set of social practices that are a part of a specific cultural and social context.

The NLS are grounded in an ideological model and purport the belief that literacy is a social practice (Barton & Hamilton, 2000; Gee, 1996; Street, 1995). Literacy as a social practice takes into consideration how literacy is used and for what purposes. More specifically, literacy as a social practice includes "ways of talking, interacting, thinking, valuing, and believing" (Gee, 1996, p. 41). In an effort to clarify this theory, Barton and

Hamilton (2000) developed the following six propositions about literacy as a social practice:

1. Literacy is best understood as a set of social practices; these can be inferred from events which are mediated by written texts.
2. There are different literacies associated with different domains of life.
3. Literacy practices are patterned by social institutions and power relationships, and some literacies are more dominant, visible and influential than others.
4. Literacy practices are purposeful and embedded in broader social goals and cultural practices.
5. Literacy is historically situated.
6. Literacy practices change and new ones are frequently acquired through processes of informal learning and sense making (p. 8).

Literacy as a social practice is further understood through the distinction between literacy practices and literacy events. Literacy practices are defined as "what people do with literacy" (Barton & Hamilton, 2000, p. 7) in a social and cultural context. Literacy practices are not always made visible through actions and often include people's understandings and attitudes (Barton & Hamilton, 2000). Furthermore, Street (1997) stated that the term literacy practices "enables us to specify the particularity of cultural practices with which uses of reading and or writing are associated in given contexts" (p. 50).

Because literacy practices are often invisible, NLS began using the term literacy events. Literacy events are observable behaviors and traditionally involve a written text. Barton and Hamilton (2000) further explain events as "observable episodes which arise

from practices and are shaped by them" (p. 8). Observation of a literacy event provides a means to understanding the literacy practices. In an effort to clarify the connections and distinctions between practices and events, Pahl and Rowsell (2005) use the example of banking. They state that a literacy event is the signing of a check, the literacy practice is filling out forms, and the social practice is banking. While these texts are traditionally print based, there is a growing body of research that expands notions of text to include a variety of "semiotic systems" (Barton & Hamilton, 2000, p. 9).

In sum, literacy as a social practice provides scholars with a framework to better understand literacy. This understanding is based on the idea that literacy is not a singular, static set of skills. Rather, given the vastness of cultural and social contexts, these scholars seek to understand how literacy is used and for what purposes. Furthermore, literacy as a social practice is better understood through literacy practices and literacy events. Literacy practices can be defined as "something that people do in everyday life" (Pahl &Rowsell, 2005, p. 11). However, as previously noted these practices are not always observable and include things such as valuing, questioning, and reflecting. Therefore, literacy events are described as the observable behavior that grows out of a literacy practice.

The NLS and specifically literacy as a social practice, frame many of the studies in the area of new literacies (Gee, 2000b; Lewis & Fabbos, 2005; Pahl & Rowsell, 2006; Stolle, 2007). The predominance of this coupling of new literacies and literacy as a social practice could be due to the similar tenets of the two. New literacies is based on the idea of constant change. Scholars argue that as new technologies become available, both foundational literacies and new literacies will be needed in order to make sense of the

technologies and to use them. Similarly, literacy as a social practice acknowledges that literacy is not only plural but also in flux as the needs of individuals or groups within a culture change. Barton and Hamilton (2000) emphasize this point as they state "Literacy practices are as fluid, dynamic and changing as the lives and societies of which they are a part" (p. 13).

While this framework is prevalent in new literacies research, I selected it because it acknowledges "people's awareness of literacy, constructions of literacy and discourses of literacy, how people talk about and make sense of literacy" (Barton, 2000, p. 7). Furthermore, this framework informed my thinking as I sought to make sense of the meaning that the integration of new literacies held for the content area teachers. Drawing on this framework enabled me to focus on the literacy events that occurred in this study.

The theory of literacy as a social practice was also helpful in understanding the complexity of the teachers and their practices in the context of the classroom and school. Furthermore, this framework informed my awareness of the autonomous model of literacy and the potential challenges that can incur as teachers integrate literacies beyond the dominant literacy, especially in an era of accountability. Street (1995) questioned:

> If…there are multiple literacies, how is [it] that one particular variety has come to be taken as the only literacy? Among all of the different literacies practised in the community, the home, and the workplace, how is it that the variety associated with schooling has come to be the defining type, not only to set the standard for other varieties but to marginalize them?" (p. 106)

Literacy as a social practice helped me make sense of how the teachers talked about and

employed new literacies, including technology and disciplinary literacy, in their math and science content.

Summary

The purpose of this phenomenological study was to develop an in-depth understanding of teachers' lived experiences of integrating new literacies in their math and science content. The details of this study are presented in six chapters. Chapter 1 provides an overview of the study including the statement of the problem, significance, and theoretical framework. Chapter 2 presents a summary of relevant research related to new literacies, content area literacy, and teacher knowledge. Chapter 3 outlines the methodology used to conduct the study. Chapter 4 details the lived experiences of the six teachers as they integrated new literacies in their math and science content through reconstructed stories. Chapter 5 examines the essential themes that were identified across all six of the reconstructed stories. Chapter 6 offers a summary of the study, discussion of the findings, and implications for theory and practice.

CHAPTER 2

LITERATURE REVIEW

The field of literacy education has undergone many changes in the past 20 years. As stated in the previous chapter, a shift occurred in the field in the early 1980s, and scholars began to acknowledge the role that social and cultural influences had on a learner as opposed to the previous sole focus on an individual's behavior and cognition (Gaffney & Anderson, 2000; Gee, 2000a). This paradigm shift forced literacy to be viewed as something broader than an isolated set of skills that simply could be passed from the teacher to the learner. As noted in the previous chapter, this shift encouraged a new line of research that has come to be identified as the New Literacy Studies (NLS). In addition to this paradigm shift, there has been an explosion in the advancement of technology. These technological innovations also required a broadened definition literacy, as the skills that are traditionally used for print-based literacy do not always apply when interacting with multiple modes such as image, sound, and gesture (Kress, 2003).

The paradigm shift combined with the technological advances required new questions to be asked and answered. With the understanding that literacy is a social practice and that new technologies impact the ways we read and write, literacy is no longer defined as a stable construct. It appears that the only constant in literacy is change. Leu, Kinzer, et al. (2004) acknowledge this and state:

> The continuously changing technologies of literacy mean that we must help children "learn how to learn" new technologies of literacy. In fact, the ability to

> learn continuously changing technologies for literacy may be a more critical target than learning any particular technology of literacy itself. (pp. 1604-1605)

Literacy scholars responded to these changes through expanded definitions of literacy and also through various labels of literacy. Most commonly these changes are identified with the term "new literacies." As previously mentioned, the purpose of this study is to gain an in-depth understanding of teachers' experiences as they integrate new literacies in their math and science content. Therefore, this study is informed by three bodies of literature which include new literacies, content area literacy, and teacher knowledge. A discussion of each of these areas follows.

Defining New Literacies

New literacies is a broad term with a variety of definitions (Coiro et al., 2008). As a result, there is a need to define what is meant by new literacies. In the section that follows, the works of key new literacies scholars are discussed. While these scholars are discussed separately, there is overlap in their work. The scholars that are discussed are the most recognizable names with the most oft cited research in the area of new literacies. These scholars include the New London Group (1996; 2000), Colin Lankshear and Michele Knobel (2003; 2006; 2007), and Don Leu (2000; 2001; 2002; 2006). They are not listed in any particular order.

The New London Group: Multiliteracies

One of the most influential groups of scholars in the past decade, the New London Group (NLG), sought to make sense of the changes in literacy education because of the changing patterns of literacy and life in new times. In 1994, ten leading scholars from

Australia, Great Britain, and the United States came together to investigate the current state of education as well as to gain a further understanding of the new direction of literacy education (New London Group, 1996). These scholars included Courtney Cazden, Bill Cope, Norman Fairclough, James Gee, Mary Kalantzis, Gunther Kress, Allan Luke, Carmen Luke, Sarah Michaels, and Martin Nakata. This group of diverse scholars became known as The New London Group. The name was chosen because the initial meeting took place in the town of New London, New Hampshire, USA. The driving question of the initial meeting was "What constitutes appropriate literacy teaching in the context of the ever more critical factors of local diversity and global connectedness?" (Cope & Kalantzis, 2000, p. 3)

In an effort to answer this question, the NLG began to formulate an argument for a different type of literacy. To direct their thinking, they created two questions that summarized dominant changes in society which included language and technology. More specifically, the New London Group (2000) sought to answer the following questions:

1) What is appropriate education for women, for indigenous peoples, immigrants who do not speak the national language, and for speakers of non-standard dialects?
2) What is appropriate for all in the context of the ever more critical factors of local diversity and global connectedness? (p. 10)

The term "Multiliteracies" was chosen to communicate the new directions of literacy education. This term expressed a broadened view of literacy that included multilingualism and multiple modes of representation that "differ according to culture and context, and have specific cognitive, cultural, and social effects" (Cope & Kalantzis,

2000, p. 5). The Multiliteracies effort addressed the changes occurring in people's working, public, and personal lives. In an era of differences, the group purported that students deserve and necessitate an education that enables them to problem solve and work collaboratively across multiple contexts with differing discourses (New London Group, 1996).

The goal of the NLG was to begin a conversation about the future of literacy education. They laid a lofty goal at the feet of the educational community as they argued:

> If it were possible to define generally the mission of education, it could be said that its fundamental purpose is to ensure that all students benefit from learning in ways that allow them to participate fully in public, community, and economic life. (New London Group, 2000, p. 9)

While this statement is general, the NLG argued that Multiliteracies offered a means for full participation in private and public life. The work of the NLG addresses *what* students need to learn and *how* students can make meaning through a pedagogy of multiliteracies. The NLG (2000) states that "the role of pedagogy is to develop an epistemology of pluralism that provides access without people having to erase or leave behind different subjectivities (p. 18).

The NLG (2000) argues that students need to be taught about the designs of meaning; this is referred to as "The 'what' of a pedagogy of Multiliteracies" (p. 19). These designs of meaning included a) available designs, b) designing, and c) the redesigned (New London Group, 2000). Simply stated, students need to be aware of the available designs which include semiotic resources (i.e., language, art, gesture) that are used to make meaning. Next, students take part in designing something through the use of the available

designs. Designing is always a transformation of knowledge. And finally, the redesigned is the outcome of the designing process. As students work within these elements of design they come to understand "that meaning-making is an active and dynamic process" (New London Group, 2000, p. 20). Additionally, the authors describe "The 'how' of a pedagogy of Multiliteracies" (New London Group, 2000, p. 30). They state that learning is complex and includes the mind and social and cultural contexts.

The NLG (2000) outline four factors that contribute to this pedagogy which include a) situated practice, b) overt instruction, c) critical framing, and d) transformed practice. Situated practice is immersing the students in experience. During this time, the students share and learn about available designs. Overt instruction is provided by the teacher based on the students needs. It is an opportunity for teachers to scaffold student learning as they interact with available designs and the designing process. Critical framing is employed as students critically examine their learning in relation to knowledge and social practice. The teacher is a key factor in assisting students in this process. The goal of critical framing is to make strange what was once understood. Finally, teachers provide students with the opportunity to take what they have learned, the redesigned, and apply it in a different culture or context. Each of these factors is necessary in order to assist students in becoming social designers (New London Group, 2000).

Because Multiliteracies was a new concept, the NLG was aware of the difficulty and tensions that would surround this type of literacy education. In fact, they warned:

> The dialogue will encounter chasms of difference in values, grossly unjust inequalities, and difficult but necessary border crossings. The differences are not as neutral, colourful, and benign as a simplistic multiculturalism might want us to

> believe. Yet as workers, citizens, and community members, we will all need the skills required to negotiate these differences. (New London Group, 2000, p. 37)

Colin Lankshear and Michelle Knobel: New Literacies

Lankshear and Knobel are considered cutting-edge scholars in the area of new literacies (Alvermann, 2006). In their book, *New Literacies: Everyday Practices & Classroom Learning*, Lankshear & Knobel (2006) traced the expanding definition of literacy over the past several decades. They posit that literacies have become "new" in two ways, including paradigmatically and ontologically.

According to Lankshear and Knobel, new literacies are "new" because of a paradigm shift in literacy education. In an explanation of this new paradigm, Lankshear and Knobel (2006) stated, "this refers to a particular sociocultural approach to understanding and researching literacy…a new alternative to the previously established paradigm that was based on psycholinguistics" (pp. 23-24). Therefore, in accordance with the work of James Gee (1999; 2000a) and Brian Street (Street, 1997, 2003), Lankshear and Knobel argue that new literacies requires "a new approach to thinking about literacy as a social phenomenon" (2006, p. 24).

In addition to being paradigmatically new, Lankshear and Knobel (2006) state that new literacies are ontologically "new," that is, they are different literacies than were available in the past. They describe this further by stating:

> It is the idea that changes have occurred in the character and substance of literacies that are associated with larger changes in technology, institutions, media and the economy, with the rapid movement toward global scale in manufacture, finance, communications, and so on (Lankshear and Knobel, 2006, p. 24).

These ontological changes are broken down into two categories including "technical stuff" and "ethos stuff" (Lankshear & Knobel, 2006, p. 25). The "technical stuff" refers to changes that have and continue to occur in information and communication technologies. These post-typographic forms of text move the user/producer beyond print-based texts and conventional literacies towards multimodal texts which include memes, music, fanfiction, and blogging (Lankshear and Knobel, 2007). They argue that literacy is always changing because of remixing. This is a process of taking apart text(s) and creating something new. The other ontologically new category of new literacies is identified as the "ethos stuff" (Lankshear & Knobel, 2006) New literacies are described as "more 'participatory,' more 'collaborative,' and more 'distributed,' as well as less 'published,' less 'individuated,' and less 'author-centric' than conventional literacies" (p. 25). In an effort to further expand on the concept of ethos, Lankshear and Knobel (2007) identify two mindsets that describe how people are approaching the changing times.

The first mindset views the world "essentially the way it has been throughout the modern-industrial period, only now it has been technologized" (Lankshear & Knobel, 2007, p. 10). The second mindset however, views the world evolving. Lankshear and Knobel (2007) attribute this to "new ways of doing things and new ways of being that are enabled by these technologies" (p. 10). The major difference between the two mindsets is that the second mindset posits that the world is fundamentally different due to people creatively exploring and finding "new ways of doing things and new ways of being that are made possible by new tools and technologies…rather than using new technologies to do familiar things in more 'technologized' ways" (p. 10).

While the emphasis of Lankshear and Knobel's work is focused on technology and

technological advances, in concurrence with New London Group (2000), they acknowledge that technology is not a required component of new literacies. Lankshear and Knobel (2006) state:

> The 'multiliteracies' project reminds us that there are any number of recently-emerged literacy practices associated with contemporary changes in our institutions and economy that do not necessarily involve using new technologies, or at the very least where we can say that using new technologies in these literacies is optional or, at any rate, not an especially important aspect of them (p. 26).

Don Leu: Information and Communication Technology (ICT) and New Literacies

A final leading scholar in the area of literacies is Don Leu. Leu argues that the definition of literacy is changing because of the continuous advances in information and communication technology (ICT). Leu (2000) defines literacy as being deictic, meaning it is constantly changing. He also believes that the focus in classrooms should be on becoming literate rather than being literate.

Due to the constant change in the field of technology, Leu (2002) states that it is difficult to provide a specific definition of new literacies. However, he explains that new literacies include "the skills, strategies, and insights necessary to successfully exploit the rapidly changing information and communication technologies that continuously emerge in our world." (p. 313). In an effort to further define new literacies, Leu (2002) outlines six aspects of new literacies. These include:

- New literacies are ever changing

- New literacies are increasingly dependent on the ability to critically evaluate information
- New literacies include new forms of knowledge necessary to negotiate and understand complex networks such as the internet
- New literacies are highly social
- New literacies provide opportunities to learn specifics about varying cultures
- New literacies build on foundational literacies

Leu (2006) argues that the advances in ICTs are changing reading. However, he believes that the internet is having the greatest influence on reading because of the new knowledge and skills that are required to comprehend online material. Furthermore, Leu (2006) states that there is a lack of research on the use of the internet in the classroom. He argues that the internet must be viewed as a literacy issue rather than as a technology issue. Because Leu (2000) believes that new literacies have the potential to impact classroom instruction, he calls for changes in teacher education and professional development in order to support teacher learning and practice.

The works of the New London Group, Lankshear and Knobel, and Leu have greatly influenced the expanding notions of literacy. While the terms new literacies, Multiliteracies, and ICTs are often use interchangeably, the term new literacies is used throughout this study because it is most associated with the advancement and increased use of technology (see Leu, 2000, 2002), expanded notions of literacy (Lankshear & Knobel, 2003, 2006; New London Group, 1996; 2000), as well as most often used in the research literature. As previously mentioned in Chapter 1, I define new literacies as the social practices that continuously evolve due to technological advances (Lankshear &

Knobel, 2006). These practices allow persons to question, construct, and participate in producing knowledge through multiple modes.

A New Literacies Perspective

In 2008 the *Handbook of Research on New Literacies* was published. This handbook is a compilation of new literacies research conducted by cutting edge scholars. In the opening chapter, the editors, Coiro, Knobel, Lankshear, and Leu (2008), argued for multiple theoretical frameworks and methodologies in an effort to continue the advancement of new literacies. While they were hesitant to define new literacies, they offered four characteristics that contribute to a new literacies perspective. The characteristics include:

- New technologies for information and communication and new visions for their use require us to bring new potentials to literacy tasks that take place within these technologies.
- New literacies are central to full civic, economic, and personal participation in a world community.
- New literacies are deictic; they rapidly change as defining technologies change.
- New literacies are multiple, multimodal, and multifaceted (Coiro et al., 2007, p. 14).

These characteristics, while general, begin to define new literacies. Taken as a whole, these characteristics become a perspective that demystifies the notion of new literacies and provides a starting place for discussions between and among university and classroom-based educators.

Technology Statistics

Technology and the internet are prevalent in most adolescents' lives. In a study of 800 adolescents, ages 12-17, it is reported that 93% of American teens use the internet with 63% of them using it every day (Pew Internet and American Life Project, 2010). Additionally, 73% of adolescents use social networking sites such as Facebook and MySpace. Among families with adolescents, 76% of the homes have broadband internet, 8% of the homes do not have a computer, and 4% of the homes have a computer but no internet access. Finally, adolescents are increasingly using personal technology with 75% of adolescents owning a cell phone and 79% owning an iPod or mp3player (Pew Internet and American Life Project, 2010).

Statistics, such as the ones reported here, depict the increasing influence of technology in adolescents' lives. However, the data was gathered by phone and was a joint interview with a parent and child. Therefore, the statistics may not be an accurate representation of all adolescents; specifically those in low socioeconomic areas.

With the increasing availability of technology, there has been a push to incorporate it into schools. However, the presence of technology does not always mean it is implemented well. One of the most famous studies in the area of technology implementation was conducted by Larry Cuban (2002) in Silicon Valley. During this study, Cuban investigated how teachers were using technology in the classroom and to what extent it changed their practice. Cuban found that only a small percentage of teachers actually used the technology that was available on a regular basis. Furthermore, he reported that when technology was used, it reinforced traditional practices rather than reinventing new ones (Cuban, 2002). Thus, Cuban's book is a cautionary tale. He argues

that technology does not reform education.

Cuban's findings are not surprising given that classrooms are typically steeped in traditional practices. O'Brien and Bauer (2005), define this as the "Institution of Old Learning (IOL)" (p. 120). They further explain this concept as "the historically situated routines, organizational structures, and practices of schools" (p. 120). O'Brien and Bauer (2005) argue that "changing school practices is bridging the new with the old rather than a revolution" (p. 130). One of the areas that bridge the new with the old is an understanding of what it means to read in a time of new literacies. Teachers feel pressured to cover content and prepare for year-end testing (Hagood, Provost, Skinner, & Egelson, 2008). Therefore, teachers may feel that new literacies are secondary to foundational literacies. Rather than viewing these as an either/or dichotomy, scholars argue that both literacies are necessary. In the section that follows, research is shared that demonstrates the skills needed in order to "read" new literacies.

New Literacies and "Reading"

While new literacies are broadening the scope of literacy, it is not the intention that the new literacies will replace foundational literacies such as phonemic awareness, phonics, and fluency (Durrant & Green, 2004; Leu, Kinzer et al., 2004). New literacies are meant to build upon these foundational literacies and extend the learning of the students. But it should be noted that "in an age of information and communication, being able to read, think critically, and communicate with the Internet has become just as important as being able to read a book or write a letter." (Leu, Castek, Henry, Coiro, & McMullan, 2004, p.500).

Addressing the expanded definition of literacy, Kress (2003), a prominent scholar in the area of new literacies, noted that there has been a shift from a dominant influence of the page to the screen. He argued that the dominance of the screen had changed literacy and that "'reading' is now a distinctly different activity to what it was in the era of the traditional page" (Kress, 2003, p. 138). The shift from the page to the screen has greatly impacted what it means to read. Given the expanded definition of text, the traditional linear reading path in Western culture with a direct sequence from top to bottom and left to right is no longer sufficient or effective when "reading" on the Internet because of the dominance of image. Kress (2003) argues that "*the world told* is a different world to *the world shown*" (p. 1). The texts of today's world are reliant upon image and use text as a support. Because images do not need to be read in the traditional reading path of left-to-right and top-to-bottom, other reading paths are made possible. These reading paths are determined "by the criteria of relevance which the reader brings to the page." (Kress, 2003, p. 162) As a result, the number of reading paths is infinite. This provides the reader with greater opportunities to construct his/her own knowledge that is most relevant while using imagination to construct the reading path.

While the expansion of new literacies may have broadened how one reads, it does not take away the sophistication that is required in order to navigate multiple resources. In fact, Wilder and Dressman (2006) argue:

> The use of e-mail, instant messaging, and the Internet still requires a high degree of proficiency in the conventions of print literacy, including the ability to spell and type with accuracy, the ability to identify keywords, the ability to make sense

> of and distinguish between abbreviated descriptions of sites, and the ability to skim, recognize, and extract information from extended passages of text (p. 210).

New literacies emphasizes the necessity for the use of multiple texts in the classroom. These include, but are not limited to, newspapers, magazines, videos, webpages, and art. New literacies encourages teachers to use multiple texts to engage students in learning (McNabb, 2006). The International Reading Association Commission on Adolescent Literacy published a position statement advocating, among other things, student "access to a wide variety of reading material that appeals to their interests" (Moore, Bean, Birdyshaw, & Rycik, 1999; Sturtevant, Boyd, Brozo, Hinchman, Moore, & Alvermann, 2006). Reading multiple texts moves learners from a passive role to an active role as they are required to summarize, critique, and synthesize information from multiple texts (Walker & Bean, 2005). Moreover, "as students encounter an increasing array of digital texts, they need strategies for critically reading and evaluating this barrage of information" (Walker, Bean, & Dillard, 2005, p. 425).

New literacies also necessitates the need for critical literacy (Leu, Kinzer et al., 2004). In defining critical literacy, Harper and Cherland (2007) stated, that it "engages and challenges the relationship between textual practices and sociopolitical conditions—between the word and the world as suggested by Paulo Freire… in efforts to create a more compassionate, equitable, and democratic world" (p. 25). Reading is not about moving one's eyes back and forth across a page. Reading is about making meaning. Moreover, researchers have also added that social context also plays an important role in reading (Street, 2005). A relationship is created between the reader, the text, and the context. Therefore, students must be made aware that each time a text is read there is a

positioning of power. As Luke (1995) stated, students must be aware "of who is trying to do what, to whom, with and through the text" (p. 103). Although this is an important skill when reading any text, it becomes vital when using the Internet.

In an effort to explain the highly complex nature of literacy as well as to situate it within a broader sociocultural context, Luke and Freebody (1999) created the four resources model of reading. This model is comprised of four roles that readers need to understand in order to navigate the texts that surround them (A. Luke & Freebody, 1999). These roles include a) code breaker, b) meaning maker, c) text user, and d) text critic. Luke and Freebody (1999) suggested that the four resources model be thought of as "a family of practices" (p. 4). This model highlights the importance of print-based literacies while encouraging critical literacy skills which are necessary when interacting with texts and specifically multimedia texts.

While it is obvious that new literacies is changing what it means to be literate, there are concerns that as teachers implement new literacies they will simply "tack on" new literacies to their print-based practices (Lankshear & Knobel, 2003, 2006; O'Brien & Bauer, 2005). These are valid concerns, and studies have reported that the use of technology does not always change practice (Cuban, 2002), however, there is minimal evidence that these concerns are founded in new literacies because little is known about the integration of new literacies in the classroom. In fact, in his review of the *Handbook of Research on New Literacies,* Robert Tierney (2009) states:

> Perhaps the area in which I am most reserved or concerned pertains to schooling. I find myself concerned about the questioning or lack of questioning about schooling…I am concerned that schools are not sites from which these or other

developments are being launched, spurred, or expanded. The role of new literacies in relation to schooling and learning deserves a fuller discussion." (p. 338)

Tierney's critique, while directed towards this specific handbook, points to the lack of research that is available in the area of new literacies and classroom practice. Along these same lines, Cervetti, Damico, and Pearson (2006) stated, "To date, there is no clear consensus about the role of multiple literacies and new literacies in K-12 classrooms" (p. 378). While there is not a clear consensus, a small body of research is beginning to emerge that focuses on teachers' use of new literacies in the classroom.

New Literacies in the Classroom

One of the potentials of new literacies is that it enables the teacher to design lessons (New London Group, 2000) that permit the students to explore their worlds and learn "new ways of doing things" (Lankshear & Knobel, 2006, p. 34) that were once not possible. This potential is realized in the work of William Kist. As noted in the previous chapter, Kist (2002; 2005) conducted multiple case studies that investigated what new literacies looked like in the classroom. One case study chronicled the experiences of a team of high school teachers that taught an art seminar. These teachers challenged dominant literacy practices as they developed a student-centered curriculum and provided opportunities for collaboration, inquiry, and multimodal representations (Kist, 2005).

While the teachers in Kist's (2002; 2005) study embraced the opportunity to rethink their curriculum, it is not a given that new literacies equals change. At the onset of a laptop initiative, Garthwait and Weller (2005) conducted a case study in order to investigate the incorporation of technology, specifically laptops, in two science

classrooms. The two science teachers implemented the individual student laptops very differently. The first teacher, Rick, viewed the integration of technology as an opportunity to engage his students and used the laptops to provide opportunities for inquiry-based projects. The second teacher, Susan, was enthusiastic about the integration of the student laptops; however, she viewed them as an add-on to the curriculum. Susan was frustrated by technical difficulties and reported that too much time was devoted to computer skills rather than teaching content.

Because teachers are faced with print-based mandated curricula and assessments, the integration of new literacies can be viewed "as 'one more thing' to cover rather than as the opportunity to rethink their entire curriculum and mode of instruction" (Wilder & Dressman, 2006, p. 209). In a similar study of one to one laptop integration, Leander (2007) found that teachers at a private school for girls were resistant to the technology. The teachers felt that the technology should "support goals already in place from the curriculum" (Leander, 2007, p. 46). Therefore, it is not surprising that the laptops were used to support traditional literacy practices which included:

- Writing process pedagogies
- Student note-taking
- An online newsletter for the school community, produced by the central office
- Distributing assignments and submitting work
- Keeping absent students up-to-date
- Quick search for online information (Leander, 2007, p. 28).

Leander stated that the teachers' perspectives revealed that "technology in particular, is seen as an add-on, a 'tool' to support forms of practice that are well-rehearsed circuits

that travel along deep grooves" (2007, p. 46). While it appears that the teachers at this school did not take advantage of the individual student laptops and wireless connection, the level of support and professional development is unknown.

A reason behind teachers' resistance to new literacies is the possible disruption of the dynamics of the classroom (Leu, 2002). Students may have a greater amount of knowledge about technologies than their teachers and may in fact "threaten teachers' security in 'knowing'" (King & O'Brien, 2004, p. 42). Lewis and Finders (2004) explain that the traditional roles of students and teachers can be understood as the "implied adolescent" and "implied teacher" (p. 102). In a study of preservice teachers, the authors found that the preservice teachers were resistant to new literacies because of their notion of the implied teacher and what that meant for their content and instruction. As a result, Lewis and Finders (2004) note that in order for new literacies to be integrated in meaningful ways, educators need to "examine the 'implied teacher' as the inscription of what a teacher is or should be" (p. 102). Furthermore there is a need to deconstruct the ideologies associated with the term.

Because teacher beliefs impact practice, there is a need for research that focuses on teachers' use of new literacies in the classroom (Leu, 2006) from the teachers' perspective. As mentioned in Chapter 1, Karchmer (2001; 2008) conducted a study of the influence the internet has on literacy and literacy instruction from the perspective of 12 teachers. Karchmer reports that the internet did not change the teachers' definitions of literacy. However, the teachers were concerned about finding appropriate reading materials, teaching students to evaluate Internet material, and ensuring safe internet use among students. Karchmer (2001) notes that "exploratory studies such as this are

essential to begin to define instructional insights about the new literacies of Internet technologies" (p. 445).

While studies have been conducted with teachers and students in classrooms, as of 2007, Stolle argues that "no published studies have investigated the connection between new literacies and specific content areas" (p. 32). Stolle (2007) conducted a study of 16 English, science, and social studies teachers in an effort to understand how the use of ICTs impacted their literacy practices. While all 16 teachers were interviewed, Stolle (2007) selected four teachers as primary participants. She reports that the teachers experienced several tensions between themselves, literacy, and ICTs. These include access to ICTs, lack of teacher knowledge of ICTS, teachers' fears of the unknown, and teachers' questions about the benefits of ICTs (Stolle, 2007). Furthermore, Stolle (2007) found that the teachers rarely used ICTs in innovative ways; rather, they used them to support their traditional literacy practices.

Since 2007, Margaret Hagood and her colleagues have reported their finding from the first year of a two-year project. Hagood et al. (2008) worked with 28 English language arts and social studies teachers at two underperforming middle schools. The authors created a new literacies professional development in an effort to support teachers' implementation of new literacies in their content areas (Hagood et al., 2008). The professional development included two-day institutes that were held twice a year. The focus of the institutes was to provide teachers with theories of new literacies and instruction of new literacies practices, and time for teachers to reflect, plan, and develop new literacies lessons. Additionally, the authors arranged bimonthly study groups at the schools. Hagood et al. (2008) report that the teachers were excited about learning new

strategies but often used new literacies as an introduction to a unit or as a culminating activity. Furthermore, the teachers continued to focus on print-based instruction that centered on the authors' intended meaning in a text (Hagood et al., 2008).

While the studies previously discussed investigated content area teachers' use of new literacies, the focus was on new literacies and literacy; rarely was the content discussed. Therefore, there is a need for research that investigates the intersection of new literacies and content areas. In the next section I provide an overview of content area literacy and content knowledge.

Content Area Literacy

As previously mentioned, there is limited research in the area of new literacies and content area literacy. Furthermore, the research that has been done has focused on how content area teachers take up literacy; content has not been the focus. Given the paucity of research in this area, Leu, Kinzer, et al. (2004) state:

> Scholars exploring important agendas in adolescent literacy and content area literacy may have the most to contribute. Research in these areas can help us to better understand ways to *support information acquisition*, develop the critical evaluation skills essential to effective use of Internet resources, and develop strategies for the effective use of information to solve important problems. (p. 1604, emphasis added)

This quote reflects the dualism between literacy and content. The call for research in new literacies, which is based on a broad and ever changing definition of literacy, is directed towards a cognitive view of content that is acquired by the students. This view of

content is consistent with the cognitive era.

The history of content area literacy dates back to the early 1900s. However, it was not until the 1970s that it gained wide recognition (Moore, Readence, & Rickelman, 1983). During this cognitive era, strategies were designed and tested in an effort to increase student comprehension of content area print-based texts. This type of instruction often perpetuated a transmission model of learning, with the notion that meaning lies in the text and students needed the strategies and skills necessary to unlock the meaning.

When the first *Handbook of Reading Research* was published in 1984 there was not a single chapter devoted to secondary reading, let alone content area literacy (Alverman & Moore, 1991). However, in 1991 when the second volume of the *Handbook of Reading Research* was published, a chapter was devoted to secondary reading. This chapter was focused on reviewing "the experimental and quasi-experimental research on strategies aimed at improving secondary school students' learning from text" (Alverman & Moore, 1991, p. 953). The focus of research at this time was on individual strategies and was steeped in cognitivism. Since that time, 19 years ago, a great many changes have occurred in content area literacy. Most obvious is the name change. Various names have included secondary reading, content area reading, content area literacy, and adolescent literacy. The shift from reading to literacy connoted an expanded notion of reading beyond the printed text and included other forms of communication including writing, speaking, listening, and viewing.

A final important change was highlighted in the third volume of the *Handbook of Reading Research* when Tom Bean described the shift from quantitative research to qualitative research that included the social, economic, and cultural factors that influence

students' literacy (Bean, 2000). Content area literacy could no longer be viewed simply as a set of strategies that assisted students in reading print-based content area texts. In fact, current definitions of content area literacy are very similar to definitions of new literacies. For example, Bean (as cited in Bean, 2001, December/January) expanded the definition of content area literacy to include both cognitive and social factors by arguing:

> Content area literacy is a cognitive and social practice involving the ability to read and write about multiple forms of print. These multiple forms of print include textbooks, novels, magazines, Internet material, and other sociotechnical sign systems conveying information, emotional content and ideas to be considered from a critical stance. (para. 3)

While the aforementioned changes have taken place in the field of literacy education, the concept of content area literacy and the way it is taught to preservice and inservice teachers remains mostly an infusion model. O'Brien, Stewart, and Moje (1995) argued that content area literacy strategies were "constructed by university professionals for pre- and inservice teachers and other school based colleagues" (p. 447). As a result, it is not surprising that content area literacy is still met with resistance by classroom teachers. O'Brien et al. (1995) state that curriculum, pedagogy, and school culture impede the integration of literacy at the secondary level. They argue that curriculum is often viewed as a formal knowledge that can be tested. As a result, the goal of secondary teachers is to cover as much curriculum as possible. The method or pedagogy that is often taken up in secondary content area classrooms is a pedagogy of telling (O'Brien et al., 1995). Teachers often forgo the use of text in favor of lecture. Finally, the school culture may impede the infusion of content area literacy. O'Brien et al. (1995) argue that specific

subject cultures, as defined by the school culture, may view literacy as inconsequential to the subject or as an added burden. The authors contest that "the current model for infusing content literacy into the secondary schools oversimplifies the complexities of secondary-school curriculum, pedagogy, and culture" (O'Brien et al., 1995, p. 454).

The aforementioned article was published almost 15 years ago. However, little progress has been made toward the inclusion of literacy in content areas; content teachers continue to resist literacy. Moje (2008) argues this is due to the teachers feeling "that the strategies are time consuming, especially given the pressure they feel to cover content information and concepts" (p. 98). Another point of resistance is the belief that teaching literacy is not the responsibility of the content teacher. The popular phrase "every teacher a reading teacher," which William S. Gray coined in the 1930s (Moore et al., 1983), has often left teachers feeling that the emphasis on literacy devalues or discredits the importance of the subject matter (Fisher & Ivey, 2005). Because of this resistance, research has been conducted that investigates content teachers' beliefs about literacy.

Hall (2005) conducted a content analysis of published studies that reported preservice and inservice content area teachers' beliefs about literacy. Hall reviewed 19 studies and found a variety of beliefs among the teachers. The author categorized the beliefs into four areas. These included a belief that content area teachers could not or should not teach literacy, it was someone else's responsibility to teach literacy, literacy instruction is important in content area learning, and content area teachers do not possess the necessary literacy knowledge for instruction (Hall, 2005). Hall reports that most of the teachers viewed literacy as an important skill but not fundamental to content learning. Furthermore, the teachers in the studies did not believe that content knowledge was

related to literacy. As a result, Hall (2005) argued that "teacher beliefs, rather than pedagogical knowledge, drives instructional decisions in the classroom" (p. 408).

This finding was evidenced in a study of 90 content area teachers at award-winning middle schools (Mallette, Henk, Waggoner, & DeLaney, 2005). The authors report that the teachers valued literacy across subject areas and considered it a large part of their teaching responsibility. Mallette et al. (2005) solicited teachers' response to the statement about every teacher a reading teacher and reported that 81 out of the 90 teachers responded positively. While the findings of this study are extremely positive, the authors note the limitations of survey data and report that very few of the content area teachers referenced specific literacy strategies that were used.

The two previous studies investigated teachers' beliefs but did not interact directly with the participants. Cantrell, Burns, and Callaway (2009) interviewed 31 secondary content teachers that participated in a yearlong content area literacy professional development. The authors report that the teachers valued literacy and desired to implement it in their classrooms. However, while the professional development raised their efficacy in the area of literacy, the teachers still felt unprepared to meet the literacy needs of all of their students. The teachers believed that literacy equated vocabulary and comprehension. Therefore, the teachers viewed content area literacy as a way to "enhance students' content knowledge, rather than to teach reading as an integral component of content area learning" (Cantrell et al., 2009, pp. 83-84). Additionally, the teachers focused on content area strategies that promoted the comprehension of print-based texts with a specific focus on vocabulary.

The findings of these three studies suggest that content area teachers are not resistant

to literacy but often fail to make explicit or meaningful connections between literacy and their content areas. This can be attributed to a perceived dualism between content and literacy. Draper, Smith, Hall, and Siebert (2005) argue that differing views of literacy and content lead to this dualism as they state:

> Literacy is often viewed as the ability to read and write traditional print materials, which obfuscates the role of content knowledge during the negotiation between the reader and the text in order for comprehension or understanding to occur. In contrast, content knowledge is frequently conceptualized as an interrelated body of facts, concepts, and processes wherein literacy skills and abilities are incidental. (2005, pp. 12-13)

In an effort to combat this dualism, literacy scholars have begun to call for the use of strategies that authentically support the content (Draper et al., 2005; Fisher & Ivey, 2005; Moje, 2008). Furthermore, there is a need to evaluate the effectiveness of the strategies that are presented to content area teachers.

Siebert and Draper (2008) ask the question: "Why have all of the literacy messages that literacy educators have dutifully sent to content-area teachers year after year failed to produce a shared understanding and vision of literacy between the two groups of educators?" (p. 230) The authors conducted a content analysis of methods texts, policy statements, and well known manuscripts and texts in the area of math. Siebert and Draper (2008) purport that the literacy messages from the 13 documents fail to address the needs of math content teachers. The authors argue that the literacy strategies fail to acknowledge the texts of mathematics and typically offer generalized print-based strategies. Furthermore, they state:

> That when content is not given a prominent position or is misrepresented in literacy messages, then the role of the content and discipline in determining what constitutes texts, discourse, and literacy is obscured. (Siebert & Draper, 2008, p. 241)

Siebert and Draper (2008) state that while their findings are specific to math content, the dominance of literacy over content can be identified in all content areas. This study suggests the need to acknowledge that literacy strategies are not "one size fits all," rather they vary according to the different content areas (Conley, 2008).

In response to these calls for change, Moje (2008) is encouraging the field of education to subscribe to disciplinary literacy. This type of literacy is defined as "learning the different knowledge and ways of knowing, doing, believing, and communicating that are privileged to those areas" (p. 99). As a result, literacy is not viewed as a detached set of skills that are imposed on the content rather, it becomes a question of what types of literacies are needed to navigate, negotiate, and create specific content. Shanahan and Shanahan (2008) investigated disciplinary literacies of chemistry, math, and history. They found a vast difference in how content experts approached reading as well as ways that different disciplines "create, communicate, and evaluate knowledge" (p. 54). Shanahan and Shanahan (2008) reiterate the importance of disciplinary literacy and argue for the necessity of making students aware of these literacies.

In an effort to explicate the importance of literacy within disciplines, scholars have begun to explicitly demonstrate the connections between literacy and content (Fang, 2006; Norris & Phillips, 2003). Literacy is often viewed as a tool for understanding or completing a task in a content area. However, Norris and Phillips (2003) argue that

literacy is not a tool for "doing science" (p.226). Rather, it is fundamental to science. They argue that the relationship between literacy and science is "a constitutive one, wherein reading and writing are constitutive parts of science" (p. 226). To further explain this belief, Norris and Phillips (2003) offer an analogy: "Throw away the cover and keep the contents, and you still have a book; throw away the contents and keep the cover, and you no longer have a book" (p. 226). The authors assert that it is only possible to understand science through literacy.

This research highlights the importance of literacy within the content areas. There is a necessity for content teachers to shift away from an autonomous model of literacy that dominates content classrooms towards an ideological model of literacy (Street, 1995). This model of literacy supports disciplinary learning because it requires one to acknowledge the social and cultural context as well as power structures that are present. Furthermore, this model of literacy necessitates critical literacy. Thus, students and teachers are provided with opportunities to question content knowledge and the various literacies that are necessary to consume and produce that knowledge.

Moje (2008) argues that in addition to embracing disciplinary literacy, content teachers need to acknowledge the importance of the technological advances in their field. She asserts the need to assist students in the development of metadiscursive skills. Moje (2008) states:

> Metadiscursive means that people not only engage in many different discourse communities but also know how and why they are engaging, and what those engagements mean for them and others in terms of social positioning and larger power relations. (New London Group, 1996) (p. 103)

Moje (2008) explains that many adolescents already possess metadiscursive practices due to their vast out of school literacies. Therefore, teachers can draw on those practices while supporting the students' domain knowledge. Moje (2008) states that teachers need to develop a metadiscursive pedagogy that facilitates students' entrance into a disciplinary field. She explains that this is achieved as teachers draw on multiple disciplines and contexts beyond the school in the development of curriculum.

Moje (2008) uses the terms discipline, domain knowledge, content, and subject area. These terms are used interchangeably however they are all founded on an understanding of what counts as knowledge. Moje (2008) argues for an epistemology of pluralism (New London Group, 2000). She states:

> Young people need to have access to the ways that conventions of disciplinary knowledge production and communication can be routinely or more explicitly challenged and reshaped; such knowledge gives young people the power to read critically across various texts and various disciplines. (p. 103)

In a theme issue of *Review of Research in Education*, Kelly, Luke, and Green (2008) address the question of what counts as knowledge. They state that knowledge is currently in transition because of new technologies as well as sanctioned school knowledge. Kelly et al. (2008) argue:

> Knowledge in education is constructed, and knowledge of concepts and practices serves as a tool for learning and building capacity for problem solving, identity, and affiliation…learning disciplinary knowledge entails more than acquiring basic skills or bits of received knowledge…knowledge is not held in archives and texts, but is constructed through ways of speaking, writing, and acting. (p. ix)

These definitions of knowledge reject a singular dominant knowledge. Additionally, these scholars state that knowledge is socially constructed and therefore varies according to the needs and purposes of the person. However, this should not be understood as all knowledges are equal. Rather, some "are more aligned with communities of practice that hold more power, whereas other types of knowledge are more aligned with communities of practice that have less power" (Nasir, Hand, & Taylor, 2008 p. 187).

Returning to the quote by Leu, Kinzer, et al. (2004), these authors indicate that content is conceived as a body of knowledge that can be acquired. This narrow definition of content does not align with a new literacies perspective. Furthermore, it is not consistent with disciplinary experts or Moje's (2008) definition of disciplinary literacy. It is necessary for literacy educators to examine their epistemological beliefs about content so that the content areas are not marginalized in the new literacies research.

Teacher Knowledge

In a description of his experimental school Dewey (1900/1902/1990) stated that all decisions regarding subject matter and instruction were made by the teachers. He noted, "The teachers started with question marks, rather than with fixed rules, and if any answers have been reached, it is the teachers in the school who have supplied them" (p. 166).

There is great discrepancy about the required knowledge-base for teaching (Fenstermacher, 1994). Bullough (2008) notes that a commonly held view is "that learning to teach is simply a matter of teaching" (p. 227). While this may be the assumption, a large body of research demonstrates the different types of knowledge that

informs teachers' practice (Fenstermacher, 1994; Munby, Russell, & Martin, 2001; Timperley & Alton-Lee, 2008).

In a review of research on teachers' knowledge, Fenstermacher (1994) identifies two different types of knowledge which include formal teacher knowledge and practical teacher knowledge. Formal teacher knowledge derives from teacher knowledge research. It is identified through scientific methods and centers on teacher effectiveness. Fenstermacher (1994) notes that "researchers in this category do not see themselves as studying teacher knowledge so much as they perceive themselves producing knowledge about teaching" (p. 7). Process-product research methods are used to indentify effective teaching behaviors that impact student learning (Shulman, 1986). These effective behaviors include management techniques, questioning, and teacher feedback (Shulman, 1986).

The second type of knowledge is labeled as practical teacher knowledge. While research on formal teacher knowledge focuses on teacher behaviors, practical teacher knowledge actually focuses on the knowledge that teachers obtain through experience. Fenstermacher (1994) states:

> Teachers are commonly acknowledged as having had experiences but they are credited with little knowledge gained from that experience. The omission is due in part to the fact that we have not had ways of thinking about this practical knowledge and in part because we fail to recognize more practically oriented knowledge. (p. 9, citing Clandinin, 1986, pp. 8-9)

Fenstermacher (1994) discusses two strands of practical teacher knowledge research. The first strand focuses on the work of Elbaz and Clandinin and Connelly. Their work is

based on teachers' first-hand experiences. This type of research does not focus on effectiveness or outcomes, but rather the purpose is to understand the teacher's knowledge of the classroom and all of its components. Interviews are used to understand this type of knowledge. Clandinin and Connelly used narrative inquiry in order to understand teacher thinking and decision making (Fenstermacher, 1994). They state that "narrative inquiry is stories lived and told" (Clandinin & Connelly, 2000, p. 20). The second strand of practical teacher knowledge research focuses on the work of Schon (Fenstermacher, 1994). This line of research centers on "how knowledge arises in the context of action, as well as for the consequences of this knowledge for practice" (Fenstermacher, 1994, p. 13). While these strands of research have differences, both reject traditional scientific research and purport that teachers' experiences are based on practice knowledge. While Fenstermacher's review is nearly 15 years old, Clandinin and Connelly (2003) state that it is still relevant.

As suggested above, teachers' practical knowledge is informed by experience (Clandin & Connelly, 2000; Fenstermacher, 1994). The researchers in this area draw on the work of John Dewey in defining experience. Dewey (1938/1997) argues for "a philosophy of education based upon a philosophy of experience" (p. 29). Dewey states that not all experiences are equal or educative. He notes that some experiences are "mis-educative" (p. 25) and potentially prohibit future experiences.

Dewey does not explicitly articulate a definition of experience, but he does name two criteria: continuity and interaction. Continuity is defined as "the experiential continuum. This principal is involved…in every attempt to discriminate between experiences that are worth while educationally and those that are not" (Dewey, 1938/1997, p. 33).

Furthermore, Dewey states that continuity of experience provides growth which leads to other experiences. The second criterion of experience is interaction. This interaction can be a person or a thing however it always involves a particular context. Dewey (1938/1997) explains:

> An experience is always what it is because of a transaction taking place between an individual and what, at the time, constitutes his environment, whether the latter consists of persons with whom he is talking about some topic or event, the subject talked about being also a part of the situation. (p. 44)

As a result of these two criteria, Dewey (1938/1997) states that the situation where this transaction takes place is crucial. While individuals cannot be controlled, certain environments are more conducive for educative experiences. These environments potentially include teacher education courses, professional developments, as well as informal conversations between and amongst educators.

Teachers' practical knowledge is also informed by their epistemological beliefs. Epistemology is "the study of what can be counted as knowledge, where knowledge is located, and how knowledge increases" (Cunningham & Fitzgerald, 1996, p. 36). Therefore, teachers' epistemological beliefs "about learning and the acquisition of knowledge…drives classroom practice" (Schraw & Olafson, 2008 p. 33). Epistemological beliefs can be identified on a continuum from a realist to a relativist. In other words, a realist, or received knower, believes that knowledge is acquired through an authority such as a text or person. A relativist, or constructed knower, believes that knowledge is constructed by individuals through social and semiotic interaction (Johnston, Woodside-Jiron, & Day, 2001; Schraw & Olafson, 2008).

In an effort to study the relationship between teachers' epistemological beliefs, classroom practice, and student's epistemologies Johnston et al. (2001) selected two fourth grade teachers that were identified as received knowers and two fourth grade teachers that were identified as constructed knowers. The authors reported that the teachers' epistemological beliefs aligned with the practices that they observed. Thus, the teachers that were identified as received knowers transmitted knowledge to students and focused on correct answers. Additionally, students in these classrooms viewed their role as consumers of knowledge. In contrast, the teachers that were identified as constructed knowers provided students with opportunities to think, question, and collaborate. The students in these classrooms viewed their role as producers of knowledge and as valued contributors to the classroom. Johnston et al. (2001) report that teachers' epistemological beliefs greatly influence students' literacy. They note that these findings are not measured on year-end tests however teachers' epistemological beliefs influence students' identity. Furthermore, "children are acquiring not simply facts and strategies, but also routines of behavior and patterns of values, beliefs, roles, identities, and ways of knowing" (Johnston et al., 2001, p. 231).

Similar findings were identified by Lyons. While the study took place a decade prior to Johnston et al., Lyons (1990) also found a connection between teachers' and students' epistemological beliefs. However, Lyons reported that the connection was not top down, the teachers' epistemological beliefs did not directly influence the students' beliefs. Instead, she reported that they were interdependent. Lyons (1990) states that "like a set of dynamic objects that are interacting with one another, although each is distinct in its own right, students and teachers come together in a special relationship in learning, having a

clear epistemological basis" (p. 173). For example, Lyons discusses a high school philosophy teacher's epistemological conflict that occurred when his students responded to ethical issues such as abortion and euthanasia as closed topics. Therefore, the teacher began to ponder how much of his own beliefs he should share in an effort to further develop the students' "emerging epistemologies" (p. 174).

Epistemological beliefs are deemed as sophisticated when learners view knowledge as dynamic and changing. There is a common belief that sophisticated epistemological beliefs improve learning in a topic area. However, Bromme, Kienhues, and Stah (2008) report that recent studies have shown that increased topic knowledge has the potential to lead to less sophisticated epistemological beliefs. For example, a learner with a large amount of knowledge in a topic area such as mathematics may view the domain as constant and would therefore be identified as having less sophisticated epistemological beliefs. Conversely, a learner may have little topic knowledge and therefore identify the domain as unstable. This person would be identified as having sophisticated epistemological beliefs. The authors point out that the learners' level of topic knowledge is a key element.

As evidenced above, experiences and epistemological beliefs inform teachers' practical knowledge. This type of knowledge is often elusive because of the ongoing experiences of teachers. However, Field and Latta (2001) argue "that knowledge should be conceived of in terms of experience and process rather than as a 'thing' that accumulates, or simply as a means to a higher end" (p. 4). It is essential to understand the practical knowledge that teachers' possess because of the influence it has on the daily

decisions that teacher make in relation to students and content. Leu, Kinzer, et al. (2004) argue:

> Teachers' decisions can enhance or impede students' learning opportunities. Students with teachers who make thoughtful decisions about what needs to be learned and how it should be learned in new literacies will be privileged; those with teachers who have not yet figured these things out will be disadvantaged, perhaps even more so than with foundational literacies. (p. 1599)

Summary

The purpose of this chapter was to provide an overview of the three bodies of literature that informed this study including new literacies, content area literacy, and teacher knowledge. As evidenced in Chapters 1 and 2, there is a lack of classroom-based research in the area of new literacies and content areas. Additionally, there is a need for further research that describes teachers' experiences as they negotiate the integration of new literacies in their content areas. Based on the literature reviewed, the negotiation of the integration of new literacies in the content areas is largely informed by teachers' experiences and epistemological beliefs. In the following chapter I describe the methodology that was employed in order to answer the question: "What is the experience of upper elementary and middle school teachers as they integrate new literacies in their math and science content?"

CHAPTER 3

METHODOLOGY

Max van Manen (1990) states that "A research method is only a way of investigating certain kinds of questions. The questions themselves and the way one understands the questions are the important starting points, not the method" (p. 1). The starting point for this study was the question. In forming the research question, I carefully combined three areas of interest including new literacies, content area literacy, and teaching. After thoughtful consideration, it was determined that a hermeneutic phenomenological methodology (van Manen, 1990) would be used in order to answer the following question:

What is the experience of upper elementary and middle school teachers as they integrate new literacies in their math and science content?

The purpose of phenomenology is to gain "a deeper understanding of the nature or meaning of our everyday experiences" (van Manen, 1990, p. 9). It is an opportunity to gain insight into experiences by asking "what is it like?" This question allows researchers to understand the way the world is experienced by persons. Phenomenology is based on the principle of intentionality which indicates that human beings are inseparable from the world (van Manen, 1990). Furthermore, the world can only be understood through consciousness (Merleau-Ponty, 1962/2002; Noddings, 2007; van Manen, 1990). All that a person knows must first be presented to the consciousness; anything that is not part of that consciousness is not part of the lived experience (van Manen, 1990).

Edward Husserl is credited as the founder of phenomenology (Ozmon & Craver, 2003; van Manen, 1990) Further, he identified the notion of the "lifeworld, the everyday

world in which we live in the natural, taken-for-granted attitude" (van Manen, 1990, p. 184). Husserl developed a methodology that allowed the lifeworld to be understood. This methodology is known as transcendental phenomenology. Moustakas (1994) states Husserl's approach is phenomenological "because it utilizes only the data available to the conscious" and "'transcendental' because it adheres to what can be discovered through reflection on subjective acts" (p. 45). Husserl argued that in order to investigate an experience, and understand its meaning, one has to reflect on it (Moustakas, 1994). For Husserl, reflection can only be accomplished through epoche, which means to "bracket the 'natural attitude' or to reflect on one's taken-for-granted, commonsensical view of things" (Pinar et al., 2004, 407). Through the process of epoche, Husserl believed it possible to reflect on the immediate consciousness (Ozmon & Craver, 2003).

In contrast, Maurice Merleau-Ponty (1962/2002) thought it impossible to bracket or remove oneself from the world. Instead, he believed that the world was experienced through perception. Merleau-Ponty (1962/2002) stated that "the world is not an object that I have in my possession the law of its making; it is the natural setting of, and field for, all my thoughts and all my explicit perceptions" (pp. xi-xii). He furthered believed that perception was both immanent and transcendent. He explained this by stating that one can only perceive what one knows, but one can never perceive something in its entirety. He also believed that reflection occurred after perception; it is only in retrospect that one can understand an experience (van Manen, 1990). Furthermore, Merleau-Ponty (1964) argued that knowledge occurs through reflection. However, he disagreed with Husserl because Merleau-Ponty (1964) believes that it is not possible to return to the immediate experience; "it is only a question of whether we are to try to understand it" (p.

30). He stated that "reflection is not at all the noting of a fact. It is, rather, an attempt to understand. It is not the passive attitude of a subject who watches himself live but rather the active effort of a subject who grasps the meaning of his experience" (Merleau-Ponty, 1964, p. 64). Thus, phenomenology aims "at explicating the meaning…and understanding the lived structures of the meaning" (van Manen, 1990, p. 4).

Phenomenology has also been described as the study of essences (Merleau-Ponty, 1962/2002; van Manen, 1990). That is, phenomenology is a systematic attempt to describe the underlying structure of an experience (van Manen, 1990). Van Manen argues that the term essence is not a mystical term. Rather, the essence is constructed through the description of the experience. Merleau-Ponty (1964) offers a further explanation of essence. He states:

> In order to grasp an essence, we consider a concrete experience, and then we make it change in our thought, trying to imagine it as effectively modified in all respects. *That which remains invariable* through these changes is the essence of the phenomenon in question. (p. 70, emphasis in original)

The term essence is not always used in phenomenological studies. Noddings (2007) argues that she does not use the term because she rejects any absolute claims, and she does not believe that any phenomena can ever be fully described. However, in her study of caring, Noddings does identify and describe specific characteristics that are universal. Therefore, it may be the terminology and not the concept that is rejected. Van Manen (1990) argues that identifying the essence is "a creative attempt to somehow capture a certain phenomenon of life in a linguistics description that is both holistic and analytical, evocative and precise, unique and universal, powerful and sensitive" (p. 39).

Phenomenology is defined as "a disciplined, rigorous effort to understand experience profoundly and authentically" (Pinar et al., 2004, p. 405). Furthermore, van Manen (1990) argues that the value of phenomenological research is:

> It encourages a certain attentive awareness to the details and seemingly trivial dimensions of our everyday educational lives. It makes us thoughtfully aware of the consequential in the inconsequential, the significant in the taken-for-granted. (p. 8)

One criticism of educational research is that it often deconstructs the classroom into such small pieces that practical significance is difficult to identify (van Manen, 1990). As a result, through phenomenological research "one seeks to live in and report a deeper layer of experience than is accessible to most in the everyday 'practical' world" (Pinar et al., 2004, p. 407).

Van Manen (1990) seeks to understand human science through a hermeneutic phenomenology methodology. He describes this approach as a study of persons. Van Manen (1990) stated that "phenomenology describes how one orients to lived experience, hermeneutics describes how one interprets the 'texts' of life" (p. 4). He further explains this idea as he argues that phenomenology focuses on the description of the lived experience and hermeneutics focuses on the interpretation. Van Manen (1990) further explains this approach by stating that hermeneutical phenomenology encompasses:

- The study of lived experience
- The explication of phenomena as they present themselves to consciousness
- The study of essences
- The description of the experiential meanings as we live them

- The human scientific study of phenomena
- The attentive practice of thoughtfulness
- A search for what it means to be human
- A poetizing activity (pp. 9-13).

Van Manen (1990) posits that lived experiences can only be understood through a "textual practice: reflective writing" (p. 38). With that said, he also argues that the task of conducting hermeneutic phenomenological research is impossible. The reason being that one must provide an in-depth interpretive description of the lived experience while realizing that the lived experience will continuously be "more complex than any explication of meaning can reveal" (p. 18). It is with this awareness that I constructed my study. I sought to develop an in-depth understanding of the teachers' lived experiences as they integrated new literacies in their classroom. Van Manen (1990) argues:

> The point of phenomenological research is to 'borrow' other people's experiences and their reflections on their experiences in order to better be able to come to an understanding of the deeper meaning or significance of an aspect of human experience, in the context of the whole human experience. (p. 62)

Therefore, I relied on the lived experiences of the teachers. It was through their explication and reflection that I began to understand what the experience of new literacies means, or as van Manen (1990) asks, "What is it like?" (p. 45) Rather than capture a "snapshot" of the use of new literacies in the classroom, I sought to describe the experiences of these teachers in the world "*as we find it* in all its variegated aspects" (van Manen, 1990, p. 18).

The integration of new literacies in the content areas of math and science cannot be

reduced to a manageable "how to" list. Furthermore, this type of list is not helpful in understanding the meaning (van Manen, 1990) or complex nature of integrating new literacies. Rather, the importance of this research is in developing an understanding of the teachers' lived experience so that preservice and inservice education can become more meaningful.

As previously noted, a challenge of hermeneutic phenomenology is that there is not a prescriptive method (van Manen, 1990). However, I relied on the guidelines that van Manen (1990) outlines in his text, which include:

1. Turning to a phenomenon which seriously interests us and commits us to the world;
2. Investigating experience as we live it rather than as we conceptualize it;
3. Reflecting on the essential themes which characterize the phenomenon;
4. Describing the phenomenon through the art of writing and rewriting;
5. Maintaining a strong and oriented pedagogical relation to the phenomenon;
6. Balancing the research context by considering parts and whole (pp. 30-31).

With these six guidelines in mind, I planned and carried out a hermeneutic phenomenological study. This chapter outlines the methodology that was employed to answer the research question. In the sections that follow I describe the research sites, teachers (participants), data sources, data analysis, and conclude with trustworthiness.

Research Context

This study took place in a large urban city in the southwest. This urban city is part of the Horizon School District (pseudonym) which is one of the top five largest school

districts in the United States. Furthermore, it is located in one of the fastest growing counties in the United States. There are a total of 347 schools that service 311,039 students. The Horizon School District reports the following student demographics: 32% transiency rate, 43% free and reduced rate lunch, 20% limited English proficient, and dominant ethnicities include 41% Hispanic and 35% White. Of the 347 schools, only 186 schools made Adequate Yearly Progress (AYP). AYP is defined as the progress that schools make toward goals of the legislation as measured by year-end tests (State of Nevada, 2008). As a result, this school district is on the watch list for AYP. This school district also reports that 99% of the classrooms have internet access and 98% of the classroom computers have internet access.

Research Site Selection

It is essential that persons studied have experienced the phenomenon in question; therefore, the persons must be carefully selected through purposeful sampling (Creswell, 2007). Specifically, I used criterion sampling when selecting the schools and teachers (Creswell, 2007). My criteria included the use of new literacies and upper elementary and middle school science and math teachers. As I constructed this study I sought out schools that were using new literacies (technology) on a daily basis. Additionally, I sought out high-needs schools because I was interested in how teachers were negotiating the challenges of high stakes testing pressures (Leu, O'Bryne, Zawilinski, McVerry, & Everett-Cacopardo, 2009) with the potentials of new literacies. Furthermore, Leu et al. (2009) state, "Thus students in the poorest schools become doubly disadvantaged: They have less access to the internet at home, and schools do not always prepare them for the new literacies of online reading comprehension at school" (p. 267). I defined high-needs

in terms of socioeconomic status, transiency rates, language proficiency, racial diversity, and year-end testing results.

Research Sites

This study took place at three public schools within Horizon School District and included: Fairview Elementary School (all names are pseudonyms), Kelly Middle School, and Washington Middle School. At the time of the study, all three schools were located in the same region. In the section that follows I detail how the school sites were selected.

I was familiar with both of the middle schools because of their participation in Dr. Tom Bean's grant-funded professional development in which I served as the project manager and instructor. The purpose of this grant-funded professional development was to assist middle school content area teachers in the integration of literacy in their content area. One of the stipulations of state grant was that student populations were highly diverse in terms of ethnicity. Therefore, we worked closely with Horizon School District officials in identifying potential sites. The school district requested that in addition to ethnically diverse schools we would also work with struggling schools, or in other words, schools that did not make AYP. Kelly Middle School fit the criteria of the grant and was selected to participate. During this time I had the opportunity to work closely with the principal, Mr. Jones and ten content area teachers. Mr. Jones was extremely pleased with the yearlong professional development and listed it as a highlight in his yearend report card. As a result of this success, when Dr. Bean was awarded a second state funded-grant, we continued our work with Kelly Middle School. While the focus remained on supporting teachers' content area literacy strategies we also introduced the concept of

new literacies. In addition to Kelly Middle School, the Horizon School District suggested Washington Middle School. This school also met the grant's requirements and the district's request because of their highly diverse student population and failure to make AYP.

Given my previous work with Kelly Middle School and Washington Middle School, I knew that they met my criteria including daily use of technology and a high-needs student population. See Table 1 for student information that is organized according to schools. I approached both of the principals for permission to conduct this study at their schools. Both readily agreed. In addition to conducting research at these two middle schools, I also wanted to include an elementary school. During a conversation with the principal at Washington Middle School, Mr. West informed me of an elementary school in the region that was known for its use of technology. He gave me the name of the principal at Fairview Elementary, Dr. Condie. At that time I realized that a former colleague had been a literacy specialist that the school. I contacted her for further information. She confirmed that technology was part of the daily instruction at Fairview Elementary School and that they were a high-needs school. As a result of these two recommendations, I contacted Dr. Condie at the Fairview Elementary and requested permission to conduct my research study at her school. She accepted with the condition that she have access to the Internal Review Board (IRB) protocol.

Table 1

Student Information by School

Student Information	Fairview Elementary	Kelly Middle	Washington Middle
Free or Reduced Rate Lunch	63%	70%	72%
Transiency Rate	30%	40%	34%
Limited English Proficiency	38%	26%	32%
Ethnicity			
African American	7%	11%	22%
Caucasian	30%	15%	12%
Hispanic	57%	70%	57%
Other	6%	4%	8%
Students Testing Below Standard			
Math	42%	52%	46%
Science	49%	53%	66%

Teacher Selection Criteria

While each content area is valuable to a student's learning, mathematics and science have moved to the forefront of education because of the No Child Left Behind (NCLB) Act and high-stakes assessment in these two content areas. While students' mathematical content knowledge has been assessed since the implementation of NCLB, assessment of science content knowledge was recently implemented in 2007 (U.S. Department of Education, 2004). In addition, these two subject areas are known for their highly technical vocabulary and often abstract concepts. Furthermore, both of these content areas lend themselves to a new literacies perspective because of the semiotic nature of the

content including the use of images, numbers, and manipulatives.

While students are assessed in mathematics and science beginning as early as kindergarten, content area literacy is not a topic that is typically addressed in the elementary school. In fact, there is only one textbook available to preservice and inservice teachers that specifically attends to content area literacy in the elementary grades (see Alverman, Swafford, and Montero, 2004). However, there is a growing awareness that content demands increase at grade four (Allington & Johnston, 2002; Jacobs, 2008). In fact, it is at this grade level that the transition from "learning to read" to "reading to learn" takes place. While this shift in content presents a perceived challenge to the students, national assessments report that fourth-grade students' literacy abilities are on the rise (Shanahan & Shanahan, 2008). However, any gains the students have made have all but disappeared by the time they reach eighth grade. Because of this trend, it can no longer be assumed that the reading skills learned in kindergarten through fourth grade are enough to enable the students to grapple with the complex texts and content they interact with at later grades.

Grades four through eight are considered transitional years as students shift from children to adolescents. As a result, this grade band is a key area for research in an effort to understand how new literacies are used to assist students in negotiating math and science content.

Teacher Selection

At the same time that I received permission from each of the three schools, I asked the principals to nominate two teachers, one math and one science, to participate in the study. I informed the principals about the purpose of the study and requested that they nominate

teachers who they perceived integrated technology in innovative ways in math or science content.

While I was open to any teachers that were suggested, I did ask Mr. Jones at Kelly Middle School about the possibility of having Kevin as a participant because I had worked with him for over two years in the previously mentioned professional development. Mr. Jones agreed that Kevin was an outstanding teacher and also gave me the name of Eden, a seventh grade math teacher.

A similar conversation took place at Washington Middle School. When I asked Mr. West to nominate two teachers, I specifically asked him about Naveed. Naveed was a new participant in year two of the grant funded-professional development. I had engaged in several conversations with Naveed during the first two months of the professional development and was aware of his innovative thinking and teaching in regards to science and technology. Mr. West agreed that Naveed would be an excellent teacher to study and also gave me the name of Sophia. Sophia was also a participant in year two of the grant-funded professional development. However, I had not had the opportunity to speak directly with Sophia about her instruction at that time.

Finally, when I spoke with Dr. Condie at Fairview Elementary School she offered two names, Evan and Angela. Dr. Condie stated that she would contact them first and would send me their email addresses if they agreed to participate. Additionally, Dr. Condie informed me that I would only be able to observe math at her school. She said that since science was not part of the mandated curriculum I would not be able to observe a teacher in the area of science on a consistent basis. She informed me that Evan occasionally integrated science in his math lessons but it was not a requirement. As I

result, I did not observe an elementary science teacher. At the conclusion of all of these conversations, the initial teachers that were identified by the principals all agreed to participate in the study.

Teachers

The six teachers who participated in this study taught math or science in grades four through eight. See Table 2 for an overview of the teachers' characteristics. All of these teachers were identified by their principals as being innovative teachers in regards to technology and instruction. During my initial meeting with each of the teachers I emphasized that I was not evaluating their instruction. I attempted to put the teachers at ease as I explained the purpose of the study. In the sections below I briefly describe each of the six teachers. A detailed description of each teacher will follow in Chapter 4.

Table 2

Teacher Characteristics

Teacher	Age	Gender	Ethnicity	Content	Grade	Experience	School
Angela	28	Female	Mexican American	Math	4	3	Fairview Elementary
Evan	32	Male	Caucasian	Math	5	7	Fairview Elementary
Eden	34	Female	Caucasian	Math	7	6	Kelly Middle
Kevin	31	Male	Caucasian	Science	8	7	Kelly Middle
Naveed	24	Male	East Indian Korean	Science	7	2	Washington Middle
Sophia	50	Female	Russian Jew	Math	6	20	Washington Middle

Angela. Angela is a fourth-grade elementary teacher. She is responsible for teaching all subject areas; however, most of her day revolves around reading. At the time of this study Angela had taught second grade for two years and was currently in her first year of teaching fourth grade. In Angela's class, math is taught during the last hour of the school day. I first became acquainted with Angela when she was nominated by Dr. Condie to participate in this study. Angela is pursuing her master's degree in educational technology. She is playful with the students and has a great rapport with them. Angela attended an intense technology professional development and earned a classroom laptop cart. She uses her interactive whiteboard, and the students use the laptops on a daily

basis. In spite of this level of use, Angela acknowledges that technology and math content make her nervous.

Evan. Evan is a fifth-grade elementary teacher. The fifth grade at this school is departmentalized, and Evan is the math teacher. This was his second year teaching only math, prior to that he had taught all fifth grade subject areas for five years. I first became acquainted with Evan when Dr. Condie nominated him to participate in this study. Evan has a passion for math and was relieved that he did not have to teach any other subject areas. He often jokes with the students and appears to be easy going. Evan was one of the first teachers to receive an interactive whiteboard at his school. He enjoys using the interactive whiteboard and student response clickers on a daily basis. Around the school Evan is known for his knowledge about technology. Teachers often come to him for help and support.

Eden. Eden is a seventh-grade math teacher. She taught elementary school for three years before coming to Kelly Middle School. At the time of the study, she was in her third year of teaching seventh grade math. I first became acquainted with Eden when she was nominated by Mr. Jones to participate in this study. Eden holds a Master's degree that was obtained through an online university. When I walked into Eden's room for our initial interview I was struck by the organization of her room. Desks were grouped together, colorful posters lined the walls, and everything seemed to be in place. Eden is full of energy. She greeted me with the same enthusiasm that she greets her students with each day. Eden feels fortunate to have access to a variety of technology but fears that she does not use it enough. However, she uses the interactive whiteboard on a daily basis.

Kevin. Kevin is an eighth-grade science teacher. He also taught elementary school for

three years before transferring to Kelly Middle School. At the time of the study he was in his fourth year of teaching science. Kevin holds a Master's degree in educational leadership and is currently pursuing a Ph.D. in instructional technology and distance education through an online university. As previously mentioned, I first became acquainted with Kevin in 2006 when he participated in a grant-funded professional development. At the conclusion of this professional development I remained in contact with Kevin as he was part of a core group of teachers that presented a cross curricular unit at a national conference. Kevin also participated in year two of the grant-funded professional development. However, due to scheduling conflicts he had to withdraw after three months. Kevin defined his personality as sarcastic and he likes to tease his students. He also has high expectations for them and incorporates technology, both electronic and not, on a daily basis.

Naveed. Naveed is a seventh-grade science teacher. At the time of the study he was in his second year of teaching. I first came to know Naveed through the grant-funded professional development. However, due to other commitments he only participated for the first three months. Naveed is part of the Teach for America Program. He grew up in an impoverished home and his parents worked multiple jobs to support their family. Naveed excelled in school and was accepted at a prestigious medical school in the Midwest. However, when a friend introduced Naveed to the Teach for America Program, he asked for permission to defer his enrollment in medical school for two years. Naveed believed that his personal experiences allowed him to connect with his high-needs students and inspire them to continue their education. Naveed possessed a tremendous amount of knowledge in science content; however, he often struggled with classroom

management. Naveed did not view a separation of science and technology. He integrated technology in everything that he did; it was a dominant part of his classroom. During the initial interview, Naveed informed me that due to testing preparation he would no longer provide science instruction after the winter break. Instead, Naveed prepared students for the year-end tests by reviewing math and reading strategies. Naveed invited me to observe anytime in his classroom and also said he would be available for future interviews. I was able to observe Naveed one time in the classroom. Although I sent emails for several weeks, he did not respond. Therefore, I was only able to collect one interview and one observation.

Sophia. Sophia is a sixth-grade math teacher. She taught second through eighth grades and adult education for 14 years before transferring to Washington Middle School. At the time of the study she was in her sixth year of teaching sixth-grade math. I first came to know Sophia through the grant-funded professional development. However, due to scheduling conflicts she only participated for the first three months. Sophia holds a master's degree in administration. The first thing I noticed about her was her large personality; Sophia is funny. She likes to laugh and joke with the students. She whistles, hums, or sings throughout the day. She has a love/hate relationship with technology. She uses her interactive whiteboard on a daily basis, and the students use the wireless laptops on a weekly basis.

These six teachers graciously accepted to be a part of this study. They welcomed me into their classrooms and shared their thoughts and feelings with me. I explained the criteria to the principals and then relied on their recommendations for teacher selection,

with the exception of Kevin and Naveed who I personally sought out. All of the teachers used technology in their instruction on a daily basis.

Researcher's Position

As previously mentioned, it is common practice in phenomenological research for the researcher to "bracket the 'natural attitude' or to reflect on one's taken-for-granted, commonsensical view of things" (Pinar et al., 2004, 407). However, I agree with Merleau-Ponty (1962/2002) that it is impossible to completely remove oneself from the world. Therefore, I follow the direction of van Manen (1990) and explicate my "understandings, beliefs, biases, assumptions, presuppositions, and theories" (p. 47). I attempted to make these known through the statement of my theoretical framework and literature review. Additionally, I will discuss my background and how I came to know about new literacies.

For the past fifteen years I have identified myself as a teacher. During these years I have worked as a classroom teacher, mentor, and teacher educator. I began my career as a first-grade teacher. I spent seven years in the classroom and was responsible for teaching all subject areas. As I stated in the opening of this dissertation, technology was something that I used to benefit myself as a teacher; it was an organizational tool. I had not heard of the terms new literacies or multiliteracies until my first year as a graduate student at a large university in the southwest. Dr. Bean handed me a book review that he had written about William Kist's work. From that moment I became enthralled with the concept of new literacies in the classroom. To date, I have read about new literacies, researched new literacies in an online environment, and spoken to teachers about new literacies in the

classroom. However, prior to this study I had not observed the use of new literacies in a traditional classroom. While my reading and research increased my understanding of the topic of new literacies, I did not feel that I had an understanding of what these teachers were experiencing as they integrated new literacies in their math and science content areas. Therefore, I believe that I entered these classrooms as a learner and as a researcher.

Throughout the study the teachers increasingly let me in to their professional and personal lives. For example, Evan invited me to be his Facebook friend, Eden invited me to a jewelry party at her home, and Kevin sent texts to check on my dissertation writing and to compare our doctoral programs. While I was always there as a researcher, I found that the teachers' needs changed their perceptions of my role. During this study I was an interviewer, outsider, colleague, confidante, and friend. Throughout the interviews and through informal conversations the teachers commented that the questions I asked were topics that they had not thought about deeply. For example, I asked Angela to share her thoughts on literacy and she commented, "Now I'm going to have to go like figure it out." This study provided the teachers with a time and space to share their thoughts and feelings about the integration of new literacies in math and science.

During informal conversations, the teachers often asked me to compare their classrooms to the other classrooms where I was observing. I did not respond directly to these questions because I felt it moved me into the role of evaluator. My failure to offer comparisons between teachers often frustrated them. Additionally, the teachers continued to ask my opinion about their teaching practices. When these specific questions were posed, again I reminded the teachers that I was not there to evaluate them, only to better understand their experiences.

Data Sources

Data collected in order to describe the lived experience of teachers as they integrate new literacies in their classroom consisted of two in-depth interviews (initial and final), three semi-structured interviews, bi-weekly classroom observations, and individual teacher reflection journals. Data collection began in December of 2008 and continued through April 2009. See Table 3 for the total number and timeline of observations and interviews during the course of the study. During the four months of observations, I observed several curricular units, preparation for the year-end criterion referenced tests (CRTs), and administration of the CRTs.

Table 3

Interview and Observation Totals and Timeframe

	Angela	Evan	Eden	Kevin	Naveed	Sophia
Interview						
1	December	December	December	December	December	January
2	January	January	February	January		March
3	February	February	February	February		March
4	March	March	April	April		April
5	April	April	April	April		May
Number of Observations January-May 2009	13	16	19	17	1	12

Interviews

The primary source of data were interviews. Interviews were conducted in order to gather the teachers' experiences. Van Manen (1990) states "*We gather other people's experiences because they allow us to become more experienced ourselves*" (p. 62, emphasis in original). Interviews allowed me to gain insight into the teachers' experiences and also build relationships with the teachers. The interviews provided a dual opportunity to gather and reflect on lived experience material (van Manen, 1990). The process of gathering and reflecting occurred throughout the interviews. The first interview was used solely to gather material. However, during the remaining four interviews, gathering of and reflecting on lived experience material occurred during each interview as the teachers shared new experiences and reflected on prior discussions. The ultimate goal of the interviews was to answer questions such as "what is the experience like?" and "what does the experience mean?" (van Manen, 1990)

I conducted in-depth phenomenological interviews (Seidman, 2006; van Manen, 1990) with each of the six teachers. I originally planned to follow Seidman's (2006) three-interview protocol. This protocol includes an opportunity to situate the participant in a context through a focused history, next, to gather detailed information about the participant's experience, and last, to provide the participant with an opportunity to reflect on the meaning of the experience. Given that the teachers were experiencing the integration of new literacies on a daily basis, I did not believe that one interview was sufficient for teachers to share their experiences or for me to understand them. Therefore, instead of one interview that focused on the detail of the experience I conducted three interviews. Seidman (2006) states that alternative structures and procedures are often

necessary, but argues for the necessity of allowing "participants to reconstruct and reflect upon their experience within the context of their lives" (p. 21). Although I did not follow the protocol exactly, I do believe I maintained the structure and achieved the goals as outlined by Seidman (2006).

I arranged the initial interview through email. I was specific about the week that I wanted to conduct the initial interview but provided the teachers with the opportunity to select the day and time that was most convenient for them. Additionally, I offered to meet each teacher at a location of their choice. All of the teachers requested that I come to their classroom with the exception of Sophia. Sophia requested that we conduct our interviews at a Starbucks that was near the university. All of the interviews were conducted at the same locations as the initial interview. The interviews were conducted at various times throughout the day. Typically they were conducted after school; however, occasionally the teachers requested that I come before school or during their preparation time. I made every effort to accommodate the teachers' schedules.

I recorded each of the interviews for later transcription. Initially, I used my iPod to record the interviews and then I downloaded them to my iTunes account for storage. However, when my iPod unexpectedly quit in the middle of an interview therefore I began to record them on a handheld tape recorder as well. The interviews were transcribed using the f4 software. As I transcribed the interviews I did not include repetitions, pauses, and other oral speech characteristics that detracted from the teachers intended meaning (Seidman, 2006).

During the first interview I sought to establish a relationship with the teacher and to gather a focused history. During this interview I introduced myself and provided a brief

history of my experience as a teacher and then explained the purpose of the study. I felt it important for the teachers to know that I had been a classroom teacher, and therefore, I was aware of the nuances of teaching. During the initial interviews I answered any questions that the teachers had and attempted to ease any reservations they expressed about my upcoming classroom observations. I started my questions by asking the teachers to provide me with background information about their education (i.e., universities attended, degrees, years of experience). I then began "asking him or her to tell as much as possible about him or herself in light of the topic" (Seidman, 2006, p. 17). This was an opportunity for the teachers to share knowledge, skills, and dispositions in relation to the integration of new literacies in their content area. I had a list of specific questions; however, I only referred to them if an aspect related to the experience was not discussed. For example, if a teacher did not mention literacy as part of their experiences I asked questions in that area.

The second interview in Seidman's (2006) three-interview protocol focuses on particular details of the experience. This is an opportunity for the teachers to reconstruct a specific experience or to share the details of the experience in general. At this point I altered the three-interview protocol. As previously mentioned, I felt it necessary to conduct more than one interview to gather details of the experience, instead I conducted three interviews. During these three interviews I asked the teachers to reconstruct a particular lesson or incident that they felt captured their experience. Most of the teachers could not identify a particular moment. Therefore, they often shared details of the overall experience or of several incidents. During these interviews I also asked the teachers to reflect on moments that I observed in the classroom or to share any reflections they had

made in their journals.

Finally, in the third interview Seidman (2006) recommends asking the participant to reflect on the "meaning of their experiences" (p. 18). This final interview provided the teachers with the opportunity to reflect on the experience of integrating new literacies in their content area. During this interview I encouraged the teachers to reflect on the experience and our discussions. I wanted to make sure that the teachers felt they had been given the opportunity to share details about the experience that they felt were important. During this time, the teachers reflected on specific moments or reconstructed incidents that we had not previously discussed.

After the initial interview with all of the teachers it was obvious that the principal influenced the teachers' experiences. Therefore, I arranged an interview with each principal. The purpose of this interview was to gain an understanding of the principals' vision for technology use in the school and to better understand the expectations the principals' had for the teachers. This interview aided my understanding of the context of the school.

Observations

The second type of data collected were classroom observations. Van Manen (1990) argues that "the best way to enter a person's lifeworld is to participate in it" (p. 69). He equates close observation with journalism and states that the observer should always be looking for a story, for a moment to remember (van Manen, 1990). Originally I anticipated spending one hour a week in the classroom during a math or science lesson. However, after the initial interviews the teachers expressed an eagerness for me to visit their classrooms more often. Therefore, I adjusted my schedule and when possible I

observed bi-weekly. Spending an extended amount of time in the classrooms provided me with a better understanding of the teachers' professional lives. My intention was to observe classroom instruction only; however, I was invited to a technology committee meeting and two interactive whiteboard trainings at Fairview Elementary School. Angela and Evan attended both of the trainings but were unable to attend the committee meeting.

When I began the classroom observations I asked the teachers to identify days and times that were most convenient for them. Initially the teachers requested specific times; I later discovered that the students in these classes were either accelerated or considered well behaved by the teachers. As the study progressed the teachers increasingly invited me to observe in any class period. Therefore, I observed at different times of the day in the classrooms of five of the teachers. Angela, a fourth-grade teacher, was the only one who had a set math time.

In an effort to be unobtrusive, I did not take my laptop into the classroom. I recorded the observations by hand and then transcribed the field notes at a later time. Recording observations by hand allowed me to draw images of the classroom and capture teachers' instruction. Additionally I sat in the back corner or off to the side of the classroom. During classroom observations the teachers often talked to me; usually this was when the lessons did not go as planned. However Sophia, a sixth-grade math teacher, was the only teacher to formally introduce me to her students. Kevin, an eighth-grade science teacher, continuously invited me to participate in all of the activities. The teachers welcomed me into their classrooms. The students at the middle schools rarely acknowledged my presence. However, I had a different experience at the elementary school. During these observations I occasionally assisted students at the computer lab, helped individual

students with math problems, and once watched over the class when the teacher stepped out. My involvement with the students did not occur during instructional time; I only interacted with the students during individual work time. Furthermore, I did not seek out opportunities to assist the teacher or students during observations. However, when I was asked I did not decline my assistance. Both of the elementary teachers expressed their appreciation for my support during these times.

Teacher Reflection Journals

The final type of data collected were teacher reflection journals (van Manen, 1990). The journals were not mandatory; however, I encouraged the teachers to reflect weekly. At the end of each week I sent an individual email to each teacher as a "friendly reminder" to reflect and also to clarify observations and/or interviews for the upcoming week. The purpose of the reflection journal was to capture experiences as they occurred. I was concerned that the teachers may censor themselves at the beginning of the study. Therefore, I felt that these journals provided the participants with an immediate outlet as they faced successes and obstacles throughout a lesson, the day, or the week. I provided the teachers with the option of using email, paper, or a hand-held recording device. Kevin sent a weekly reflection through email, Eden requested a hand-held recording device and reflected several times throughout the study, Evan captured his weekly reflections on a word processor and gave them to at the conclusion of the study, Sophia hand-wrote her reflections and also gave them to me at the conclusion of the study, and Angela apologized at every classroom observation and interview for not reflecting. She did send one email. However, she repeatedly assured me that she was continually reflecting on the questions I asked.

Data Analysis

As previously mentioned, the primary source of data were the five interviews. I transcribed the interviews at the conclusion of each set. For example, after I conducted the initial interview with all six teachers I transcribed them. During the second set of teacher interviews I began using the f4 software to transcribe the interview data. The secondary sources of data included the teacher reflection journals and classroom observations. These data were also transcribed for analysis. I used these data to support or refute the initial categories and themes that I identified in the interview data. All transcribed data were grouped by teacher and organized according to interviews, observations, and reflection journals. As a part of data management (Creswell, 2007), all data were stored in binders according to teacher and also stored in files on my personal computer.

Van Manen (1990) states that "human science research is concerned with meaning—to be human is to be concerned with meaning, to desire meaning" (p. 79). While formal analysis did not begin until the conclusion of the study, I continuously reviewed transcribed observations and interviews. This type of informal analysis served as a guide for future observations and interviews (Bogdan & Biklen, 2003). Once all data were collected and transcribed I began the journey towards understanding the structures of the teachers' lived experiences. Van Manen (1990) notes:

> Making something of a text or of a lived experience by interpreting its meaning is more accurately a process of insightful invention, discovery or disclosure—grasping and formulating a thematic understanding is not a rule-bound process but a free act of 'seeing' meaning. (p. 79)

Thematic analysis is based on the identification of themes. As I searched the transcribed data I relied on the four statements that van Manen uses to define themes. These include: a) theme is the experience of focus, of meaning, of point, b) theme formulation is at best a simplification, c) themes are not objects one encounters at certain points or moments in a text, and d) theme is a form of capturing the phenomenon one tries to understand (van Manen, 1990, p. 87). While it is impossible to create an exhaustive list of themes "they allow a systematic investigation" (van Manen, 1990, p. 168). The purpose of phenomenological research is to find the essence, or meaning structures, of the phenomenon. Therefore, throughout my data analysis I sought to find the internal meaning structures of teachers' experiences of integrating new literacies in math and science content through the identification of themes.

The themes were constructed through careful repeated readings of the transcribed data. Using the selective approach (van Manen, 1990), I searched for sentences or phrases that stood out. During each reading as I selected a sentence or phrase I asked myself "What is its meaning, its point?" (van Manen, 1990, p. 87). My initial thematic analysis resulted in numerous pages of sentences and phrases. Therefore, I returned to the original transcriptions and used the search feature to locate pertinent words such as technology, tools, and Promethean Board/SMART Board. While this approach is not consistent with thematic analysis, it focused my thinking. As keywords were identified, I read the teacher's entire response and then selected important sentences or phrases. I highlighted these statements and compiled them in a separate document for further analysis. Once I identified all of the important statements through the search feature, I reread the transcripts again to make certain that I had not overlooked an important or revealing

statement. I completed this process for each teacher.

Through the next phase of analysis I sought to make sense of the selected statements. I used the cutting and sorting technique (Bernard & Ryan, 2010). Once all of the selected statements were grouped in a document I printed them out and reread them several times. As I read each statement I referred back to van Manen (1990) and asked myself "What is its meaning, its point?" (p. 87) I then labeled each statement with a term (Seidman, 2006) that I believed summarized the statement. For example, Evan stated "I see us really trying to integrate, but at the same time I see that it's really difficult at the same time with the stuff that the district throws down to us and, you know." I labeled this statement as "roadblock." Once I had labeled each statement I cut them apart and sorted them according to similar labels (Bernard & Ryan, 2010). From these piles I began to identify categories for the statements. I completed this process for each teacher.

The next step in the analysis involved identifying similarities across the teachers' statements. Again I used the sorting method to group the categories of the teachers' responses. The categories were in constant flux throughout this process. However, as I repeatedly read across the statements and categories I began to group them into subthemes. Initially, the subthemes were identified as content, pedagogy, engagement, technology, literacy, and roadblocks.

At this phase of the analysis I believed I was familiar enough with the data to start writing. Van Manen (1990) states that "writing fixes thought on paper…as we stare at the paper, and stare at what we have written, our objective thinking now stares back at us" (p. 125). While I believed that I had a grasp on the data and emerging themes, the process of writing refuted that belief, but also provided clarity. It was through the writing process

that I began to make sense of the teachers' lived experiences (van Manen, 1990).

I used an analytic approach (Seidman, 2006; van Manen, 1990) as one type of data analysis. This approach also assisted me in the reduction of interview data. Seidman (2006) argues that the purpose of interviews is to "come to know the participants through their stories" (p. 119). Therefore, the reconstructed stories were created from the thoughts, words, and actions of the teachers. The purpose of these stories was to share the teachers' experiences in context so that readers are able to gain greater insight into the teacher as a person. Additionally, Seidman (2006) argues that "one key to the power of the profile is that it is presented in the words of the participants" (p. 121). Therefore, I relied solely on the teachers' words.

In creating the reconstructed stories for the teachers, I again returned to the transcribed data and the important statements that I had identified. With the stories in mind and the need to create a structure for them, I reread the statements and the emerging subthemes. I expanded on and organized the subthemes around the themes of teacher, content, student, and context. With these themes in mind I began to construct the stories (Seidman, 2006).

The reconstructed stories do not follow the chronological order of the interviews. Instead I reconstructed the statements according to the themes (van Manen, 1990) and created a structure that reflected their experience. Each reconstructed story includes the teachers' definitions of literacy and technology and then describes in depth their experiences with integrating technology in their math and science content and the impact this integration had on them in regards to their understanding of teaching, content, students, and context. The stories conclude with the teachers' beliefs about education and

the role that technology and the integration of new literacies plays in education on a personal and professional level.

Once all of the reconstructed stories were created, I conducted a thematic analysis across the stories. Again I used the selective approach (van Manen, 1990) to highlight important sentences or phrases that related to the themes of teacher, content, student, and context. I then organized the important statements in a chart and labeled each statement (Bernard & Ryan, 2010; Seidman, 2006). Though this process I identified the subthemes of the lived experiences of integrating new literacies for all six of the teachers. In an effort to ensure that I remained focused on my question and the meaning structure of the lived experience, I organized these subthemes around the following questions:

- What does new literacies mean?
- What does the integration of new literacies mean for me as a teacher?
- What does the integration of new literacies mean for my content?
- What does the integration of new literacies mean for my thinking about my students?
- What does the integration of new literacies mean for my context?

By structuring the data around these questions I focused on the teachers' experience. These questions assisted in the development of the essential themes as I sought to answer the questions. Figure1 provides an overview of the questions and subthemes. The essential themes are discussed in detail in Chapters 5 and 6.

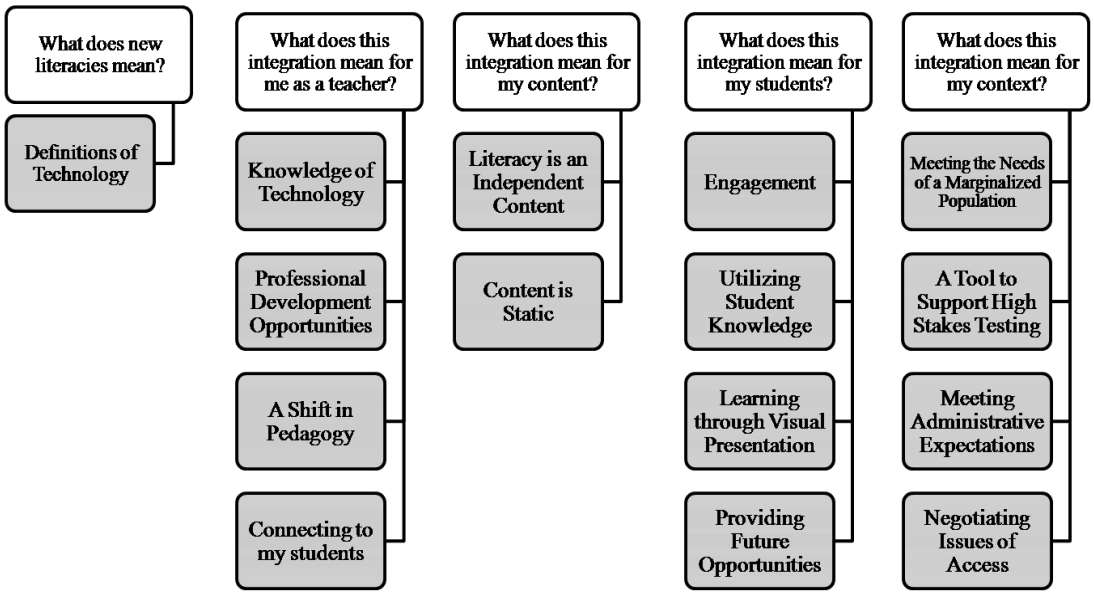

Figure 1. Overview of thematic questions and subthemes.

Trustworthiness

Merriam (1998) argued that "every researcher wants to contribute results that are believable and trustworthy" (p. 218). Therefore, I sought to conduct a valid study. Internal validity is addressed as researchers provide evidence of findings that are consistent with reality. For this study, internal validity was enhanced through triangulation of data, member checks, and a statement of the researcher's biases. Data were triangulated through the collection of multiple sources of data. Based on the interviews, observations, and reflection journals I provided thick descriptions of the experiences of upper elementary and middle school teachers as they integrated new literacies in their math and science content. These different data sources provided a more

holistic view of what occurs in the classroom than if only one data source was collected. Specifically, "observations are… conducted to triangulate emerging findings; that is they are used in conjunction with interviewing…to substantiate the findings" (Merriam, 1998, p. 96). Because I was not seeking to question the disconnect between the teachers' beliefs and practices, the observations provided me with a context for the teachers lived experiences. The observations also informed my understanding of the experience and provided me with specific questions for the interviews. I conducted member checks throughout data collection. As interviews and observations were transcribed I emailed copies of the transcriptions to the teachers. Additionally, during interviews I summarized my overall impressions and asked the teachers to clarify statements or further explain their experiences. Finally, in an effort to strengthen internal validity I openly discussed my biases through my theoretical framework and statement of my role as the researcher.

Summary

In this chapter I provided a detailed description of the methodology that was utilized in this study. Specifically, I provided an overview of phenomenology, explained the selection and provided an overview of the research sites and teachers, described the data sources and analysis, and identified the trustworthiness and limitations of the study. In the following two chapters I present the findings of the study. In Chapter 4 I share the reconstructed stories of the math and science teachers, and in Chapter 5 I describe the essential themes of the teachers' lived experience of integrating new literacies in their math and science content.

CHAPTER 4

FINDINGS: RECONSTRUCTED STORIES

The purpose of a reconstructed story is to share the participant's experiences in context so that readers are able to enter the "lifeworld" (van Manen, 1990, p. 69) of each teacher. The reconstructed stories were created in an effort to answer the following question:

What is the lived experience of upper elementary and middle school teachers as they integrate new literacies in their math and science content?

As discussed in the previous chapter, six teachers participated in this study: Angela, a fourth-grade math teacher; Evan, a fifth-grade math teacher; Eden, a seventh-grade math teacher; Kevin, an eighth-grade science teacher; Naveed, a seventh-grade science teacher; and Sophia, a sixth-grade math teacher. In presenting the reconstructed stories, I chose to group the teachers according to school. By grouping the teachers this way I am able to situate the teachers' experiences within the context of their daily lives. As previously mentioned, when selecting research sites I targeted high-needs schools because I was interested in how teachers were negotiating high stakes testing pressures (Leu et al., 2009) with the potentials of new literacies. I defined high-needs in terms of socioeconomic status, transiency rates, language proficiency, ethnic diversity, and year-end testing results. The student demographics at these three schools are not representative of the district and state. The percentages reported for these schools were considerably higher in the identified high-needs areas than the district and state averages (State of Nevada Department of Education, n.d.).

Because there was not a prevalence or preference among teachers, grade levels, or

subject areas, I chose to order the schools and teachers within the schools alphabetically. The findings in this chapter are organized into three sections according to school: Fairview Elementary, Kelly Middle School, and Washington Middle School. I begin each section with a brief introduction to the school which includes: contextual factors, the principal's vision and expectation for the integration of technology, and the reason why the two teachers were nominated to participate in the study. Following this brief introduction, each teacher's reconstructed story is presented. These stories were constructed using the five interviews that took place throughout the study. In an effort to capture the individuality of the teachers and to ensure the production of the individuals own meaning of the experience, I created the stories using the teachers' own words. However, I did delete repetitions, pauses, and other oral speech characteristics that detracted from the teachers' intended meaning (Seidman, 2006). Each reconstructed story begins with teachers' definitions of literacies and technologies and then describes in depth their experiences with integrating new literacies in their classrooms and the impact this integration had them in regards to their understanding of teaching, content, students, and context. The stories conclude with the teachers' beliefs about education and the role technology and the integration of new literacies plays in education on a personal and professional level.

Fairview Elementary School

I hurried towards the front office to check in at Fairview Elementary School. I asked the secretary for the sign-in sheet, and she pointed me through the steps of signing in, having a picture taken, and printing my visitor badge. I quickly realized the technology

was a prevalent factor at this school. Dr. Condie met me in the main office and welcomed me to her "high-tech" school. Fairview Elementary is located, as one teacher stated, "in not so great of a neighborhood." At this high-needs school, over 60% of the students receive free and/or reduced lunch and the student transiency rate is 30%. The student population is 57% Hispanic with 37% of the students classified as Limited English Proficient. Fairview Elementary School did not make Adequate Yearly Progress (AYP) for the 2008-2009 school year. Additionally, on the 2008-2009 year-end tests, 42% of the students did not meet standards in math, and 58% did not meet standards in science. While these test results were discouraging, Dr. Condie was optimistic that improvement had been made and would continue to be made through the integration of technology. When asked about her vision for the integration of technology Dr. Condie stated:

> My vision is that we would be keeping up with what's happening out there. The reality is obviously a funding issue, but my vision is like every kid in our school has a laptop or some technology related device that they're using in a productive fashion during every class. My vision is that having technology in your school means nothing if the children aren't using it. Yes, we want the teachers to use it, but that's not the point of it. The point is having the kids use it. So that's our goal, to provide as much information that way and to have [the students] doing, because we know whoever is doing is learning.

When discussing the economic challenges of the student population, Dr. Condie stated, "The only obstacle we have is, of course, our kids go home to less technology, but I think that we're doing an excellent job of exposing them to it at school." Dr. Condie

viewed technology as a benefit for both faculty and students. She perceived the greatest benefit of technology to be engagement, and engagement equaled fun. Dr. Condie stated:

> Well, right off the bat for the teachers, I want them to have fun at what they're doing and as you've seen in Evan's room and Angela's room, they love what they do, but they have toys to do it with. I've told my teachers that it's my goal to give them so much technology that they couldn't leave my school because they couldn't teach anywhere else. So let's have our teachers have fun. Let's have our kids be engaged, but let's teach our kids what they need to know.

When I first made contact with Dr. Condie about using her school as a potential research site she immediately welcomed me. She had recently finished her Ph.D. and was supportive of research at her school. When I met with Dr. Condie to talk about potential upper grade math and science teachers to participate in my study I was told that science was not part of the mandated curriculum so I would only be able to observe math. With that said, Dr. Condie immediately gave me the names of Evan and Angela. When speaking about Evan, Dr. Condie stated:

> The way we rolled out the interactive whiteboards on our campus is I was able to fund two classroom sets, with the voting devices and everything. As I go into the classrooms to see what's happening Evan's voting devices are on [the students'] desks. His kids are voting. I can say to him at any time, "What did you do on Tuesday in math?" He flips on the [Promethean Board] to show me what they did Tuesday in math. When I watch his lessons, the evidence of him integrating technology [is abundant.] So he integrates technology with an intensity.

And in regards to Angela, Dr. Condie stated:

> Angela just got her board this year. She is just one of those teachers who I told you is very hard on herself to be perfect. I don't want her to be perfect, but she just absolutely does anything I ask her to do. So the minute [the Promethean Board] was in front of her, she knows it's good for kids and she just uses it.

In the sections that follow, I present the reconstructed stories of the teachers at Fairview Elementary School.

Angela, Fourth-Grade Math Teacher

Literacy: that's like a huge bundle, but integrated through the entire day. Like it encompasses all. [Literacy is] part of everything that [our class has] worked on. So [the students] have to have that literacy crutch in order to do what we're doing throughout the day because it's used in every subject, real life, school, friends, you know? [Literacy is] all social. It's kind of like reading different signals and signs. Like you read body language, and if someone tells you something as a friend you kind of make a conclusion out of it and get the gist of it and they don't have to say everything. You are kind of just reading what they're trying to say. You need to learn those skills. [Literacy is] a challenge. I want to say "yes" [literacy does have a connection to math] because I know that's the proper answer. You really don't think about [literacy in math]. It's probably something that you will mostly likely see me integrate throughout the day, but I probably don't realize it. I don't think I [think more about literacy because of the integration of technology in math.] I just go for it. I don't see any of [my students] or hear any of them make any complaints or "I don't get it."

[Technology means] a lot of work. Probably more work than what I anticipated. From the beginning of my career until now, it's been a bit stressful because there is so much

[the administrators] want you to do with technology. But, technology also means strength. It gives me the power to do more things than what I was able to, so it's a mixed feeling. [Technology is] almost like a human – strengths and weaknesses, personification. I think [technology] offers a different way of thinking [about math]. Like, there are different ways of learning. Some people are fine the way math used to be and learned better that way. Technology seems to get in the way of some people, loses their focus and others seem to be really focused on technology, especially the younger generation because that's all they've known is technology. [Technology] really makes you think about you know we're falling really behind as teachers, we've got to keep up. So the sooner we're more open to it, I think the better off our kids will be.

I don't really use [technology] a lot [outside of school]. I'm not really the type to go and get on my laptop and cruise the internet. Usually the only time I'm on [my laptop] is if I have projects or lesson plans. I mean it's not a lot of technology, but I normally don't use a lot of technology outside of school. I feel bad saying it's not a huge part of my life outside of school, [but] I just want to relax. I do so much with it [at school] and just through the day that when I go home, I'm not the highest person with technology.

Pretty much [the technology is] all new. It's like me being a big kid. I don't know, it's always like there is something new that I've learned and I'm all excited about it and the kids get excited because they see me excited. This year [my instruction is] pretty much, I would say, about 85% technology. [The students] do a lot with technology. Because of that [professional development] class that I was in with my ECS (Educational Computing Strategist), I earned [my class] a laptop cart which has 20 laptops in it.

I guess it would be the Promethean Board and the laptops [that I use the most], only

because I have both in the classroom. [I use the Promethean Board the most] probably because it's so fresh and new; it's just been introduced this year. Like I'm teaching my kids, but at the same time we still have our laptops open and while I'm teaching they're doing… they're kind of like following as I'm going. They see what I'm doing up there [on the Promethean Board] and then they do it on their laptops, so I kind of have that extra influence in there so they can actually do it firsthand rather than me showing them and then doing it through me. They actually get to do hands-on. Overall, my teaching now, I don't have a problem with holding fast to what I was used to. I'm much more open.

[The administrators] have a promethean trainer that comes in once a month and we meet in my classroom and she teaches us different things and some cool tricks. Yeah, in that hour training they give you so much and you're still playing with it and then after that training I can't remember exactly what we did. We have that training once a month but if you can imagine we have all of this new technology we haven't been trained in; once a month is not going to cut it. That [training] teaches you a basic of how to add something new but that's one thing out of tons. I actually wrote a paper on it for my masters program of this type of question and it was about the things that are expected out of teachers but they're not given the chance to actually learn but they are expected to know. I know how to use the Promethean Board but its mainly because I just do it on my own. I don't know how to do everything the way it probably should be done.

I believe that having technology [integrated in math] makes it a little easier for the students to understand math concepts because it's more alive to them. It's something that's more up to date, what they are used to seeing, that's how they learn. I think [the students] have [benefited from the technology] because most of them are more visual

learners so it's pretty interesting for them to be able to see pictures on the board that relate to other things. So I can pull up pictures to that sort and they can visualize more than me just telling them. [Technology] is a learning-based tool. It has also pushed them to think outside a box. They kind of have more of a visualization of test questions and how to respond, the correct way to respond.

[My success with integrating technology in math is] that their test scores have been getting slightly better than what they were. I like the students to explain the way they got [their answers] because there's usually different ways…they're getting better at it nowadays because they see all these different ways. I usually like to have at least two to three different ways that they have figured it out. [The students will] come up to the Promethean Board [to share their different solutions]. So they are starting to get details in there and that really helps with math.

I've probably gained more of an understanding of technology more than just math [through this integration]. I understand how to be able to pull in different resources to teach math better than I knew before. [My instruction has] gotten a lot more fun [because of the integration of technology]. I think it's just the overall enjoyment of learning math, as well as teaching it. [My instruction] just used to be very blah. [The students] got what they needed, but they weren't excited. It wasn't memorable. Now, [the students] get more out of the program and it's more of a cartoonish, so they're all interested in it. So, [technology] makes me happy and it makes my job easier because [the students] are so focused and engaged. [Integrating technology in math means] participation. [I'm] seeing more hands in the air, even for those students that say they have a tough time in math, they're more excited to join. I think they're more excited about learning the math. [The

students are now] saying the vocabulary words, and I hear them saying [them] after school. It's more enjoyable, which means it's more memorable.

They're doing projects that would be hard for an adult, like it's nothing. So, the biggest thing they have been working on is the graphs that you were looking at outside, their Christmas graphs. They had to write down what things they wanted for Christmas, and they had organized it in different categories like, "what I really want and can't live without" -- there was that category, of course. And there was a category of, "What would be okay if I didn't get it." So they organized all their things and then they went onto the internet and researched different websites like Target's website, Wal-Mart, K-Mart, whatever they needed to get there. They started writing down prices. They started graphing prices in a written graph. And then we put all that information into… Their job was to write a persuasive letter to whomever usually buys them gifts and saying, you know, "This is the gift I want. This is where you can get it. This is how much it is. This is the color I want. Save gas, go here, don't go there." They really got a kick out of that. It was so much fun.

Well, [technology] teaches [math] for me. [The math program] actually has this whole interactive video that they can watch, and it really helps me because sometimes I don't know exactly how to teach [the content] to them. I already know how to do it; I just don't know how to break it down again. So, sometimes [the video] takes that stress or that guesswork about how do I do it, how do I go about it, and it does it for me. Planning is just right out of the book. Yes, [I rely on the textbook as my curriculum] because it has certain components that we need to have. Sometimes with Henry (the interactive math video) it will ask a question at the bottom of the screen and I don't really know the

answer and I can't think of the answer and I'm like “please let the answer be on the next slide!”

I don't know if [technology] is an incredible help, but I don't think it really hindered the way I taught. I think I could do it either way. [Technology] is like a resource that's there when you need it. I still teach [math] the same way, but [technology] helps push a little bit more. Like I feel like I'm touching more learning abilities than what I was used to, but I would still be able to teach [without technology]. The technology makes it quicker, faster, absorbent in their minds because they remember what they saw up there compared to me cutting out paper. But sometimes that’s going to happen, the electricity won't work one day or it just shut down and yah, that's fun. I notice that when my Promethean Board doesn't work I panic because I don't know what to do without it.

So, [technology] makes me, as a teacher, a little more apprehensive or nervous because I feel like I can push them to do so much more, but there's kind of a barrier when you're not used to using technology and I don't know like how much I can do compared to what they can. They are already creating things that I never, ever [have]. I didn't really use Excel that often in creating graphs, so teaching [my students] almost makes me feel a little nervous because I think they're quicker at it than I am. I would almost say [I have lost] a connection [with my students], like a personal connection. Because when you don't have that technology you tend to work more closely with your groups. You tend to do more things that are hand held and you tend to have the groups grouped up together to get more interaction from each other.

Yes, I'm not going to lie, yes [technology intimidates me] especially when I know Dr. Condie is going to come around and watch. These [Promethean Boards] are expensive;

they have a lot of tools on there and half of them I don't know how to use. I'm like "Whoa, I haven't scratched the surface." So it can be kind of scary at times because I don't want anyone to feel like I'm wasting the [Promethean] board. But I can't do anything more because I don't know. So I think it's hard too when administrators expect us to incorporate technology more and more because we don't know exactly what to do with the technology. It's kind of we're doing it as we think fits at that time. So it's tough to hear them keep adding things on, and it's almost like technology takes up more time because we have to get used to it. So it kind of shortens our day and then we get less done, and it's frustrating. Frustration! So I try to learn as much as I can as quickly as I can. But I think that the most learning that I go through is just right in front of the kids. We kind of learn as we are going.

No [technology has not changed how I think about math]. I probably answered yes to that before. But I'm going to say no because I know technology doesn't take over everything. You still need that background knowledge, starting from the basics. So it helped, but I wouldn't just constantly use that. In my class, I like them to use something that they can have in front of them as well. I don't think it completely takes over old-school style of manipulatives in your hands, playing with something to get what the answer is.

[What do I gain by integrating technology in math?] A migraine, it really is. It has been a huge feat to try to not just figure it out and use it, but how to apply it to what I'm doing. And then when it breaks down and I'm like, "well, what do I do now?" Like I'm blank. Yeah, I would have to say it's been stressful. There are probably some good parts about it, but the thing that sticks out is just headaches. It's been a headache. [Roadblocks]

in math? With technology? White flag, I give up. Um, my whole classroom, I don't mean my students, I mean the building loses connectivity to all wireless, everything. I lost connection for three days. So things like that are really just – headaches, migraines.

I want [my students] to continue what they've been learning. I want them to push themselves to use what they've learned the past few years using technology and apply that to further learning beyond what they've already done to really impress, you know, whatever they're working on or whoever they're doing something for. I want them to be able to teach other students what they already know and the other students don't. Kind of feel that comfortable [with their knowledge] where they could be an influence to someone else. I think that would be my philosophy, to get them to the point where they could feel independent and influence someone else that's not ready.

[The integration of technology in math] just means more growth. It just means there's just change. You constantly have to keep updating and changing with times. I'm sure later on there's going to be something else new coming along and they're going to want us to integrate that as well. So, integration of technology to me means change. Things change and you've got to keep up with the times. It's frustrating at times. It's exciting, but it's nothing that's going to be different. It's just evolving. So you just roll with it. You gotta go. [Technology makes me feel] connected. Connected because I feel like I can do so much more with my students than what I was capable of before. I feel like I can go onto the internet, and we can do blogging, we can do wiki's, we can do all of these different things that I never knew we could do before. So I also know that it's possible that they could email me when they're at home. And so I feel like I'm more connected to my students because of technology, like we have this common ground now.

Evan, Fifth-Grade Math Teacher

Well, obviously I think about reading and writing. Being an elementary school teacher you're pounded with literacy, and that's reading and writing. But obviously there's a math literacy as well. If you can't read well how are you going to take the information out of word problems or, you know, real-life situation problems that they give you even on tests, even on these standardized tests? There's also math vocabulary. If you're illiterate in math vocabulary, you're not going to know the difference between the tens column and the tenths column. There's a ton of stuff that they expect us to teach too, like associative property, commutative property, distributive property, you know all these things, that is vocabulary. One of my goals at the beginning of the school year, I guess, is to try and get the kids more comfortable with using the terms correctly. Instead of saying, "four point five" say "four and five tenths." Reading is the crux of education really. I mean, if you can't read, you can't write for sure. So definitely, yea, I think literacy plays a big part in teaching math.

When I think of literacy and when most people think of literacy, they just think of reading and writing. But, I think there's definitely, I don't know, I guess there could be more to it than that. I think that there is book literacy, but I think there's a literacy that comes with technology at the same time. You know, you've gotta be able to know how to use the stuff if you're going to use it correctly. But, to be honest with you, I don't really even know how to associate it because I haven't opened a reading manual. I haven't opened a writing instruction manual in months. And it's actually been kind of nice. So I'm sorry. I mean I don't think [technology] made me think about [literacy] necessarily any more. I'm probably not the right person to ask because to be honest with you, since I

started teaching only math I've really just only thought about math. I really haven't thought too much about literacy.

Technology for me revolves around computers doing the little things, like I can do the magic rectangle. Having kids see things they never thought of in their own little minds, using the resources to see things a different way, to share with students if they aren't getting it in the traditional teaching way. It's putting power and knowledge into the hands of the teachers to share with their students. It's creating independent thinkers and knowledge is power. "Knowledge is power; knowledge is happiness," that's by Thomas Jefferson. A computer is probably the most powerful tool that you can have in my opinion.

I don't know where I would be without it, computers, internet. I use the internet every day for sport scores. I don't know where I would be without my HDTV. I play video games online with my friends sometimes. I'm kind of a nerd like that. I own a Microsoft Zune, but it's the same thing [as an iPod]. I spend time online paying bills or looking at stuff on the internet, working on projects at home. Where would you be without it? I mean if I lost my phone I wouldn't know anyone's phone number. I would not know anyone's email address. I think just being comfortable with [technology] at home and being able to troubleshoot problems and stuff like that has made me more comfortable and adventurous in the classroom. I've realized that there's not much that you can do that can't be fixed or undone, and the undo key is the best key in all of creation.

A couple of years ago Dr. Condie said "We've got this presentation [on Promethean Boards] that we really think you should go check out on your prep." I was in there for twenty minutes, and I wish I could have stayed the whole day. And Dr. Condie said,

"We're going to get two of them and I want you to have one of them." I felt, obviously, very honored by that. So [technology] was kind of put in my lap, but I was excited about it. It wasn't like I was resistant to it. I think just my comfort level with computers and what not has made it pretty easy for me to transition to [integrating technology in math]. [The Promethean Board] is so obviously my most powerful form of technology that I have. And while the majority of the time I'm using it, the kids get up and use it as often as we can, and they are interacting. Getting them actually up and manipulating the board, manipulating objects on the board to show relations and relationships between whatever it is is a lot of fun too. The kids, I think, kind of have this feeling that the Promethean Board is the teacher's toy but multiple times a week I ask kids to come up and do stuff on the board, "Show us how this relates to this and blah blah blah." I mean [the Promethean Board] does everything.

[The Promethean Board is] really just an amazing utility for sharing information I think. This is kind of stupid I know, but back when I used to teach with a whiteboard, how many colors did I have? Maybe four or five? And now I probably have 32,000 colors that I can choose from. You know, being able to highlight stuff and make things stand out. You have an unlimited amount of blank white screen space basically. You can save that information and pull it up days later. I mean, that kind of stuff is just incredible and then the video utilities, it's being able to watch clips and whatnot. It's powered to get on the internet. We use Google Earth too; a couple of days ago we were doing a line graph on populations of a couple of cities over time. I can say that I personally have had more success teaching math with the Promethean Board and that type of technology than I had in any other subject.

[I feel a lot of support from] like professional development courses and just help from our ECS. She's so willing to do basically whatever we need; I would say that's a big help. Our ECS said that she's glad that I'm around when she's not around. I feel like I can fix most problems. I'm kind of like, when the ECS isn't here everyone comes to me and they are like "I've got this problem with the Promethean Board, can you come fix it?" and I'm like "yeah." I don't mind it, I take pride in it. We also have a Promethean Board group. Not every teacher has a Promethean Board. So we have a group that meets once a month on Tuesdays after school. Sometimes the crew from Promethean comes in and shows us cool things and sometimes we get time to work on flip charts and stuff because the flip charts take time to build. A math lesson flip chart that I'm using, a typical one, probably takes at least a half an hour to forty five minutes. [It is] just a lot of typing, a lot of prepping, putting stuff on different layers. It's kind of complex but totally worthwhile.

I grab [the students] attention [with technology]. It's a tool for keeping them involved [and] isn't that kind of the goal? I think [I teach with technology] because it's the best way to do it. I've taught many lessons before where the kids are just like, you know, beating their heads and turning around, heads down…I think that it engages them so much more and there is so much more participation involved. This is the first year we've started taking all of our math assessments on line, and they are like excited to take the test because they are using a computer. I mean, that's what it is. They're technological natives. There is accountability too [with technology], I mean, because the voting devices will tell me who got it right, who got it wrong, who didn't answer, you know. That alone, that accountability alone, knowing that I'm going to know what they did, I'm going to know what they answered has made them pay attention even more. They are very

comfortable with the activotes and that is so interactive too. But with the activotes they are like "Wow, that is actually working, and my vote is counting for something and if I don't get it right my classmates are going to get mad at me." It's kind of competitive, but I think it's helpful for the most part and I think they still get it.

I definitely think a few years ago [the integration of technology] shifted my thinking [about math]. [My instruction is] a lot more interactive. [Technology] makes teaching more fun, that's for sure. I think that I can get [content] across easier [with technology] than I would in the past. Being able to use video clips that go along with [my lessons, for example] one of the problems [of the day] was about M.C. Escher prints and [the students] were like "who is M.C. Escher?" I pulled [a website] up instantaneously; we went to an online gallery of his basically. That's a powerful tool for the kids to see. So I just think it's just different, the method, the way that I teach it is the same. [If all of my technology was taken away] we'd have to draw out in the dirt, chalk on the sidewalk. I've told many people I don't know what it would be like to teach without it now. I actually had a dream, a nightmare if you will, that Dr. Condie came in and said, "We're moving you to a different room and there won't be a Promethean Board." I was paranoid! I woke up sweating. I mean I think I could go back to the old way. I think I was an effective math teacher before with just a white board and markers. [But] the resources it brings to the table are so much more extreme than me standing up there.

[Math is] kind of a constant thing. I don't think fundamentally anything is really different [in math because of technology]. I mean it's been around for thousands of years. You know? I think that there's definitely one way to do it as opposed to…I mean, there's different strategies to get to that point and different methods to get to that point. I think

that you still really have to kind of hammer it out the old-fashioned way every now and then. I know a lot of the stuff that we're using now really helps kids, especially visual kids. But I don't think the fundamentals of how I understand math I don't think have changed at all. I like that math is, one of the things I told the kids when they first came in is "I like that math is constant. It's not going to lie to you. Like sometimes, in English, you have words that look like they're pronounced one way but they're not, you know, there's trickery, where in math, it's always the same thing." I just kind of like that it's uniform.

I see us really trying to integrate [more technology], but it's really difficult at the same time with the stuff that the district throws down to us you know. We're taking CRT's in March instead of at the end of school. And unfortunately the way that we kind of know how to [prepare for the test] is just kind of an old school way you know, where we present the information, and then the kids give it back to us and hopefully they remember it for testing. And that stinks. I mean, there is no doubt about it. That really sucks, and I would like to do so much more.

The biggest roadblock is just when it doesn't work, it's such a fine line between trying to get the board fixed and continuing to teach and it's a distraction. I mean I need to get the information across to them, [and] I just think that the Promethean Board does it better and keeps their attention more than a regular white board. When it fails that's when I'm trying to do two things at once. I'm trying to teach the lesson and troubleshoot the problem at the same time. I'm sure you saw me shutting down, unplugging and plugging things in, trying different things and at the same time when I'm doing that I'm kind of neglecting my duties of getting the stuff, getting the information across to them. When

[the Promethean Board] failed I was just like “what’s going on,” you know and you have everything built around that, I had those lessons prepared. Most of the kids are pretty cool about [when it shuts down or breaks]. I'll just say it’s broken, and we're going to do it like this. For the most part most of them want to learn. Most of them want to get the information regardless if we're using chisels and stones or the [Promethean Board] or smoke signals in order to learn the information.

[Another roadblock is] like the maintenance, the upkeep. Like when I was talking about the laptops, we use the laptop cart [and] half of them don’t work. The batteries are burned out because we’ve had them for more than two years. So now they only last for 15 minutes and the batteries are too expensive to buy, that’s kind of a roadblock to technology for sure. There’s the upkeep of the technology that you have and then, of course, the outdatedness. I mean these computers back here that we bought four years ago, they’re ancient now. So I mean they’re nice paperweights; that’s all they are. They work great, but you can see the kids are like “I’ve been waiting here for five minutes and it still hasn’t loaded up.” That type of stuff is frustrating, but what do you do?

Well, I mean obviously I want them academically to be the best students that they can be. I understand that elementary school is kind of like a foundation of what’s ahead. I’ve always thought that education was more than just books, pencils and paper. I thought that, you know, especially in elementary education, I think we’re really developing. I mean, obviously, I want my students to be the best person that they can be in general. I think everyone has something to contribute to our society. [My students are] going to have hundreds of more teachers down the road too, you know, so I know I’m just kind of a piece of the puzzle and maybe if I can affect them in one way for the better, then that

will be good. Whether it's me being goofy or me giving them support [I want to be a teacher] that is just way personable to kids. A lot of kids don't really know I guess, their intrinsic worth. They just think school is a place they get talked at and yelled at and stuff like that, but if I could be someone that's more loving than anything else maybe I'll get my point across a little better. I talk Rock Band with some of these kids. That's the only way to get to them.

[The integration of technology in math means] moving forward. Technology makes me feel powerful. Yea, I would say powerful, because it's a powerful tool. Not to say that I'm reigning supreme like reigning with an iron fist or anything, but powerful like the past three to four days we've been watching video clips I'm able to instantaneously pull them up. It's not like I have to say, "Okay, we're going to turn the VCR and TV on" you know? I can maximize Windows Media Player, push play and within five seconds there's a video up there, and it's less time wasted. The video is full-screen. That's just powerful. Technology as a tool is a powerful way to transmit information.

Kelly Middle School

It was ten minutes before the first bell rang when I walked towards the doors of Kelly Middle School. It was the usual morning rush as students, faculty, and staff scurried about. Outside of the main entrance stood Mr. Jones; this was part of his daily routine. Mr. Jones greeted me by name and welcomed me to the school. I quickly noticed that he greeted everyone by name; this principal knew his students. Kelly Middle School is located in what locals refer to as a "bad part of town." At this high-needs school over 70% of the students receive free and/or reduced lunch and the student transiency rate is

34%. The student population is 69% Hispanic, and 26% of the students are classified as Limited English Proficient. Additionally, Kelly Middle School is in its third year of not meeting AYP. Over half of the students in both mathematics and science are testing below standards. While these challenges are not unique, what makes this school different is Mr. Jones' passion for and belief in technology. When I interviewed Mr. Jones, he shared his vision for the integration of technology at this school. He said:

> The vision is that [technology is] integrated into instruction, and the kids learn to use it because I am of the opinion that it's essentially something that the kids are going to have to be literate in. We talk about reading, writing and arithmetic well, digital literacy is the fourth. So we want to expand the use, ideally while the teachers have to use the technology I'm not interested in seeing the teacher's use the technology. I want the kids using the technology.

Technology integration is an expectation at Kelly Middle School. With Title I funding, Mr. Jones has worked very hard to make technology available to his students and teachers. Mr. Jones perceives the integration of technology as an essential skill for his students' current and future lives. He stated:

> For the population that we serve here, it is more crucial because if the kids don't acquire technical literacy skills not only are they at a disadvantage in terms of acquisition of information, they're flat out at a disadvantage in terms of ability skills. The only jobs that are going to be open to them are the jobs that are historically open to this demographic, and that is manual labor, low-tech jobs with no future.

When I first approached Mr. Jones in the summer of 2008 about the possibility of conducting research at his school, he emphatically agreed. And when asked that he suggest two teachers that I might study, without hesitation he gave me Eden's name and agreed that Kevin would be a good teacher to study. Mr. Jones stated:

> When we track scores and we do pull the data by teacher, their data trends are stronger than their peers. But I'm also one of those educators that don't believe that everything that counts can be counted… [Eden and Kevin] are both highly motivated. They are both extremely intelligent. They are both very, very creative. Kevin and Eden both get it. If you go into their rooms, at times they're going to be the one that's directing the instruction, but then at other times they're sitting back allowing the kids to manipulate the Promethean Board, allowing the kids to interact in groups and really engage in a constructive approach to their content areas. Technology is not being used for technology's sake. It's being used as a deliberate system.

In the sections that follow, I present the reconstructed stories of the teachers at Kelly Middle School.

Eden, Seventh-Grade Math Teacher

I think a lot about literacy just because coming from elementary, I kind of see how everything is related to reading. Yeah, and you have to read to be able to do anything. I mean what I'm doing when I'm searching is reading to find the answers and there is so much vocabulary. We use a lot of words. So I think I've realized that more, but maybe haven't made that connection: "This is literacy." Literacy is reading and writing [and] being able to do so fluently and effectively. A lot of the questions have shifted now in

tests to be a lot more word questions. And I know when I was growing up it seemed a lot more of just numbers and symbols. So I think for them to really understand mathematical situations and how to apply them, they are having to use a lot of word problems. So they need to be able to read and do that.

The other day, I had used the term when we talked about box-and-whisker plot and an upper quartile and a lower quartile. On a test it said the third quartile, and it didn't say upper quartile and I'm like, "Wait a minute, we didn't talk about it like the first third quartile. Let's just make sure." I had something I had to pass out so I had a student come over and told her to look up and leave it up on the Promethean Board. I said, "I'm pretty sure it's the same thing as the upper quartile, but I want to make sure it's not the third quartile...." I said, "I want to make sure so why don't you look it up." And so she was looking it up and [the students] were kind of reading it as she was looking it up. I thought that was kind of cool, you know that we could search together and find the answer.

[Technology is] more than just like the PowerPoints, maybe, I don't know, it can be all different things. [The integration of technology in math] means using any kind of machinery, I guess, in the classroom. But using enough variety with it, I think that's important. Because I've seen something they think is great and if I use it too much then they get bored with it. So switching things out and just, I don't know, using it in a way that they actually are understanding and responding. I think that computers have so many capabilities. The positives would be that we can go to endless places on the internet, everyone can see it. There's video clips, there's all kinds of supplements. I think there's so many visuals. I mean they can hear things, see things, I think it's just great it those ways. A negative might be that there might be less of them actually doing things, creating

things and more of them still sitting and watching.

I think [my personal use of technology] just makes me somewhat more comfortable with it. I text, I check my email and send email, and I go on the internet to do all our banking basically. [I have] an iPod that I use sometimes when I work out. I would think those would be the biggest ones, and then every once in a while when I find something on the Internet I'll bring it in [to class]. I know last year I did, I actually found something that looks like box and whisker plots on a website, yeah, for a share builder for buying stocks and so I showed it to the students. I wouldn't have understood what they were if I didn't think about it as "oh, this is a box and whisker plot." So I showed it to them and said "you might actually see this" and talked to them about buying stocks. It was really fun they were really into it. So sometimes if I'm outside of the classroom and I find something really cool I can bring it up. I think that I've gotten more comfortable with technology and I think that I can engage more students because I can show different things. I think that it reaches more students. I can be more organized. I feel more prepared with the technology.

I didn't know I was going to get a Promethean Board and we just had a staff development day where we could kind of go see what different things were happening at our school. Ms. N was showing her Promethean Board and kind of showing us how it worked and I got so excited. I was like, "Oh, this is so cool." It was just really exciting to see all the things it could do and I just saw how, I don't know, how I think it could really help student engagement. So that was just really exciting to me. More than being afraid of it, I was excited and I wanted to try it. One of the biggest things with the Promethean [Board] is that it is so visual. I think there is so much in math where you have to see and

watch, and the Promethean is a really good tool for that. And because it's connected to the computer, it kind of does everything. So, it's kind of like the best of everything, a whiteboard, I can go to the computer, there is so much I can do on it with math modeling and then showing pictures of things.

The Promethean Board, I just got last year and [the administration] did a whole bunch of trainings for us. I am somebody who needs a lot of training when it comes to learning something new and I still need more. I haven't been able to go to as many trainings. But [the training] was very frequent maybe once a month and it was kind of intensive at the beginning of the year and we had some somebody come in and help us out during our prep if we needed, so it was great. Yeah, really good training. [But,] there are some things that I don't know, so I don't know how to do them. So a lot of times I'll just avoid them. Instead of taking the time to figure it out, I just kind of think, "well, I'm not sure" or I'll try it for a couple of minutes and then forget it – I can't find it. So [I need] just the knowledge, the training, and then the time also.

I think [technology is] changing how I teach. The reason why [I'm teaching differently] is because they're not getting it the old way, the traditional way, they don't get it. If it hasn't worked for them before, I don't know why I keep doing it. That's kind of an attitude of, "Well, I've taught it and they're responsible to learn it" but, I really want them to learn it and so I think I've got to try in as many ways as I can. Sometimes this one activity will hook one student and at other times another activity, so I just have to try. I want the kids to get it, and I want them to like math. I want them to like school and keep trying. I want them to have some success, that's another part of it. I don't like just the Promethean [Board] or just manipulatives. I think that in the perfect world it would be a

Promethean game one day, manipulatives another day, maybe showing what you learned on a worksheet one day; changing it all up. I think the Promethean Board makes [teaching] a lot easier. I know when I was able to do the one lesson last year with the protractor and then have them doing it while I was modeling it up there, I really realized, "Oh wow. There's another way where they can actually be really engaged and they can be doing this as I'm doing this." Not, "Watch me, now you do it." They were performing it as I am.

What [the integration of technology] means to me, like personally I guess, is just that if I use this properly then it really can affect student learning and I can see more students engaged and understanding and the lights come on a little more if I use if effectively. Maybe [I can show the students] how mathematical classrooms can apply to real life situations that have to do with technology. I think at times they get glimpses of it, but I don't know, I would like to do more of that connecting and having them understand how it really is in the real world. I don't think they know how much they're going to use [technology] or they should use, they need to use it. I get nervous sometimes thinking about it.

I would think [the integration of technology in math has affected me] in a positive way because I mean like last week when I had to come up with an activity because the thing I was thinking of didn't work. I got shapes from the [Promethean Board] library really fast. It just made it faster for me. So [technology] made it faster and easier for me to put together creative ideas. I would say it helps my planning because especially because our textbook has all of this stuff. If our textbook didn't have all of this stuff I would feel like it would be more work trying to get it all prepared. [All of my presentations are] from our

curriculum, our textbook. It's so great; they have all sorts of great resources. They have videos so I pull slides from it. I haven't done a whole lot of [creating flipcharts] by myself. I've been realizing, thinking about, if we ever move and if I didn't have a Promethean Board, it would be difficult because it's easy to do things quickly and make them look nice.

I think it's just the medium that's different. I don't think the curriculum, the content, I don't think it's changed at all. I think it's just the way…I think they're able to see more; see actual pictures more, but it's the same content. [Technology redefines math] maybe motivationally. I think that it can make it come alive and be exciting for them if we do enough variety. We have a lot more fun and my attitude is better when I'm doing something that's kind of exciting. For example, when we were doing a day that was kind-of celebrating the whole inauguration and we did, because of the deficit, we looked up what the word "trillion" meant basically. There's a website that showed pictures of like what a million pennies would look like, what a billion and what a trillion would look like and how big it would be if we stacked these pennies on top of each other. So, to visually understand numbers better, I think it's great for that. But, I'm not always able to [make math exciting]. There are some [units] where I do less [integration of technology] because of all the procedures, like we just finished decimals and all the procedures with decimals [such as] adding, subtracting, multiplying, dividing.

I want to be a reflective teacher, that's kind-of my word this year. I realize that if I'm a reflective person and just constantly trying to improve, I am closer and closer to where I want to be. I think [I need] just more time in developing [my understanding of technology], practicing. Every year [I'm] doing a little more of what I want to do. There

are some things that I don’t know [about technology] so I don’t know how to do them. So a lot of times I’ll just avoid them instead of taking the time to figure it out. So, [I need] the knowledge, the training, and then the time also. Pretty much it comes down to time. But there are things that I really like that I am doing. For example, I can find a coordinate plane and just find one and drag it over and it’s on my board so then I don't have to create it and it's made all perfectly, that’s nice. And like today, I'm showing some short video clips and it’s nice because I can show those and then I can write on top of them so there’s little things that I am doing

I want [my students] to have success and like kids who have hated math to be able to feel like they understand some of it. I want them to, you know, if they can see the concrete and if they can get some of it, maybe they can get that understanding of, "Well, at least I get this." That's what I'm always hoping that [integrating technology] does, but I don't know, that's what I'm wondering as I'm looking at tests. It's just not translating to that. Yeah, a lot of times in the verbal stuff and what we're doing [in class] and they seem to get it but then it’s not translating into their grades, yeah. Sometimes [integrating technology] makes [teaching] easier, sometimes it makes it harder, and I don't know if it’s me, or them, or the day, or whatever.

On the most basic level, I want them to live a good life and be able to live the way they want to live and not be taken advantage of basically. I want to see them fulfill their dreams. I want students to feel successful. I want them to realize they have strengths and weaknesses and they can work on their weaknesses and it doesn't mean they're dumb. My hopes for my students would be that they will be successful people in, you know, every area of their life. I see that they need math to be successful in life. To not be taken

advantage of, I tried to explain that to them. That, you know, somebody can take advantage of you if you don't understand these basic principles; like pretty much everything you learn in 7th grade Math is the stuff you're going to need to know for the rest of your life.

I think [the integration of technology in math] means that we're moving forward and we're adapting to a new culture if we're using it. I mean, [my students] know how to do so much technology. They all know how to text. Most of them, most of them have computers or they are comfortable with computers. [Technology is] everything. I am thinking of the job world. They are going to need to know all this and everything is moving that direction, so we need to move that direction. [Technology makes me feel] capable. Capable to do things that I couldn't do without technology, but I can feel a little scared by it too and overwhelmed.

Kevin, Eighth-Grade Science Teacher

I think science encompasses a lot of literacies. With the math equations that we can solve, obviously with reading technical articles, reading out of the book, answering questions, things of that nature; even just the literacy or how to use the tools in a lab setting. So, I mean, that's a literacy all on its own. You can read, "oh, 500 milliliters." Well, measure it because that may be a different application form of that type of literacy. So I like science because I can bring anything into the classroom and make it apply. I feel that if you're an effective teacher and you utilize a variety of strategies, you're going to keep touching upon these things that everyone has the new buzz word for. In my own strategies, I integrate more technology.

I see a lot [of connections between science and technology]. For me, science probably

draws on a lot of technology. That's why we have tools, maybe not necessarily the computer, but the computer does a hell of a lot. For me, science is pretty pervasive in most, if not all, fields just because of the way you approach problems or you try to develop new concepts, new ideas. So you can use scientific approaches for that. And I guess the reason I see [science and technology] differently is just because how far we are behind the curve; it's pretty unfortunate. It's not necessarily gloomy, but it's still just like, "wow." Students, education, even myself, I mean, where science and technology has taken the field even, not just the field, but even society is fascinating. But the school is a dinosaur, and we're just not teaching them what's going to prepare them for the future. Our job is to prepare students for the future, and I don't think that we are.

Technological integrations within society have obviously been pretty pervasive I mean, it's basically in everything now. Technology is anything that can supplement the students' learning. It's not necessarily electronic it's just anything I would say. Depending on what you're using it for and what their experience is with it. [Technology is] any tool that can be used or applied to a task, I guess you could say. Not just an assignment or anything because any sort of task in daily life, obviously education, but any kind of tool. It's going to depend on socioeconomic status. It's going to depend on the environment. As we mentioned before, here in the science classroom, it could be how to light a Bunsen burner. I mean, I went through five minutes of, "this is how you bypass a childproof lighter so you can light the candle so we can do this experiment." For them it's a tool, so hopefully they won't burn down the home, but it's still a tool that they may not be familiar with. So, they need some experience with it.

In some ways, I would like to say [my use of technology outside of school is] huge. I

don't use it as much as I should at this point I think because I've got my doctoral classes and so many other things to do. I mean, I'm on the computer on a daily basis. I'm typing using word processing programs. I am researching through websites and servers. But I just don't have time… right now. Eventually [technology] will have a bigger role. Right now, I guess I'm preparing myself for that role, trying to understand what's available out there, but as for the extent of using [technology], it's not to the point that maybe I'm interested in having it be a part of my life. But, [my personal use] leads me to try and integrate it into the class more because it's obviously a skill the students need to know.

Now…with the projector and Promethean Board, this was an opportunity to pull ten teachers aside and said, "We have this available, would you want to use it?" And the ten of us jumped on it and said, "Hell yeah, we'll give it a shot." At first it was a pretty slow learning curve and then it increased from there. So, I guess the first six months was kind-of a challenge. After that, from there, I just saw it as a tremendous asset. When I started using Promethean Boards I was a little bit overwhelmed with having to learn the new software and things of that nature and some of the nuances that go with it. It was a struggle, but it's one of those things, it's like trudging across a tundra mile after mile kind of deal. You know you're getting some place. You don't always know how far you have left to go because I don't know everything about Promethean, I know enough to get done the things that I want done. Had I not gotten this board, I don't think I'd be in [my doctoral program]. I really see these technologies as the future of education.

Sometimes it's like "technology is a great time saver" well yeah when you're proficient with it but until you're proficient with it you're getting screwed. And that's one of the things a lot of time with the staff development stuff it's like "we need to teach

them this and that" and sometimes it's just better to understand what they've already showed us or what you want us to implement. And that's tough because it doesn't always come from a site administrator, it will come from region administrators and things like that. We've had a tremendous amount of support from the [site] administration. In fact, all science classes, science and math specifically, have these [Promethean] Boards. Some of the other subjects are getting them integrated, but the focus was math and science. So there has been weekend trainings, but they're getting paid $22.00-$30.00 an hour, so it's not just "here's the technology, now spend all your free time trying to learn it." But it's also, you know, "we'll pay you and do what we can to make sure that it's worth your while and you're effective with it." I think [the administration has] done a tremendous amount, more so than maybe necessary. [However,] the technical support at the school level isn't what I'm hoping it could or what I, it isn't what it used to be. The technical support person isn't as proficient with this stuff as a tech support person could or should be.

Well with the students I perceive the benefits [of the integration of technology in science] to be more engagement which is obviously helpful. [I think] there should be more of a showcase with it, with the technology. I think the students really need to get more experience with it. I think the computer is an interesting way to get pretty much all students to participate. Because not all students will be writing notes, but for the most part every single one of them will type. Even though basically it's the same task you will get more participation so that's one of the bigger reasons as well. Yes, more students are engaged with working with that technological device. There are much fewer management issues. In some ways [technology] starts getting them more prepared for things in their

careers maybe because they are going to see a lot more technology even more so than we're accustomed to obviously.

[The integration of technology] makes me more consistent. I think it makes me more prepared. Technology] definitely makes me a little bit more prepared and even a little more thoughtful. In some ways, "What am I going to need to do for this? How is that going to tie into the next day? How is that going to tie into the week?" The more I use technology the more thoughtful and planned I think everything becomes. For me, I would say as a teacher I have gained the knowledge of activities for students. The kids really behave better, tend to perform better, tend to talk more about what they're learning when they have hands-on things to work with. Whether it's roasting the marshmallows in the back of the room, whether it's doing like a lab today where they're making a carbonated juice with baking soda, it's little things like that. The biggest way that [the integration of technology in science] impacts my teaching, and something that I'm really struggling with now, is trying to figure out how to make my teaching more relevant here at school. When they walk home there's no application for them. Some are taking care of elderly grandparents, or sick parents, or a whole variety of things. Many have a tremendous amount of responsibility when they leave this place. That can make it difficult for them. So as long as I can give them some sort of skills with the technology that's about all I can ask for. They are not all going to be scientists; I really don't care if they are.

[Technology has changed how I think about science] to a degree. I know there's a lot of simulation software out there for doing science experiments. But I don't think that overshadows the actual hands-on experience of, "I am mixing these two chemicals" kind of thing. I don't think that [technology] would redefine [science], but I think it would

definitely supplement it or add new dimensions to science. I think the technology supplements me. Because I think if I lost this [Promethean] board I could still teach; I don't think that's a question. I think I could still be effective [if I did not integrate technology] but I don't think I would be as effective. Especially in making it relevant to the students, they need to experience what we are talking about and not just talk about it. So I could be effective just not as effective.

[The integration of technology] has maybe helped [my understanding of science] a little because you can go and research pretty simply, so it's real easy to go and find current material. For science in particular, you know maybe it's helped the students because they can access it and they can see it in a variety of formats. So instead of me just lecturing or seeing it in a book, maybe they can see a video of it online, when they are doing research they can you know do some stuff like that. You have to know how to use a variety of tools and a variety of technologies, not just one. So I think that's what you have to realize is, you know, a variety of technology is better, electronic or otherwise.

Teaching with technology doesn't make me that nervous. I know I don't know many things. I guess I know more than some, but I know that there is a hell of a lot more that I don't know. Pretty much the more you learn the more you realize that you don't know much at all. But, I'm not concerned about not knowing many things with these students because in all reality if I don't know it they probably don't know and if they do, they can teach the class and they can teach me. I mean, if I can learning something out of it, you know, great. In some ways, I'd really like to learn where I'm deficient and then where they're proficient so I can have them teach more. I mean, I've got no problem with them

coming up I guess part of it is, I know what content needs to be taught so I'm pretty sure they're deficient there.

What frustrates me [about integrating technology is] that one: It's not always as clear cut as it should be. It's not always as easy and simple as it sounds. Part of it is just the opportunity to have the time with the students to just…..let go and get comfortable with the technology and two: To develop their skills. It's really going to be hard to develop somebody to be proficient on the computer, and I'm talking about the students that are on the lower end because obviously the students that have a computer at home and are on My Space, they have created their own kind of webpage and they're up there. But the students that don't have that access, developing their skills, whether it's computer labs being booked up and they don't have access to it or whether it's content things coming in, making sure they're prepared for the test. You know? There is just a myriad of things that I think at this point impede traditional education from allowing them to access the technology like they should, at least in my eyes that they should.

I guess academically, I don't know, my first thing is just to prepare them for the future. I think the biggest thing that I would like them to do is realize that there is a future. They need to be prepared for it, and that's going to be just knowing the reality around them. I think the biggest factor in slowing down the students' progress with technology is the teachers. Yes, every school has a computer lab or what is it 99% of all schools are hooked up to the internet but it doesn't mean the kids get to use it. The kids get to watch the teacher use it; they don't get to use it themselves. This is [the students'] future, and unfortunately I don't think we're even preparing them as much as we should be because everything that they're going to need to know is probably going to be computer-based.

They don't have that on a continual, daily basis. Some students do at home, but in this demographic, when you have students that don't get to go home and get something to eat, getting online is not really an option for them. When we talk about literacies, computer literacy is something they really need to have, probably more so than maybe math literacy. It could probably be argued that it's going to be just as important only because it's something that it's a skill that they're going to have to have.

[The integration of technology in science] just means using the tools and resources available, again, electronic or otherwise. It could be a variety of things, whatever is available, being able to use it in the classrooms. And not for just my own use, but having it assimilated into their skill set, at least into their experiences. [Technology makes me feel] empowered. It helps. It doesn't make everything, but it helps. It's just a great tool. In some ways, I don't know much of anything, but I'd say it's empowering because once you do learn some of the things and how easy it can make your life, sometimes more challenging as well, but, yeah, empowering.

Washington Middle School

Mr. West has a reputation. I had heard rumors of him riding his bike around campus, coming to work at 3am to work on a grant, and purchasing pizza for families with his own money, just to name a few. I quickly found these rumors to be true. Mr. West is the principal at Washington Middle School. When I first walked into his office, Mr. West let me know he was passionate about two things: his students and his teachers. Washington Middle School is identified as a high-needs school with over 70% of the students receiving free and/or reduced lunch and 32% percent of the students classified as Limited

English Proficient. The student population is 57% Hispanic and 22% African American and there is a 40% percent transiency rate among students. Washington Middle School did not make AYP for the second year in 2008-2009. Students not meeting standards in year-end testing included 46% of all students in math and 66% of all students in science. While these are challenging statistics, Mr. West has a vision for education that he hopes will assist both students and teachers in progressing. Mr. West believes that technology is an essential component of classroom education. He said:

[My vision is] to upgrade [technology] every six months as I can find the funding and make [content] more and more relevant to these kids. They live on video games, and YouTube and Facebook and you know Twitter and everything else. If we don't keep up with them then they get bored and tired of coming to school and technology just makes it more interesting and fun and relevant.

Mr. West continuously writes grants and "begs" for money to support this vision. He believes that the integration of technology will bring students to school. He argued that "[Technology] increases engagement automatically. You turn the SMART Board on and you can have a boring lesson but you'll still get better engagement because the kids are interested in what's going on." While Mr. West cannot envision a school setting that did not include technology, he feels that it is vital that this particular student population has access to technology on campus. He stated:

> Over 65% of my kids don't have computers at home. So if I don't expose these kids to technology they are going to be that much further behind. So that's a big part of what we do is give them a chance, a fighting chance to know what's going on.

It was Mr. West's passion for and commitment to technology that brought me to his school. When I asked Mr. West to suggest two teachers to participate in this study, he immediately commented on Sophia and agreed that Naveed would be a good teacher to study as well. He said:

> [Sophia and Naveed are] open to change, open to suggestions. [Naveed is] a superstar in the classroom. [Sophia] loves kids. She's just a consummate professional; she is a leader.

In the sections that follow, I present the reconstructed stories of the teachers at Washington Middle School.

Naveed, Seventh- Grade Science Teacher

I think the whole goal of literacy in general is understanding. [However], I think what's problematic is how we define literacy within different disciplines. Like, I'd say to myself, "I do want to focus on scientific literacy." However, when I say to myself, "scientific literacy, scientific literacy, scientific literacy," what that entails I only have a very, very loose [understanding]. I know it involves some sort of understanding of technology. I know it involves some scientific understanding of how scientific knowledge is developed. But, when I say "I want kids to develop or have a scientific literacy," if you would ask me to write that down in a series of like objective or standards, I would be very…I think that's probably one of the issues I also kind of struggle with; it's ongoing. I think that as the year goes on, I'm getting a little bit better about what I think scientific literacy is and when I get to know my students and how they learn [I think] it's helping me develop a clear, instructional philosophy. I do think that my scientific objectives are important. I mean, that's important information, but kids have to know how to read and

write. But I think my attention to literacy has more to do with our kids are just so far below where they need to be…our kids are just so far lacking with where they should be right now. And what we're trying to do is we're trying to provide them with the tools that they need to succeed later in life; give them the tools that they need to learn.

I think the reason why I'm incorporating technology is that I cannot imagine teaching science well without really incorporating it, I just can't. I can't envision a way of teaching science absent from computers, internet-based technology, microscopes, SMART Board I just can't. I don' t know how to get from where we're starting, from the skills that they have, to what I want them to be able to do without using science as a good vehicle for that, or without using technology for a vehicle. Definitely [technology] has the capability of redefining what science is because I think in general, the perception for students is that scientific understanding, what scientists know, what we know through science is concrete fact. Like if I tell you, "This is what evolution is" that's just what it is, that's what you accept. I feel like what science instruction should do is try to mimic the scientific community and the processes that go within the scientific communities. Specifically, how scientific knowledge is developed and how scientific knowledge is revised constantly over time.

[Technology is] an apparatus for showing kids the real life implications of our study. Not only that, but it also kind of gives them an ability to extend their learning outside of the classroom environment because I realize that the walls of this classroom, they are kind of constrictive. Whereas in the science community, you're in a context and that part of learning science is about being able to transfer things that you've learned and like different experiments, different inquiries from specific context to context. And

technology really gives me and other science instructors the ability for kids to say, "Okay, this is the way that you might naturally do this." Frankly, [students] have no idea how scientific knowledge is developed. And then when they see something on the news like, "Scientists cloned a sheep and in five years they'll be able to clone a human, and we'll have stem-cell technology to basically take a stem-cell from an unborn fetus and use that to regenerate somebody's arms…." Like scientific development is really being fulfilled and how it's transitioning from time to time. [My students are] not able to really, really deliberate those ethical or moral issues unless they have those conceptual understandings of what science really, really is.

I think I am actually fairly good at technology. With respect to technical skills, I understand technology to the point where I could build my own computer, I can troubleshoot at the school, during my prep I'll go around and I'll deal with technology issues; like my principal bought up my prep for that specific purpose. With respect to how I use technology, I guess in my personal life I use it as a way in keeping up with the world. I'll use it to access streaming media, whether it be in the form of newscast, You Tube. I guess primarily what I use it for the most is like keeping up with sports because I'm a big sports fan. I use it to keep track with some of my friends back home. Not only through like emailing, but frequently I'll make a blog post about stuff like how teaching is going for me in general, how my life is. I use it for accessing songs, media, TV shows, stuff like that. I don't think that [the students] really encountered too many teachers with a knowledge of technology like I have. I don't mean to sound arrogant or anything like that, but they'll try doing these things that I'm just like, "you have got to be kidding me." Like [students are] trying to open up a proxy filter in the background, and I say "You

think that I don't know this kind of stuff, but this is so far below what I know, you are not even challenging me."

In terms of what we do on a day to day basis, SMART Boards, I don't know how much you know about them, but basically it depends on who you talk to, some teachers will describe them as basically a glorified whiteboard where they are using the projector, the whiteboard as basically a projector for whatever they have on the computers. There are some days where like my day to day lessons will look like that, but realistically that's not how I like to scaffold instructions. But periodically throughout my instructional cycle you will see not only do I display some sort of interactive flash or [some] kind of like applet on the SMART Board and hiding the stuff on the applet where other kids are trying to form conclusions while they tell them what to do and stuff like that. Sometimes I use my laptop for kind of like storyboarding. Like, you know, say last year when we were doing stuff on the water cycle, what I had was basically a play. Me and a couple of other teachers, we were pretending that we were members on a water conservative, like town council meeting, and we basically just read out loud the play for them. Then in every classroom I was like, "Let's pretend the following situation happens, we're going to eavesdrop on this council meeting where a mayor is talking to two people. And here's what they're talking about…" You know, I would just play the sound clips for that.

It was a personal choice [to integrate technology in science]. Like when I started last year, I really don't think that I was in accordance with my personal belief of how I should teach. I was still trying to not only figure out how kids learn, but how my instruction should be tailored to how students learn. Has [my teaching] changed? Yeah, actually definitely. I'm somewhat embarrassed, but [last year] I would say, "These [are] different

properties of rocks, blah, blah, blah, blah, blah, where you can find it, what it's used for in industry, blah, blah, blah, blah, blah." When I was using technology in the form of like Microsoft Word, PowerPoint, etc. stuff like that last year, content, knowledge, factual based driven like, "Here are three points about this objective. Number one: Air has mass. Number two: Air does this. Number three: Air is made out of this. Write this down and memorize this." And then we would do some sort of activity that basically bolsters this or solidifies this. Whereas now is I use activities or simulations as a premise for discussing and developing science. [I now] focus on developing a student-centered inquiry-based curriculum given what I have to work with, but it's still a learning process for me as well. There are certain constraints upon my curriculum, as far as what I have to teach and when, because [the school district] wants to make sure that every classroom, of a specific subject, is doing the exact same thing all the way throughout the entire school district.

Oh, definitely [technology is used to motivate students] which I don't like, to be honest. I say this jokingly, but I tell my kids "I don't like fun." [Technology] is engaging to a certain extent. When I say engagement, I mean authentic learning. They're applying knowledge, like real-life circumstances. I think that coming from a scientific background and given my own personality, my classroom has to look a certain way. When we do station labs where kids have to get up in teams and go from station to station, by the end of the day I'll have taken like six to seven Advils. It's just like hard for me. Part of it is also like my own personality…I [like to] have some sort of formal assessment or something I can point to and say like, "This shows me that Johnny is learning A, B and C." It's hard for me [to change my instruction]. It annoys the hell out of my students

really [because] I'll do things like, "No. You can't work in groups because it jeopardizes my data." I mean, we do try to do collaborative assignments as well. It depends on the period. What I've found is that the more I integrate technology, the more and more classroom management becomes an issue.

We're specifically doing station labs with simulations on the computer [right now] and so I get here at like 6:00 am, expecting to type in the specific URL's for the simulation that I want them to do. But then I'm like, "Dude, these computers are just so old." I'm like, "God, damn it." I would just wish that I could figure out…you know, I could have them do stuff with posters, do stuff out of a textbook, but like it's not giving them the conceptual understanding that I want them to have. I wish I wouldn't have to deal with this crap. I also wanted them to participate in this blogging activity where they would not only pose their own ideas or pose their own project proposals and post them on a specific blog, where not only the students in my class could read and react to each other's proposals, but they could also read and react to the proposals with this one teacher at [another school] to see if his kids could do the same thing. Like that's something we have planned, but as it turns out the blogging site or the software that we have on the internet for that purpose is actually banned by the district.

I have to teach things in a certain way, at a certain time, for a specific reason. I think I have a big goal that we want for our students and mine was…CRTs and making AYP; making sure kids perform well on the math and reading and writing sections. Like [that is] number one, that's it. I don't want to say that's it, but it takes precedence. For example, like if you were to start observing me I guess any time next semester, what you would see is a whole bunch of CRT prep. We made AYP two out of [the last] three years and last

year we didn't. Specifically one of the reasons why we didn't make AYP was because number one our writing scores sucked and number two our math scores sucked as well too. So, this year it's like there's a big focus for it. If our CRT is in March, in around late January or February, we'll pretty much stop teaching science and we'll say, "Here's a math problem. I'm going to show you how to do this math problem," or "this is how you write an essay." [We are going to focus on] math, reading, and test taking strategies.

I have a clear idea of what a perfect classroom looks like. It's a very student-centered environment where I am not freaking out because I don't need to because I know that my students understand the significance of their education and execute like not only what I want them to do, but what they want themselves to do. A student should be able to come up with their own question within the context of what we're studying. So say like, for example, when we were talking about earthquakes and seismic waves, one of my kids had a question like, "So, q waves and s waves and only one type of wave can go through one type of material, like why does that matter?" We talked about how we know how the layers of the earth look like because of explosions and stuff like that and earthquakes and stuff like that. So, like really, how do scientists use that information? Ideally, numerous technological innovations [would be] at their disposal, whether it would be computers, internet, SMART Boards, whatever, and in partners and groups and [the students] will actually use that question and go find an answer to it on their own. That's what I have, that's how I envision this.

Sophia, Sixth-Grade Math Teacher

[Literacy is] being able to understand [or] comprehend written words and transfer knowledge to something else. [Literacy] plays a huge role [in math] because most of the

standardized tests that they have are some type of a combination in writing and reading. So I have a word wall in my room, and I have a vocabulary wall in my room and samples. I tell them, "look over there, look over, there it is!" Plus our kids are so low that even if they can read the vocabulary, the chances are they don't [understand]. [The integration of technology in math has made me more aware of literacy] in the sense that when my kids are on their computers there's probably four to six different programs running. So it's hard to make sure that they know what they're doing, because when they go to read a passage or when they go to read directions, [I wonder] "Okay, did they miss this because they misread the directions? Or because they didn't understand the vocabulary that was there?"

With what I do in my classroom, I would define [technology] as an alternative method of comprehension because for some of them that's what it is. It is also an alternative assessment method. [Technology] means you can reach a whole different level of learner in your classroom. So, you know, we've always had the visual learner and the dah, dah, dah, and the computer just adds a whole other level in there for a different kind of learner. I think [technology] engages them. Everything is instant gratification, give it, give it, give it, give it. If [technology] gets them excited, it gets me excited. In the teaching sense [the integration of technology in math] just means an alternative assessment tool. [I tell other teachers] "Don't be scared of [technology]. The kids will probably figure out how to use it faster than you will. It's just another way for them to show you what they can do."

Technology is a huge part of my life. I have a "Smart House" where I can set like my air conditioners to go up and down at a certain time. I have lights that come on and off at

a certain time. I can turn on the stereo here and not the stereo there, and the speakers here and not the ones there. I can turn on the hot tub using a computer. I have three computers at home, two in the office and one in the kitchen. It was a personal [choice to integrate technology in my math class]. Not everybody is interested [at school, but] it's so prevalent at [my] home. The more I know [about technology], the more I let them use it basically. Sometimes [technology] is my best friend and sometimes…(laughs). [My reason for integrating technology comes from] not being scared, that's exactly what it is. I'll try anything they throw at me. So bring it on and we'll see what happens!

I have a mobile lab in my room with 36 laptops on it; all connected wirelessly. But mostly I use the SMART Board and the students use the SMART Board. [The SMART Board is different from a whiteboard] because the SMART Board is interactive and the others are not, basically. [The SMART Board] just helps you to reach the visual learners. And for the visual learner as you get into algebra and geometry it doesn't compare to anything; it's just spectacular. [I give] much thought [to my use of colors and font on the SMART Board]. I think colors help them remember things. I teach much differently [with the SMART Board]. Geometry is a lot of fun. [The students] always have trouble with it. So because you can put the shape on the board and the students can actually move and manipulate it and can put a compass on top of it and overlay layers and layers and move everything and shift everything and measure everything and they can even record it if they want and keep it.

When we got our SMART Boards, there were four of us that got them at our school first. No manual, no training, no nothing. Of course, you have to do what your boss tells you to do. He brought those SMART Boards in with no training, no background, no

people to help us and said, “hey, figure these out,” and we’re like, “okay.” [When we did receive professional development] the people presenting the inservice had very limited knowledge as far as the capabilities of the machine. We [as teachers] knew more than they did and that’s not good. And it’s still that way today. I think what it is is [the trainers] know the board and they know and they know and they know, but they never use it. I personally as a teacher do not get proper training, instruction, on how to use these programs and the one-time thirty minute [training] doesn't do it if you're lucky enough to get that. If [the administration is] going to mandate or ask us to use a program, we need to be properly inserviced. Properly inserviced is not 45 minutes after school for one day and it’s not a full day either, to where you’re head is spinning and you can’t remember the first thing you were supposed to do. If you would like us to do something, we need to practice it just like the kids do. And then again the, you need to have…a knowledgeable person on campus that can answers these questions and fix these things and get them back up and going for you when it goes down instead of it being down for four months with 30 computers sitting there doing nothing.

My lessons are scripted. The program we use is scripted. The only thing it doesn’t have in it is technology. There’s a lot of hands-on, a lot of manipulatives. So when there’s a manipulative [in the program] we create the same manipulative on the SMART Board. Along with seeing it and moving it and all that, [the] students can also do it at their desk. That is helpful. [If] I see that the kid has done it right then I’m like, “Oh, why don’t you go up there and work your magic” and they do. I don’t think I can break [the SMART Board]. There’s times where I’ve had to force it closed. It pisses me off. I mean, we’re supposed to spend so much time on this dah, dah, dah. It’s like, “Okay, that’s great,

but technology is not reliable." Once it goes down, it's down and we got nothing. So, I come back and teach you how to add without calculators. You know, if you go shopping and you give somebody, I don't know, it's like $10.00 in change and you give them $20.00 and they can't figure what to give you back (laughs). What I'm trying to talk Mr. West into is [that] any incoming sixth grader that cannot add, subtract, divide, and multiply does not get an elective until they can. They need to be put into a title math class. So they still get their regular math class but they are in the title as well. They don't need [electives], I'm sorry, music and art are important absolutely, I'm not debating that and some kids that is all they will ever excel in, absolutely, but in the real world when you're twelve and you are making tally marks to add five and seven there is something wrong with that.

[Through the integration of technology in math] I've gained gray hairs! (laughs) No, it's very exciting to learn something new, and a new program, and it is fascinating. [This integration] just makes it so you can reach more kids. For me personally, I know that my kids are going to be more prepared when they go to high school or they go out in the real world than a lot of other kids because they will have had this experience; real life experiences. [My students have gained] skills that they will need all the way through high school, they are going to need these skills. And even if they don't get that far, at least they know that they're not going to break [the technology]; they can't screw it up. Just go ahead and give it a shot. That used to be what I'd tell them, "Go on and give it a shot. Don't throw up on it and no gum. Aside from that you really can't hurt it." And, what else have they gained? Just the knowledge that there is more than one way to do a math problem and more than one way to see a math problem. Because a lot of kids, like I said

before, can't or won't do it with paper and pencil, but they will do it in front of a screen. They have to be able to operate that computer. Whether you can [use the technology] or not has nothing to do with what you want your students to be able to achieve. In this day and age, they've got to be able to do it.

[Has technology changed] how I think about math? No. [Has it changed] how I teach it? Yes. There is less paper and pencil, that's good, it's less but it hasn't replaced it. [My] second language kids can sometimes, they would rather see the visual and see their visual explanation I guess, where it's more animated and moves more instead of the paper and pencil. So in one respect, because of the vocabulary, [the technology] can kill them. But [it gives the students] another way to look at it. Plus, I can look at the programs and put them in at their grade level. I couldn't do that in a [traditional] classroom, but here I can do that. [Technology makes math] extremely individualized. [Technology] just extends [math]; it's just another component. Nowadays [the students] love sitting in front of that screen. I can see a lot of students doing things on computer that they won't or can't do on paper. They will actually tell me that it's easier on the computer, even though it's the exact same thing. I guess if they change how they learn, you have to change how you teach them. Otherwise it's not going to work. I try to look at it from the kid's point of view. I mean, you're not going to want to come into a math room and have someone tell you, "Sit down and shut up and do this worksheet." If it was me, there is no way. You know, I look at it as "Would I want my kids in that room?" If the answer is "Hell no," then I'm doing something different.

[Technology has changed how I think about math], but only to the extent that money and time will allow. I know there's programs out there where you can do wonderful,

wonderful things. You can individualize a test and send it out to the kid's computer and have the computer score it and send it back to you. You can see what's going on [immediately]. So yeah, money and time absolutely, because I would love to have all those programs. There's so many programs out there that would make my life and their life so much easier. Even if I purchase the program myself, which would be illegal because it has to go through the district and they have to okay it by the time they okay it and then they want you to buy it through them even though I can get it for third of the price somewhere else, all that bureaucracy crap.

I'm not 24/7 with [my integration of technology], but I would also use it more if it worked more. [My] frustration comes when they don't work properly. It is [also] frustrating when all those [laptop] computers have been sitting locked in a room for six months because nobody had the time to get them. So that is frustrating. Well [the school district] took my laptop cart. It's gone, because the district wanted them reimaged and I was told that I would get them back in 3-4 days. It's been a month. It means that our ECS most likely put something on them he shouldn't have. So they all have to be scratched clean and then everything put back on. Yeah, and it's terrible because the kids are used to them and they know certain days or certain things or whatever. I'm just like "Don't look at me. As soon as he brings the cart back, we'll be all over it again." [I think that's why I rely on the SMART Board because] it's mounted to the wall and they can't take it away from me. It's mounted to the wall and the ceiling, so they can't have it. [My integration of technology in math is] all positive, except for I'm wondering, "Do they take it away and don't give it back?"

I want to be an ass-kicking [teacher], (laughs) hopefully one that will make a

difference to someone one day. [In order to become that teacher I need] prescription drugs and alcohol. (laughs) Ah! [I need] lots of patience, lots of patience. [I don't need anything external to assist me], I mean I use it all, but when it comes right down to it I remember having a chalkboard and that (makes a clicking sound and pretends to crank a wheel) to make the dittos. I love my school, I love my kids, love it, love it, I wouldn't want to teach anything else except for those children. I'll never [teach] anywhere but at an at-risk school. [In a perfect world] my students would be, the hierarchy of needs would be met in my students before they walk into my classroom. They would not be hungry. They would not be tired. They would not be sleepy. They would not be worried if their mom is getting out of jail today. They would not have all this baggage that eleven, twelve, and thirteen year-old kids shouldn't have anyway, but they do. It's very hard to take a child that doesn't have those primary, basic needs met and make them understand that this will help them in the future and this is their way out of that. It's very hard to get them to understand that when they have all that baggage on them. We have a lot of kids that just come to school for the food.

The purpose of education hopefully, is to make you a well rounded person. I would hope that a decent education would help you to function better in society and hopefully it would make you just a better person because you're exposed to so many different things; that you would just be a better more understanding individual. For the most part I think [my math class] does [this], and I think part of the reason is that we do not use the technology all of the time. If they're just in front of that machine they don't learn to relate and respect and get along with other people. They just don't and that's a big problem I think. You know, nothing makes them happier than sitting in front of the computer. I

think [technology is] a good thing, and I think it is a necessary skill these days to have, but back to what I was saying before you still need human contact and I don't think they're getting it.

[The integration of technology in math] means more, more, and more work and it actually means, when I say more work, I mean it to be more of my own time figuring out what to do because we are not given time at all to do any of that. So it means more of my own time spent on the computer doing school things and not going to Craig's List and Overstock.com, oh, I love that! Yeah, I will have to spend some time this summer figuring out whatever, whatever, whatever, and that's a pain in the ass but it's alright too. I get excited too. [Technology makes me feel] stupid (laughs) it's true; stupid because there is something new all of the time. I can't keep up, and I wish I could but I can't and I don't, but I do the best I can with what I've got. I know what I know, but that's all.

Summary

The purpose of these reconstructed stories was to capture the six teachers' experiences as they navigated the integration of new literacies in their math and science content. Additionally, I sought to situate their stories within the context of the school and the realities and complexities of daily classroom life. While I constructed the stories, the words belong to the teachers alone. The reconstructed stories included the teachers' definitions of literacies and technologies and then described in depth their experiences with integrating technology in their classrooms and the impact this integration had on them. While each story was unique, there are commonalities across all six teachers' experiences. Therefore, in an effort to better understand the phenomenon of the

integration of new literacies, I identified the essential themes that were evident in the teachers' experiences. These themes are discussed in detail in Chapters 5 and 6.

CHAPTER 5

FINDINGS: ESSENTIAL THEMES

"*We gather other people's experiences because they allow us to become more experienced ourselves*." (van Manen, 1990, p. 62, emphasis in the original)

In the previous chapter I shared the reconstructed stories of six upper elementary and middle school math and science teachers that were created in an effort to gain deeper insight into their worlds. By studying the individual I was able to gain insight into his/her professional lived experience. The teachers participated in this study through interviews, reflective journals, and allowing me to observe math or science in their classrooms. Through this study I sought to make sense of the individual experiences of these teachers as they integrated new literacies in their math and science content. While the individual stories provided insight into the particulars, an analysis of all six teachers' experiences began to capture what the integration of new literacies means for math and science teachers in upper elementary and middle school classrooms within this particular social context. Therefore, the purpose of this chapter is to describe the themes that were identified following a systematic analysis of the data. While it is impossible to provide an exhaustive list of themes, the ones discussed here were dominant throughout each teacher's reconstructed story. The essential themes centered on technology, teacher, content, students, and context (see Figure 2).

For these teachers, the integration of new literacies in math and science means:

- Technology exclusively
- Rethinking who they are as teachers

- Stabilizing rather than challenging the content
- Rethinking student learning, circumstances, and futures
- Serving official context and discourse

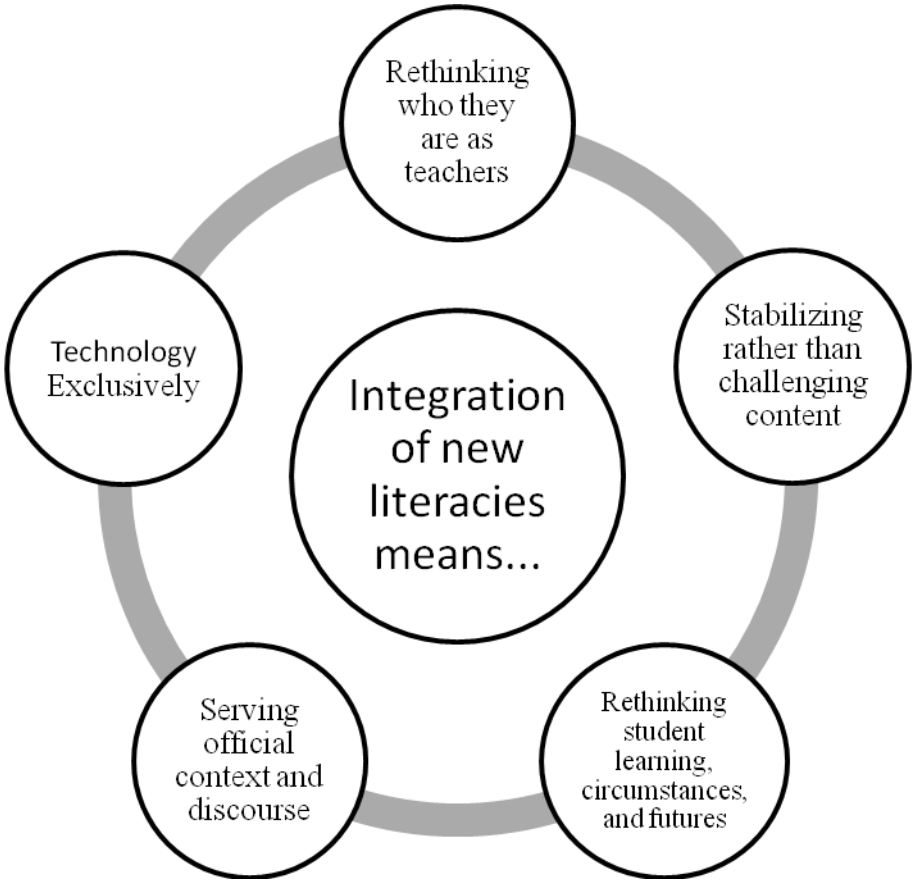

Figure 2. Essential themes of the teachers' lived experiences.

As described in Chapter 3, the five themes were identified through the teachers' interviews. Therefore, the meaning for teacher, content, students, and context is viewed through the teachers' perspective. In the following sections I address each theme and

subthemes that were constructed during data analysis. In organizing the data, I wrote the themes in the form of a question and then used the subthemes to provide the answers. I conclude each section with a summary of the essential theme. I used exemplars from the teachers' interviews and reflective journals, my field notes, and the principals' interviews to support the themes that captured the teachers' experiences as they integrated new literacies in their upper elementary and middle school math and science classrooms.

What Does New Literacies Mean?

I walked into Kelly Middle School with a recorder, notebook, and a list of questions. My first interview for this study was conducted with Eden, a seventh grade math teacher. I sat down with her and began to explain the purpose of this study. When I used the term new literacies I was met with a blank stare. Eden had not heard of this term before; therefore, I gave her a brief explanation that was informed by the work of Lankshear and Knobel (2007). I sought to explain that new literacies involved "technical stuff" and "ethos stuff" (p.7). I shared with Eden that new technical stuff included technology that was chronologically new such as blogging, podcasting, and interactive whiteboards. But I also stressed that new literacies included a different way of thinking about literacy that encouraged student creativity, collaboration, and shared knowledge. Eden informed me that while she did not know the term, it made sense.

My experience with Eden was not unique. In fact, I had similar conversations with the remaining five teachers. New literacies was unknown. And while Kevin and Naveed had been exposed to the term in the previously mentioned grant, it was not part of their common vocabulary. However, as I described the term and further clarified my study the

teachers were comfortable in discussing their integration of technology in their content areas as well as sharing their beliefs about literacy. And while technology is only one component of new literacies, it became the focus word for this study.

Although the level of integration varied among the teachers, the use of new literacies had a large impact on all of them. In our final interview I asked the teachers to finish the sentence "Technology makes me feel…" Their answers included stupid, powerful, connected, capable, and empowered. The teachers' affective response to this integration was evident throughout the study.

In an effort to follow the teacher's lead I used the term technology when talking with them. In writing this chapter I use both technology and new literacies. The term technology is used when I share the teachers' experiences. However, when I am discussing the experiences and findings from my analysis I use the term new literacies. I will further explore the distinction of these two terms in the following chapter.

The theme, "What does new literacies mean?" was developed through the subtheme which included the teachers' definitions of technology. In the following sections I discuss this subtheme in addition to providing an overview of the technologies that were available in the schools and classrooms.

Definitions of Technology

While the term technology was used by all of the teachers in the study, it was defined in a variety of ways. Two of the teachers defined technology in terms of hardware. Evan stated, "Technology for me revolves around computers." Similar to this thought Eden commented, "[Technology is] more than just like the PowerPoints, maybe, I don't know, it can be all different things. [The integration of technology in math] means using any

kind of machinery." For these two math teachers, technology was something that was plugged into the wall. Additionally, technology was something removed from their content area. When defining technology, these two teachers spoke about it as a separate entity from their content area.

Three of the middle school teachers defined technology in relation to their content. For example, Sophia stated "I would define [technology] as an alternative method of comprehension because for some of them that's what it is. It is also an alternative assessment method." For Sophia, technology was hardware, however, it offered students another way of "doing" math. The two science teachers had the broadest definitions of technology. For these teachers, technology was related to science tools, both electronic and non electronic. Naveed stated "[Technology is] an apparatus for showing kids the real life implications of our study." Kevin pushed the definition further as he discussed technology by stating, "[Technology is] any tool that can be used or applied to a task…not just an assignment or anything but any sort of task in daily life, obviously education, but any kind of tool." For Naveed and Kevin, technology was a tool that had implications for students both in and out of school.

While definitions of technology were readily defined by the previous five teachers, when I asked Angela to define technology she immediately stated that she had never thought about it before. She informed me that she needed to think for a while and when we came back to this question Angela stated "[Technology means] a lot of work. But, technology also means strength. It gives me the power to do more things than what I was able to, so it's a mixed feeling. [Technology is] almost like a human – strengths and weaknesses, personification." This was Angela's third year of teaching and her first year

as a fourth grade teacher. She often expressed feelings of being overwhelmed with the content and the technology, both of which were new to her.

As the teachers shared their definitions of technology, they also listed the technologies that were available to them in their schools and classrooms. While there was some variation of technologies all of the teachers listed the following items:

- Interactive whiteboard
- Teacher laptop
- Teacher desktop
- Television/VCR
- Video Streaming
- Student computer cart
- Computer labs
- Calculators
- Manipulatives
- Digital cameras
- Student activotes

Though a variety of technologies were available the majority of our conversations revolved around the interactive whiteboards. Interactive whiteboards are interactive displays that are connected to a computer and a projector. The desktop screen is projected on the interactive display and the images can be manipulated through the use of a pen or finger. Fairview Elementary School and Kelly Middle School had purchased the brand Promethean Board, and Washington Middle School had purchased the brand SMART

Board. The average cost for these boards was six-thousand dollars each. Given the expense, newness, and perceived capabilities, the teachers talked a lot about these boards. The level of experience varied among the teachers. At the time of the study Kevin had the most experience with three years. The remaining teachers were in their first or second year of use. The interactive whiteboard greatly impacted their thinking about technology; in fact, for most of the teachers it was difficult to get them to talk about something other than their interactive whiteboard. Angela articulated her fears about the Promethean Board. She stated, "These [Promethean Boards] are expensive; they have a lot of tools on there, and half of them I don't know how to use. I'm like 'Whoa, I haven't scratched the surface.'" Sophia had similar worries. She said, "It's on your desk. So I get worried sometimes though because I know I'm not as good on it as I should be."

The theme "What does new literacies mean?" was answered in the previous section and included the teachers' definitions of technology. New literacies was an unknown term. For these six teachers, new literacies means technology exclusively.

What does the Integration of New Literacies (Technology) Mean for Me as a Teacher?

It's Monday morning, Sophia's first period is an all girl math class. On a typical day, the agenda is displayed on the SMART Board. However, today is not a typical day. Sophia said, "Okay ladies, this thing is giving me a spaz attack. It's always nice when the technology doesn't work on a Monday morning! Alright, one more time." Sophia restarts the SMART Board and her laptop. Sophia mumbles, "My light is on, my bulb is on, uh, uh, uh, uh." Sophia appears to be flabbergasted as she looks back and forth from the

laptop, to the SMART Board, to the projector. Sophia walks over to the SMART Board, knocks on the screen and says, "Hello, hello?" She then picks up a yardstick and walks towards the projector that is mounted on the ceiling. She swings the yardstick back as if she is going to hit it like a piñata. Instead, she pokes the reset button and shouts, "Yeah!" The screen on the SMART Board opens with the agenda and Sophia tells the girls, "Get it while you can ladies, because I don't know how long it's going to stay."

The theme "What does the integration of new literacies (technology) mean for me as a teacher?" was developed through the subthemes which included knowledge of technology, a shift in pedagogy, professional development opportunities, and a connection to students. In the following sections I discuss each of these constructs.

Knowledge of Technology

Because the purpose of this study was to capture the teachers' lived experiences of integrating new literacies in their content, a large part of our conversations revolved around what this integration meant for them as teachers and their instruction. In early conversations, the topic of personal use and knowledge of technology was often discussed. Angela was the exception to this group; she told me that because technology was used so much in the classroom, she needed a break from it when she went home. However, the other five teachers expressed that technology was an integral part of their personal lives. Some of the examples they shared included banking, social networking, blogging, and surfing the internet. The teachers expressed that their personal use of technology had an impact on their use and comfort level in the classroom. Sophia said, "The more I know [about technology], the more I let them use it basically." Kevin echoed this thought when he stated, "[My personal use] leads me to try and integrate it into the

class more because it's obviously a skill the students need to know." Additionally, Eden shared that when she was searching the internet at home she often found information that was pertinent to a topic they were studying. She noted:

> I actually found something that looks like box and whisker plots on a website, yeah, for a share builder for buying stocks and so I showed it to the students. I wouldn't have understood what they were if I didn't think about it as "oh, this is a box and whisker plot." So I showed it to them and said "you might actually see this" and talked to them about buying stocks. It was really fun, they were really into it. So sometimes if I'm outside of the classroom and I find something really cool I can bring it up. I think that I've gotten more comfortable with technology.

While these teachers felt confident in their use of technology in the classroom, several of them acknowledged that integrating it in their content area was overwhelming because they lacked the knowledge. As mentioned earlier in this chapter, the interactive whiteboards were the dominant piece of technology that was discussed. The teachers all shared their feelings of inadequacy when they first began using the interactive whiteboard. For example, Kevin stated:

> At first it was a pretty slow learning curve, and then it increased from there. So, I guess the first six months was kind of a challenge. After that, from there, I just saw it as a tremendous asset. When I started using Promethean Boards I was a little bit overwhelmed with having to learn the new software and things of that nature and some of the nuances that go with it. It was a struggle, but it's one of those things, it's like trudging across a tundra mile after mile kind of deal. You

> know you're getting some place. You don't always know how far you have left to go because I don't know everything about Promethean.

This feeling of not knowing enough was evident among the three female teachers. Each of them worried that their knowledge was limited and that there was always more to be learned. Angela stated, "I try to learn as much as I can as quickly as I can." However, each of them had busy lives outside of school and felt they would never catch up. Eden reflected, "I can feel a little scared by [technology] too and overwhelmed." The feelings of lack of knowledge and lack of time to learn was a topic the three female teachers discussed often. Through a mixture of frustration and laughter Sophia said:

> [Technology makes me feel] stupid. It's true; stupid because there is something new all of the time. I can't keep up and I wish I could but I can't and I don't, but I do the best I can with what I've got. I know what I know, but that's all.

Professional Development Opportunities

The teachers expressed a need for more knowledge, training, and time. Given the curricular demands at school and their full lives out of school, the teachers often expressed frustration with the professional development they had received. Time was considered a precious commodity, and when out of school time was devoted to professional development the teachers wanted the training to be focused. As the teachers shared their experiences, it was apparent that a large amount of content was covered in a short period of time. For instance, Kevin said, "With the staff development stuff, it's like 'we need to teach them this and that' and sometimes it's just better to understand what they've already showed us or what you want us to implement." Angela echoed this frustration as she commented:

> They have a Promethean trainer that comes in once a month and we meet in my classroom and she teaches us different things and some cool tricks…I've done a few things that she's taught us but I can't remember the cooler things. It's the basic things I can remember, so I'm kind of frustrated… I'm hoping that she'll teach us more, but maybe I should start taking notes because I'm like, "I remember clicking this button but it's not working."

While the teachers at Fairview Elementary and Kelly Middle School received some professional development, Sophia, at Washington Middle School, was initially left to figure it out on her own. Sophia reflected, "When we got our SMART Boards, there were four of us [teachers] that got them at our school first. [There was] no manual, no training, no nothing." However, when professional development was provided, Sophia was frustrated by the presenter's lack of knowledge:

> [I've learned] just playing with it…the people presenting the inservice had very limited knowledge as far as the capabilities of the machine. We knew more than they did and that's not good. And it's still that way today. I think what it is, they know the board and they know and they know and they know, but they never use it.

Sophia used the term "play" to describe how she learned the use the interactive whiteboard. This idea was expressed by all of the teachers. And connected to play was time. The teachers wanted time to try new things, practice what they had been taught, and problem solve. Eden said:

> I think [I need] just more time in developing [my understanding of technology], practicing. Every year [I'm] doing a little more of what I want to do. There are

> some things that I don't know [about technology] so I don't know how to do them…So, [I need] the knowledge, the training, and then the time also. Pretty much it comes down to time.

Because the professional developments were not meeting the teachers' needs, Sophia offered advice for district leaders and administrators. She stated:

> We need to be properly inserviced. Properly inserviced is not 45 minutes after school for one day and it's not a full day either, to where your head is spinning and you can't remember the first thing you were supposed to do. If you would like us to do something, we need to practice it just like the kids do.

A Shift in Pedagogy

As I spoke with each teacher, while frustrations were expressed, there was an excitement connected to this integration of new literacies. Angela enthusiastically stated, "It's like me being a big kid. I don't know, it's always like there is something new that I've learned and I'm all excited about it and the kids get excited because they see me excited." The idea of learning something new was consistent across all of the teachers. When asked what they had gained by integrating new literacies in their content areas, every one of them discussed how it had impacted their pedagogy. From listening to the teachers, new literiacies shifted their instruction from a pedagogy of telling to a pedagogy of showing. The teachers acknowledged that students' needs were not being met through their pedagogy of telling. For example, Eden said:

> I think [technology is] changing how I teach. The reason why [I'm teaching differently] is because they're not getting it the old way, the traditional way, they don't get it. If it hasn't worked for them before, I don't know why I keep doing it.

Similar to this thought, Sophia reflected that she needed to change her instruction to engage the students. She stated:

> I guess if they change how they learn, you have to change how you teach them. Otherwise it's not going to work. I try to look at it from the kid's point of view, I mean you're not going to want to come into a math room and have someone tell you, "Sit down and shut up and do this worksheet." If it was me, there is no way. You know, I look at it as "Would I want my kids in that room?" If the answer is "Hell no," then I'm doing something different.

As the teachers spoke about a shift in their pedagogy, the three key words used were visual, variety, and fun. A pedagogy of showing was adopted by the teachers. The interactive whiteboards allowed the teachers to model content for the students. One of the greatest benefits of the interactive whiteboard was its ability to save information. When describing this, Evan said:

> You have an unlimited amount of blank white screen space basically. You can save that information and pull it up days later. I mean, that kind of stuff is just incredible and then the video utilities, it's being able to watch clips and whatnot.

On several occasions I observed the teachers pulling up previous lessons to show students how the content in a new lesson built upon a prior topic. In addition to the ability to save information, the teachers were thrilled that the interactive whiteboard provided opportunities for students to interact with the content through multiple modes. Eden said:

> The positives would be that we can go to endless places on the internet, everyone can see it. There's video clips, there's all kinds of supplements. I think there's so

> many visuals. I mean they can hear things, see things, I think it's just great in those ways.

Interacting with content through multiple modes was not just something the teachers articulated to me, some of them talked to their students about it as well. For example, when introducing a unit on nuclear energy Kevin asked the students to copy down the steps of an explosion. He told the students, "We're looking at what happens to people, buildings, and other things." Kevin went on to say, "Then we'll watch videos [of explosions], that way we're not just talking, you'll draw them, and then you'll see them as well." For these teachers, the visual was a key component to their instruction. The teachers' pedagogy of showing included video clips, manipulatives, lab experiments, and instruction through flipcharts.

While interactive whiteboards were the main instructional tool, the teachers strongly believed that a variety of learning tools should be used in the classroom. Kevin noted, "What you have to realize is, you know, a variety of technology is better, electronic or otherwise." Eden agreed and expressed her desire in varying her instruction as she stated, "I think that in the perfect world it would be a Promethean [Board] game one day, manipulatives another day, maybe showing what you learned on a worksheet one day; changing it all up." As I observed in the classrooms, I witnessed the teachers' attempts to add variety. Again, video clips, small group activities and discussions, as well as individual projects were incorporated if not daily then throughout the week. I often had informal conversations with the teachers at the conclusion of observations. There were days when the teachers were excited about the variety of instruction they employed and days when they felt they had regressed to a pedagogy of telling. The teachers often used

technology as a management tool. When the class misbehaved lectures and worksheets were often used. During one observation, Kevin walked by me after assigning bookwork and said, "Not every day is about fun, some days you need to get to work."

When reading the teachers' reflective journals, many of them wrote, "It was a fun day." When I asked them to explain what they meant by fun, the word was connected to their personal enjoyment of teaching and interacting with the content through technology. Rarely were students mentioned during these conversations. Technology provided opportunities for the teachers to have fun. As Dr. Condie stated in her interview, "[The teachers] love what they do, but they have toys to do it with." The teachers acknowledged that in the past their pedagogy had been one of telling and one that they did not find personally engaging. For example, Angela said, "[My instruction has] gotten more fun [because of the integration of technology]. I think it's just the overall enjoyment of learning math, as well as teaching it." By integrating technology the teachers felt they enjoyed themselves more. Eden reflected, "At the end of the day I feel refreshed and much happier than when I lecture and so it was a great day, lots of fun." Evan also commented, "[My instruction is] a lot more interactive. [Technology] makes teaching more fun, that's for sure."

Connecting to my Students

The teachers in this study genuinely cared about their students. They wanted to connect with their students and most viewed technology as a means for achieving that goal. The teachers all said the students were "different" than past students and believed that technology had made the difference. One teacher described his students as "digital natives." The teachers were willing to use technology to build relationships with their

students. Angela commented, “I know it’s possible that they could email me when they’re at home and so I feel like I’m more connected to my students because of technology.” In sharing his feelings about reaching out to students, Evan said:

> I know I’m just kind of a piece of the puzzle and maybe if I can affect them in one way for the better, then that will be good…if I could be someone that’s more loving than anything else maybe I’ll get my point across a little better. I talk Rock Band with some of these kids. That’s the only way to get to them.

While the teachers sought to connect with their students, they often spoke of them as a homogenized group. There was an assumption that because of their generation then technology was something they were all familiar with. However, when speaking with the teachers about their specific students, the teachers talked about homelessness, hunger, and a myriad of other challenges their students faced. In terms of numbers the teachers reported overall that less than half of their students had access to a computer at home. So as the teachers sought to connect to students through technology, it seems they were actually seeking to connect to “the generation,” rather than their individual students who did not have unlimited access to technologies outside of school.

While most of the teachers used technology to connect with their students, Kevin viewed technology as a means to connect his students with the science content. Kevin had a passion for science and wanted his students to share in that passion. However, Kevin perceived that the students felt disconnected to science and he was concerned that his instruction was the cause. Kevin said:

> The biggest way that [the integration of technology in science] impacts my teaching, and something that I'm really struggling with now, is trying to figure out

> how to make my teaching more relevant here at school. When [the students] walk home there's no application for them. Some are taking care of elderly grandparents, or sick parents, or a whole variety of things. Many have a tremendous amount of responsibility when they leave this place. That can make it difficult for them. So as long as I can give them some sort of skills with the technology that's about all I can ask for. They are not all going to be scientists; I really don't care if they are.

The theme "What does the integration of new literacies (technology) mean for me as a teacher?" was answered in the previous section. For these six teachers it meant knowledge of technology, professional development opportunities, a shift in pedagogy, and connecting to students. The integration of new literacies (technology) means rethinking who they are as teachers.

What Does the Integration of New Literacies (Technology) Mean for My Content?

A student dimmed the lights, and Angela started the interactive learning video. A chameleon walked across the screen and the students all said "Hi Henry." At the beginning of the year they named him and now the interactive learning video was just referred to as Henry. The topic for the day was perpendicular and parallel lines. The video defined the terms, provided examples, and asked the students to respond to questions. Angela paused the video several times to further explain the vocabulary words and also to provide students with the opportunity to answer "Henry" in both small group and whole group discussions. Additionally, Angela asked the students to use their bodies to demonstrate their understanding of the two terms. Throughout this math lesson I

observed multiple literacy events.

Because the term word new literacies was not a familiar term, I was curious about the teachers' definitions of literacy and if they perceived any connections between literacy and their content area. The theme "What does the integration of new literacies (technology) mean for my content?" consisted of two subthemes including: literacy is an independent content and content is static. In the following sections I describe these subthemes and provide examples from the data.

Literacy is an Independent Content

The teachers were quick to share the overall importance of literacy. In fact, when talking about literacy in a general sense their definitions often included math and science literacies. When discussing literacy Evan said:

> Being an elementary school teacher you're pounded with literacy and that's reading and writing. But obviously there's a math literacy as well. If you can't read well how are you going to take the information out of word problems or, you know, real life situation problems that they give you even on tests, even on these standardized tests? There's also math vocabulary. If you're illiterate in math vocabulary, you're not going to know the difference between the tens column and the tenths column.

Angela also discussed literacy in a broad way, she said:

> Literacy; that's like a huge bundle, but integrated through the entire day. Like it encompasses all. So [the students] have to have that literacy crutch in order to do what we're doing throughout the day because it's used in every subject, real life, school, friends, you know?

However, when I asked the teachers to talk about literacy within their content many of the teachers did not see a space for literacy. Moreover, their definitions of literacy as a general term often contradicted their definitions of literacy in their specific content areas. While Evan acknowledged the importance of literacy, and even a math literacy, he contextualized it within word problems and testing. However, when I asked Evan if the integration of new literacies had caused him to think more about literacy in math he replied:

> I'm probably not the right person to ask because to be honest with you, since I started teaching only math I've really just only thought about math. I really haven't thought too much about literacy.

Angela also said, "I want to say yes [literacy does have a connection to math] because I know that's the proper answer. You really don't think about [literacy in math]." Both of these elementary teachers talked broadly about literacy in a general sense. However, when pushed to think about a connection between math and literacy they did not see one. And while they acknowledged literacy as an integral part of every subject, when thinking about their specific subject, in this case math, literacy was viewed as an independent content area.

Eden, a middle school math teacher, talked about the importance of literacy in relation to word problems on tests. She noted:

> Literacy is reading and writing [and] being able to do so fluently and effectively. A lot of the questions have shifted now in tests to be a lot more word questions. And I know when I was growing up it seemed a lot more of just numbers and symbols. So I think for them to really understand mathematical situations and

how to apply them, they are having to use a lot of word problems. So they need to be able to read and do that.

As Eden and I talked about her integration of new literacies, I asked her if this integration caused her to think more about literacy in math. Eden said:

> I think a lot about literacy just because coming from elementary, I kind of see how everything is related to reading. Yeah, and you have to read to be able to do anything. I mean what I'm doing when I'm searching [the internet] is reading to find the answers and there is so much vocabulary. We use a lot of words. So I think I've realized that more, but maybe haven't made that connection: 'This is literacy.'

While Eden acknowledged that vocabulary was part of her instruction, she had not labeled this practice as literacy. This connection was something that occurred to her over the course of the study. Again, literacy was viewed as an independent content area.

Sophia, a middle school math teacher, also defined literacy in relation to test questions. However, Sophia was the only teacher to include writing in her definition. Sophia stated:

> [Literacy is] being able to understand [or] comprehend written words and transfer knowledge to something else. [Literacy] plays a huge role [in math] because most of the standardized tests that they have are some type of a combination in writing and reading; so I have a word wall in my room and I have a vocabulary wall in my room and samples.

Sophia was keenly aware of the striving readers in her classroom. Vocabulary words and mathematical definitions were displayed all throughout the room. Sophia consistently

referenced these word walls and charts throughout her class periods; vocabulary was a key component in her instruction. Through further conversations, as we talked about literacy, technology, and math it became clear that literacy did not extend beyond the printed word. Sophia said:

> [The integration of technology in math has made me more aware of literacy] in the sense that when my kids are on their computers there's probably four to six different programs running. So it's hard to make sure that they know what they're doing, because when they go to read a passage or when they go to read directions, [I wonder] "Okay, did they miss this because they misread the directions? Or because they didn't understand the vocabulary that was there?"

With these six teachers, there was a difference in their definitions and beliefs about literacy according to subject area. While the math teachers viewed literacy as impacting their content in a small way if at all, the two science teachers viewed literacy as the foundation of their content. Both of the science teachers had participated in grant-funded professional developments in content area literacy. The professional developments included professional readings, instructional literacy strategies, and group discussions.

Kevin, a middle school science teacher, had a broad definition of literacy. When I asked him to define literacy, he said:

> I can probably say it in five words; literacy is the way a student writes, communicates, basically express themselves is what I would say. It can be texting, it can be drawing, it can even be the way they dress in some ways. That's kind of a stretch, but in some ways I think it could.

As we continued our conversations, Kevin shared his thoughts about science and literacy. Kevin said:

> I think science encompasses a lot of literacies. With the math equations that we can solve, obviously with reading technical articles, reading out of the book, answering questions, things of that nature; even just the literacy or how to use the tools in a lab setting. So, I mean, that's a literacy all on its own. You can read, "oh, 500 milliliters." Well, measure it, because that may be a different application form of that type of literacy.

Kevin spent time each day teaching students how to "read" a calculator, thermometer, and periodic table. Text was not confined to words on a page, Kevin subscribed to a semiotic notion of reading as he assisted students in negotiating signs and symbols. Naveed, a middle school science teacher, also thought about literacy broadly. While he could not articulate a specific definition, it was something he was working towards. Naveed said:

> I think the whole goal of literacy in general is understanding. [However], I think what's problematic is how we define literacy within different disciplines. Like, I'd say to myself "I do want to focus on scientific literacy." However, when I say to myself, "scientific literacy, scientific literacy, scientific literacy," what that entails I only have a very, very loose [understanding]. I know it involves some sort of understanding of technology. I know it involves some scientific understanding of how scientific knowledge is developed. But, when I say "I want kids to develop or have a scientific literacy", if you would ask me to write that down in a series of

like objective or standards, I would be very…I think that's probably one of the issues I also kind of struggle with; it's ongoing.

As previously mentioned, Naveed also participated in a grant-funded professional development that focused on content area literacy. Due to other commitments he was only able to participate for three of the nine months. Naveed had signed up for the professional development because of the large population of striving readers at his school. Naveed was deeply concerned about the reading abilities of his students and struggled to find a balance between his curricular goals and the students' literacy needs. Naveed stated:

> I do think that my scientific objectives are important, I mean, that's important information, but kids have to know how to read and write. But I think my attention to literacy has more to do with our kids are just so far below where they need to be…our kids are just so far lacking with where they should be right now.

As previously mentioned, Naveed did not participate in this study beyond the initial interview and one classroom observation. Therefore I was not able to further discuss his beliefs beyond the one interview.

Content is Static

The teachers in this study acknowledged that the integration of new literacies changed their pedagogy. However, they did not believe that the integration of new literacies changed or had an impact on their content. For these teachers, the content was viewed as static. In speaking with the teachers, content was defined as a discrete set of facts and concepts that were bound by the state curriculum. When I asked them what would happen if all of their technology was taken away, all of the teachers replied that nothing would

change. For example Kevin said, “I think the technology supplements me because I think if I lost this [Promethean] board I could still teach.” Evan replied, “We’d have to draw out in the dirt, chalk on the sidewalk.” And Sophia said, “When it comes right down to it I remember having a chalkboard and that (makes a clicking sound and pretends to crank a wheel) to make the dittos.”

For these teachers, new literacies was simply an add on to their content. New literacies was separate from their content. Angela said, “I don’t know if [technology] is an incredible help but I don’t think it really hindered the way I taught. I think I could do it either way. [Technology] is like a resource that’s there when you need it.” Sophia said, “[Technology] just extends [math], it’s just another component.” New literacies changed how the content was presented but the teachers did not perceive that changing the medium changed the message. Eden stated:

> I think it’s just the medium that’s different. I don't think the curriculum, the content, I don't think it’s changed at all. I think it’s just the way…I think they're able to see more; see actual pictures more, but it’s the same content.

Perhaps the teachers held firm to the content because the technologies in the classrooms and schools proved to be unreliable. Throughout the four months that I visited the three schools there were several occasions when a server was down or a light bulb was burnt out, or some other technological problem occurred. Sophia reflected:

> There’s times where I’ve had to force [the SMART Board] closed. It pisses me off. I mean, we’re supposed to spend so much time on this dah, dah, dah. It’s like, “Okay, that’s great, but technology is not reliable.” Once it goes down, it’s down and we got nothing.

I witnessed the frustration that occurs when technology breaks down on my first day of observing in Evan's fifth grade classroom. I walked into Evan's room and sat off to the side. The students were transitioning to the next period and Evan stood at the door of the classroom to greet the next group of students. Evan walked to the front of the room and started the lesson, and the Promethean Board crashed.

E: It's doing what it wants to do, it's really acting up.

S1: It's human!

E: It's trippin', it's really bad.

S2: It's probably got a virus.

S3: Please no viruses!

E: It's acting so weird. We'll try shutting it down one more time and then we'll try something different. Let's worry about math not computers.

S4: Is everything plugged in?

Evan tried to refocus the students and shifted to the whiteboard to continue his lesson on equivalent fractions. As soon as the students got to work on the assignment Evan returned to the computer and Promethean Board. As Evan worked to reboot the system he talked out loud though I was not sure his comments were directed at anyone. Evan said:

> The board is really whacked out. I was talking about this with my technology group. If my computer dies I don't know what I'm going to do. The pen's not working. I'll try another thing. Trying to problem shoot and teach a math lesson at the same time is not a fun thing.

For the next three weeks Evan had problems with his Promethean Board. During this time I heard him state several times, "Let's worry about math not computers."

As a result of this unreliability, the teachers held firm to their content knowledge. While technology was in flux and out of their control, the teachers held firm to the static content. Out of the six teachers, Evan was the most overt in describing the static nature of his content. Evan stated:

> [Math is] kind of a constant thing. I don't think fundamentally anything is really different [in math because of technology]. I mean, it's been around for thousands of years. But I don't think the fundamentals of how I understand math I don't think [they] have changed at all. I like that math is, one of the things I told the kids when they first came in is "I like that math is constant. It's not going to lie to you. Like sometimes, in English, you have words that look like they're pronounced one way but they're not, you know, there's trickery, where in math, it's always the same thing." I just kind of like that it's uniform.

Along with the content being static, three of the four math teachers talked about "basic" knowledge that students needed to posses. This basic knowledge had nothing to do with new literacies. When I asked Angela if new literacies had changed how she thought about math, she said, "No, you still need that background knowledge, starting from the basics." Sophia also discussed the importance of the basics in math and had a plan for ensuring that students possessed that knowledge. She said:

> What I'm trying to talk Mr. West into is [that] any incoming sixth grader that cannot add, subtract, divide, and multiply does not get an elective until they can. They need to be put into a title math class. So they still get their regular math class but they are in the title as well. They don't need [electives], I'm sorry, music and art are important absolutely, I'm not debating that and some kids that is all

> they will ever excel in, absolutely, but in the real world when you're twelve and you are making tally marks to add five and seven there is something wrong with that.

While these two teachers talked about basics in relation to addition, subtraction, multiplication, and division, Eden believed that the content of seventh grade math was essential to the students' future lives. For her, seventh grade math was the basics. Eden told me about a speech she gives to her students at the beginning of every year on the importance of math. She tells her students, "Somebody can take advantage of you if you don't understand these basic principles, like pretty much everything you learn in seventh grade math is the stuff you're going to need to know for the rest of your life." When I observed in Eden's classroom I noticed a chart hanging on the wall at the front of the classroom that listed the "basic principles" that the students would cover. As the content was covered Eden literally put a checkmark next to it and then the class moved on to the next topic.

The teachers in this study were passionate about their math and science content, with the exception of Angela. This was her first year teaching fourth grade; she had previously taught second grade. Angela was very uncomfortable with the fourth grade math content and often told me that she was much more confident in the area of literacy. As a result, Angela relied heavily on the math program to guide her content. In fact, when observing Angela she held the teacher's guide throughout each lesson. The remaining five teachers were confident in their content knowledge. While new literacies allowed for students to showcase their knowledge, the teachers were secure in their knowledge of the content. For example, Kevin stated, "I know what content needs to be taught so I'm pretty sure

they're deficit there."

The two science teachers held broad views of content. When talking about science it seemed that Kevin divided it up into real world science and eighth grade science. Kevin discussed his eighth grade content in static ways. He talked about technology as a supplement to him, as a tool to present information. But the content did not change, it was static. However, when sharing his thoughts about the field of science Kevin said, "For me, science is pretty pervasive in most, if not all, fields just because of the way you approach problems or you try to develop new concepts, new ideas. So you can use scientific approaches for that."

While the five teachers discussed above articulated static or somewhat static definitions of their content, Naveed was a polar opposite. Content was not viewed as static but was something that was always in flux. It was Naveed's goal for his students to become comfortable with uncertainty as he worked towards apprenticing them into the scientific community. Naveed stated:

> Definitely [technology] has the capability of redefining what science is because I think in general, the perception for students is that scientific understanding, what scientists know, what we know through science is concrete fact. Like if I tell you, "This is what evolution is" that's just what it is, that's what you accept. I feel like what science instruction should do is try to mimic the scientific community and the processes that go within the scientific communities. Specifically, how scientific knowledge is developed and how scientific knowledge is revised constantly over time…in the science community you're in a context and that part of learning science is about being able to transfer things that you've learned and

> like different experiments, different inquiries from specific context to context. And technology really gives me and other science instructors the ability for kids to say, "Okay, this is the way that you might naturally do this." Frankly, [students] have no idea how scientific knowledge is developed. And then when they see something on the news like, "Scientists cloned a sheep and in five years they'll be able to clone a human, and we'll have stem-cell technology to basically take a stem-cell from an unborn fetus and use that to regenerate somebody's arms…." Like scientific development is really being fulfilled and how it's transitioning from time to time.

With the exception of Naveed, technology was typically used to present content. The teachers viewed their interactive whiteboards as a teaching tool, as means for delivering the content. Therefore, if the vehicle broke down there was another one available in the form of whiteboard markers and chalk. Past experiences had taught these teachers that technology was unreliable and often out of their control. As a result, the teachers embraced their content and held it constant. With the idea that content is static and is defined in discrete facts and concepts, literacy did not have a space in most of these classrooms. Literacy, while important, did not find an integrated space in these classrooms.

In the prior section I examined the theme “What does the integration of technology mean for my content?” For these six teachers it means literacy is an independent content and it means content is static. The integration of new literacies (technology) in math and science means stabilizing rather than challenging the content.

What Does the Integration of New Literacies (Technology) Mean for My Students?

I sat at the back of Kevin's seventh grade science classroom. The topic for the lesson was the effects of nuclear energy. Boys and girls were gathered around tables. No one moved, no one talked, and every single pair of eyes was focused on the screen. On that day Kevin did not talk, the students learned about nuclear energy through image. On the screen flashed images of destruction while testimonials from Hiroshima bombing survivors played in the background. At 9:40 the bell rang and no one moved. Kevin announced that there were two more minutes in the video and if they wanted to stay he would continue to play it. Out of 28 students, 22 students sat still. At the conclusion of the video and once the class was empty Kevin turned to me and said, "That's engagement."

The theme "What does the integration of new literacies (technology) mean for my students?" was identified through the subthemes engagement, utilizing student knowledge, learning through visual presentation, and providing future opportunities. These constructs will be discussed further in the following sections along with exemplars from the data.

Engagement

The topic of engagement was prevalent throughout the data. For these teachers new literacies meant engagement. Evan said, "I grab [the students'] attention [with technology]. It's a tool for keeping them involved [and] isn't that kind of the goal?" Kevin said, "Well with the students I perceive the benefits [of the integration of technology in science] to be more engagement which is obviously helpful." The teachers noticed more participation among the students and felt that technology played a key role

in that change. Evan commented, “I’ve taught many lessons before where the kids are just like, you know, beating their heads and turning around, heads down…I think [technology] engages them so much more and there is so much more participation involved.”

Angela sought to engage her students in learning the content through the use of student response clickers. Angela would show a multiple choice question on the screen and the students would “lock in” their answers on their voting devices. Once all of the votes were cast, Angela would flip the slide and a graph would show the percentages of the correct answers in green and incorrect answers in red. While this activity was competitive, the students worked together and encouraged one another to raise the class percentage. Celebration dances occurred when the score was 100 percent. While this was one incident, it highlights the engagement that occurred in the classroom. The students in all classrooms were excited to interact with the technologies.

For most of the teachers engagement meant something “fun.” Naveed clarified his definition of engagement by stating, “When I say engagement I mean authentic learning. [The students are] applying knowledge, like real-life circumstances.” Eden shared an experience when this occurred in her classroom. She reflected:

> The other day I had used the term when we talked about box-and-whisker plot and an upper quartile and a lower quartile. On a test it said the third quartile and it didn’t say upper quartile and I’m like, “Wait a minute, we didn’t talk about it like the first third quartile. Let’s just make sure.” I had something I had to pass out so I had a student come over and told her to look it up and leave it up on the Promethean Board. I said, “I’m pretty sure it’s the same thing as the upper

> quartile, but I want to make sure it's not the third quartile...." I said, "I want to make sure so why don't you look it up." And so she was looking it up and [the students] were kind of reading it as she was looking it up. I thought that was kind of cool, you know that we could search together and find the answer.

In this example, the students benefited from the opportunities the internet afforded as well as applying their knowledge of the technology and content in order to learn.

Utilizing Student Knowledge

The integration of new literacies in math and science provided teachers with the opportunity to utilize student knowledge. The teachers acknowledged that the students were well-informed in a variety of technologies. Sophia shared advice for new teachers and said, "Don't be scared of [technology]. The kids will probably figure out how to use it faster than you will. It's just another way for them to show you what they can do." Most of the teachers were comfortable with their students knowing more than they did in terms of technology. In fact, Kevin said:

> I'm not concerned about not knowing many things with these students because in all reality if I don't know it they probably don't know and if they do, they can teach the class and they can teach me. I mean, if I can learning something out of it, you know, great. In some ways, I'd really like to learn where I'm deficient and then where they're proficient so I can have them teach more. I mean, I've got no problem with them coming up.

While most teachers embraced the students' technological knowledge and abilities, Angela commented, "They are already creating things that I never, ever [have]." While Angela was nervous about her abilities, she did not let these fears stand in the way of her

students. She said, “I think that the most learning that I go through is just right in front of the kids. We kind of learn as we are going.”

Even though the teachers shared experiences when they utilized students’ knowledge of technology, most of the teachers felt they were more knowledgeable than their students. The reason for this was the lack of experience or limited access to technology that their high-needs student population had. But typically, the teachers felt their knowledge was superior. For example, Naveed said:

> I don't think that [the students] really encountered too many teachers with a knowledge of technology like I have. I don't mean to sound arrogant or anything like that, but they'll try doing these things that I’m just like, "you have got to be kidding me." Like [students are] trying to open up a proxy filter in the background, and I say "You think that I don't know this kind of stuff, but this is so far below what I know, you are not even challenging me."

Learning through Visual Presentation

As the teachers talked about the benefits of new literacies they all spoke about the ability to reach a variety of learners. More specifically they discussed the importance of reaching the visual learner. Sophia said:

> [Technology] means you can reach a whole different level of learner in your classroom. So, you know, we’ve always had the visual learner and the dah, dah, dah, and the computer just adds a whole other level in there for a different kind of learner.

New literacies provided these teachers with tools. Evan reflected, “I know a lot of the stuff that we’re using now really helps kids, especially visual kids.” This comment was

echoed by all of the teachers in the study. The teachers felt that if the students could engage with the content visually they would better understand the content. New literacies reminded the teachers, as Angela said, “There are different ways of learning.”

Opportunities for the Future

The teachers perceived that the integration of new literacies provided opportunities for the students’ futures. The teachers were aware that new literacies was already of a part of their lives and would only continue to grow in importance. Kevin argued, “This is [the students’] future and unfortunately I don't think we're even preparing them as much as we should be because everything that they're going to need to know is probably going to be computer based.” The teachers wanted to provide the students with opportunities that would benefit them in the future both in terms of content and new literacies. Sophia commented:

> I know that my kids are going to be more prepared when they go to high school or they go out in the real world than a lot of other kids because they will have had this experience; real life experiences. [My students have gained] skills that they will need all the way through high school, they are going to need these skills. And even if they don’t get that far, at least they know that they’re not going to break [the technology]; they can’t screw it up. Just go ahead and give it a shot. That used to be what I’d tell them, “Go on and give it a shot. Don’t throw up on it and no gum. Aside from that you really can’t hurt it.”

Many times throughout our discussions the teachers used the terms “real life,” “real world,” and “out of school life.” For most of the teachers,these terms were inherently

different from the classroom. However, none of the teachers acknowledged the problem that this dichotomy presented with the exception of Naveed. He stated:

> [Technology is] an apparatus for showing kids the real life implications of our study. Not only that, but it also kind of gives them an ability to extend their learning outside of the classroom environment because I realize that the walls of this classroom, they are kind of constrictive.

In this section I explained the theme "What does the integration of new literacies (technology) mean for my students?" For these six teachers it means engagement, utilizing student knowledge, learning through visual presentation, and future opportunities. The experience of integrating technology in math and science means rethinking student learning, circumstances, and futures.

What Does the Integration of New Literacies (Technology) Mean for My Context?

I arrived at Washington Middle School a few minutes after the first bell had rung and walked in with a male student. He held the door open for me, smiled, and said "Good morning Miss." I smiled back and thanked him for being such a gentleman. He told me today was good day and when I questioned him he responded, "Today my brother gets out of jail."

As I sought to develop a deep understanding of teachers' lived experiences, I found that the experiences could not be understood outside of the context. The theme "What does the integration of (new literacies) technology mean for my context?" was identified through the following subthemes: meeting the needs of a marginalized student population, a tool to support high stakes testing, meeting administrative expectations, and

negotiating issues of access. In the following sections I discuss each of the subthemes and provide examples from the data.

Meeting the Needs of a Marginalized Student Population

The students' lives at these high-needs schools are not without challenges. The teachers all told stories of student homelessness, gang violence, and hunger. The teachers felt added pressure to provide their students with "basic skills." Naveed said, "Our kids are just so far lacking with where they should be right now. And what we're trying to do is…provide them with the tools that they need to succeed later in life." When I asked Sophia what she needed in order to teach her students, I assumed she would ask for more technology, funding, or supplies. Instead Sophia responded:

> [In a perfect world] my students would be, the hierarchy of needs would be met in my students before they walk into my classroom. They would not be hungry. They would not be tired. They would not be sleepy. They would not be worried if their mom is getting out of jail today. They would not have all this baggage that eleven, twelve, and thirteen year-old kids shouldn't have anyway, but they do. It's very hard to take a child that doesn't have those primary, basic needs met and make them understand that this will help them in the future and this is their way out of that. It's very hard to get them to understand that when they have all that baggage on them. We have a lot of kids that just come to school for the food.

Because most of the students at these schools came from low socioeconomic backgrounds the teachers felt an obligation to provide them with the necessary knowledge, skills, and dispositions that would benefit them in their current and future lives; this included technology. Kevin said:

> They don't have [technology] on a continual, daily basis. Some students do at home, but in this demographic when you have students that don't get to go home and get something to eat…getting online is not really an option for them.

As a result, the teachers were cognizant of the students' needs to interact and become familiar with a variety of technologies. Mr. West, the principal at Washington Middle School said, "If I don't expose these kids to technology they are going to be that much further behind. So that's a big part of what we do is give them a chance, a fighting chance to know what's going on."

A Tool to Support High Stakes Testing

Because my study took placing during the months of December 2008 through May of 2009 I was observing in the schools during testing preparation for the Criterion Reference Tests (CRTs), otherwise known as year-end testing. As previously mentioned in Chapter 4, none of the three schools met AYP. As a result there was pressure to raise student test scores. As a visitor in the schools I was keenly aware of the pressure these teachers were under. At Washington Middle School a large sheet of paper was displayed in the front corridor that counted down the days to year-end testing. At Kelly Middle School testing dates and test taking skills were announced in the weeks leading up to year-end testing. Students at Fairview Elementary School were not overtly told about the test, but the teachers were under extreme pressure to raise testing scores. While my study did not begin until December 2008, Dr. Condie invited me to attend the opening faculty meeting in August 2008. At this meeting the focus on was year-end testing. The grade levels that passed the test were celebrated and the grade levels that did not were encouraged to try harder and to follow the example of successful grade level teachers. Many of the

discussions revolved around the programs and the test preparation strategies that successful grade levels and individual teachers had employed.

One of the reasons Angela was moved from second grade to fourth grade was to help raise the grade level test scores. As a third-year teacher she was asked by Dr. Condie to be the leader of her grade level even though her colleagues had more experience. While my observations focused on math in Angela's classroom, I was often there for the conclusion of literacy centers. On one particular day, close to the start of year-end testing I walked in to the classroom and noticed student names and reading scores displayed on the Promethean Board. For the next fifteen minutes, Angela led a class discussion on how each student could raise their individual scores. It was at that moment that I became acutely aware of the pressure Angela felt and in turn placed on her students to raise test scores. When reflecting on the testing pressures Angela stated:

> We, meaning teachers, get a lot of pressure to make AYP. We hear it throughout the summer because that's when they find out if we made it. So it starts from the summer. We start work in August. We usually get a banner saying we made it, or else there are sad faces. So we hear it from the beginning of the year. We hear how we need to push…But as a teacher, we also push the students a lot too because the administrators are on us so then we push the students. So I'm sure they go home with like anxiety…So I believe the stress is both internal and external. I believe the kids put a lot of pressure on themselves as well. Some of them just don't care, but I think they can feel what I'm feeling and it rubs off. They can tell if I'm stressed out. They're like, "Oh my gosh she's stressed out. We have to take the test. We are stressed."

While there was an expectation to raise test scores at Kelly Middle School, there was not the overwhelming pressure that was felt at Fairview Elementary and Washington Middle School. When I talked with the teachers at Kelly Middle School about the role testing played in their teaching, Eden and Kevin both expressed that it was something they thought about, but was not something they worried about excessively. Perhaps this was due to Mr. Jones's philosophy. As we talked about year-end testing Mr. Jones stated, "I'm also one of those educators that don't believe that everything that counts can be counted…Bottom line is we have a broader responsibility than test scores." However, at the other two schools testing was thought about constantly. When I asked Sophia about the role testing played in her teaching she replied, "Huge, huge, huge, huge, huge, huge, huge, huge, huge, huge, huge. All of our curriculum is driven by the test. Everything we teach is driven by the test."

With the pressure to prepare for the tests, technology was either eliminated or became a tool for preparing for the test. Some of the ways students used technology was to practice multiplication facts on a computer or answer multiple choice questions through student response clickers. As the year-end tests drew closer the teachers shifted from a pedagogy of showing to a pedagogy of telling. Evan commented:

> I see us really trying to integrate [more technology], but it's really difficult at the same time with the stuff that the district throws down to us you know. We're taking CRT's in March instead of at the end of school. And unfortunately the way that we kind of know how to [prepare for the test] is just kind of an old school way you know, where we present the information and then the kids give it back to us and hopefully they remember it for testing.

Technology was not the only thing eliminated from the school day, at Washington Middle School science was eliminated. In our first and only interview, Naveed explained:

> Like if you were to start observing me I guess any time next semester, what you would see is a whole bunch of CRT prep. We made AYP two out of [the last] three years and last year we didn't. Specifically one of the reasons why we didn't make AYP was because number one our writing scores sucked and number two our math scores sucked as well too. So, this year it's like there's a big focus for it. If our CRT is in March, in around late January or February, we'll pretty much stop teaching science and we'll say, "Here's a math problem. I'm going to show you how to do this math problem," or "This is how you write an essay." [We are going to focus on] math, reading, and test taking strategies.

Meeting Administrative Expectations

The administration played a key role in the integration of new literacies in math and science content. While the teachers' personal beliefs about and uses of technology influenced their pedagogy, it was the administrators' placement of technologies in the classroom and expectations of use that drove the teachers in this study. All of the teachers respected their principals and in most cases felt supported by them. Evan said, "[Dr. Condie] has provided us with everything that we've really asked for…She's really good about getting us the stuff that we need and that's great, even during these budget cuts and all of that stuff." All of the principals worked hard to provide materials and to support the teachers. Kevin commented, "We've had a tremendous amount of support from the administration…I think they've done a tremendous amount, more so than maybe necessary." The teachers at Kelly Middle School felt that Mr. Jones had offered a great

amount of professional development and had even provided an hourly stipend for teachers to attend the trainings outside of their contracted hours. However, the teachers at the other schools were often frustrated by the lack of support. Sophia said, "Of course, you have to do what your boss tells you to do. He brought those SMART Boards in with no training, no background, no people to help us and said, "Hey, figure these out," and we're like, "Okay." Additionally, the teachers felt that the learning curve was steep and a lot was expected of them by their administration. Angela stated, "I think it's hard too when administrators expect us to incorporate technology more and more because we don't know exactly what to do with the technology."

As I interviewed the principals, professional development was discussed. The principals felt they were providing as much support as money and time would allow. Dr. Condie said, "Running the school is dropping a pebble in a pond." The principals hoped that the teachers would support one another and that experienced teachers would mentor others.

Negotiating Issues of Access

As previously mentioned, the teachers had access to multiple technologies including but not limited to interactive whiteboards, student response clickers, the internet, laptop carts, student computer labs, and video streaming. However, access to the technologies was not deemed as enough by the teachers in order to meet the current and future needs of the students. Kevin stated:

> What frustrates me [about integrating technology is] that number one it's not always as clear cut as it should be. It's not always as easy and simple as it sounds. Part of it is just the opportunity to have the time with the students to just…..let go

> and get comfortable with the technology and number two to develop their skills. It's really going to be hard to develop somebody to be proficient on the computer, and I'm talking about the students that are on the lower end [economically] because obviously the students that have a computer at home and are on My Space, they have created their own kind of webpage and they're up there. But the students that don't have that access, developing their skills, whether it's computer labs being booked up and they don't have access to it or whether it's content things coming in [and] making sure they're prepared for the test.

Additionally, the teachers were concerned that the students were not interacting enough with the new literacies. Although the Promethean Boards and SMART Boards are defined as interactive, they were predominately used by the teachers. Evan said, "The kids, I think, kind of have this feeling that the Promethean Board is the teacher's toy." Eden also worried about the lack of student use of the Promethean Board, she said "There might be less of [the students] actually doing things, creating things, and more of them still sitting and watching." Kevin noted:

> I think the biggest factor in slowing down the students' progress with technology is the teachers. Yes, every school has a computer lab or what is it 99% of all schools are hooked up to the internet but it doesn't mean the kids get to use it. The kids get to watch the teacher use it they don't get to use it themselves.

The teachers also discussed the problems with maintenance. While the principals touted the vast amounts of technologies available, the teachers were frustrated with the outdated equipment. Evan commented, "There's the upkeep of the technology that you have and then, of course, the outdatedness. I mean these computers back here that we

bought four years ago, they're ancient now. So I mean they're nice paperweights; that's all they are." Naveed also expressed his frustration with the dated technology. He stated:

> We're specifically doing station labs with simulations on the computer [right now] and so I get here at like 6:00 am, expecting to type in the specific URL's for the simulation that I want them to do. But then I'm like, "Dude, these computers are just so old." I'm like, "God, damn it." … I wish I wouldn't have to deal with this crap.

The teachers wanted to use the technologies that were available to them. Lessons and activities were carefully planned, only to be thwarted by banned websites, downed servers, or run down batteries. It was evident that while the teachers sought to embrace technology they did not trust it. Sophia was thrilled when she learned she would be getting her own laptop cart in her classroom. However, the excitement quickly faded with the many challenges she faced during the school year. Sophia reflected:

> I'm not 24/7 with [my integration of technology], but I would also use it more if it worked more. [My] frustration comes when they don't work properly. It is [also] frustrating when all those [laptop] computers have been sitting locked in a room for six months because nobody had the time to get them. So that is frustrating. Well [the school district] took my laptop cart. It's gone, because the district wanted them reimaged and I was told that I would get them back in three to four days. It's been a month. It means that our ECS most likely put something on them he shouldn't have. So they all have to be scratched clean and then everything put back on. Yeah, and it's terrible because the kids are used to them and they know certain days or certain things or whatever. I'm just like, "Don't look at me. As

> soon as he brings the cart back, we'll be all over it again." [I think that's why I rely on the SMART Board because] it's mounted to the wall and they can't take it away from me. It's mounted to the wall and the ceiling, so they can't have it. [My integration of technology in math is] all positive, except for I'm wondering, "Do they take it away and don't give it back?"

While this is only one experience, it captures the frustrations that the teachers faced as they sought to integrate new literacies in their content areas. Again, technology was viewed as an unreliable resource.

The theme "What does the integration of new literacies (technology) mean for my context?" was discussed in the prior section. For these six teachers it means meeting the needs of a marginalized student population, a tool to support high stakes testing, meeting administrative expectations, and negotiating issues of access. The integration of new literacies (technology) in math and science means serving official context and discourse.

Summary

The purpose of this chapter was to discuss the essential themes that were present across all six teachers' experiences as they as they integrated new literacies. At the conclusion of my analysis and findings I found that the experience of these six teachers was about uncertainty and a search for stability. The teachers often used the phrase "I don't know." They were aware of the potentials that the integration of new literacies held and were often frustrated by their lack of knowledge. Even Kevin, who stated technology was a large part of his personal life said, "In some ways, I don't know much of anything." A variety of emotions were expressed over the length of this study. Feelings of guilt,

excitement, stress, joy, and worry were shared monthly, weekly, and even daily. When I asked Angela to share her feelings about the integration of new literacies in her math content she stated, "A migraine, it really is…there are probably some good parts about it, but the thing that sticks out is just headaches. It's been a headache." The teachers' experience was complex and muddled as they struggled to negotiate their understandings of themselves, their content, their students, and their context.

While the experience of the individual is powerful, an analysis of all six teachers' experiences began to paint a larger picture of teachers' lived experiences as they integrated new literacies in their math and science content in upper elementary and middle school classrooms. The five essential themes of integrating new literacies in math and science content included: technology exclusively, rethinking who they are as teachers, stabilizing rather than challenging the content, rethinking student learning, circumstances, and futures, and serving official context and discourse. In the following chapter I provide a summary of the study, a discussion of the five essential themes, and offer implications for professional development, teacher education, and future research.

CHAPTER 6

SUMMARY, DISCUSSION, AND IMPLICATIONS

Through this research I sought to bring to the forefront the lived experience of classroom teachers as they integrated new literacies in their content areas. This study specifically highlighted the stories of six upper elementary and middle school math and science teachers as they negotiated and integrated technologies that were available in their content areas. In this final chapter I provide an overview of the study including: statement of the research problem, theoretical framework, methodology, and findings. Next, I discuss the findings in relation to theory and practice. Finally, I discuss the implications these findings have for professional development, teacher education, and future research.

At the start of this dissertation I told my story of my first desktop computer in my first grade classroom. As I reflect on this personal story I realize that I did not see beyond myself; this technology was only for me. However, in 1999 I had not heard of the term "new literacies." I did not perceive the potentials of the computer and internet. I only viewed them as tools for organization and planning. However, when I began my doctoral program in 2005 and served as a field supervisor I was taken aback at the amount of technology that was available to educators. While the same desktop computer sat on teachers' desks, student computers now lined the walls of the classrooms, laptop carts were positioned in classroom corners, interactive whiteboards had replaced chalkboards and whiteboards, and student response clickers sat on desks. These classrooms looked very different. It was then that I began to wonder about the teachers in these classrooms; what was their story?

As I read in the area of new literacies, I found that the research is in its infancy. Many researchers are theorizing about the possibilities of new literacies and the research that is available typically focuses on students' out of school experiences with new literacies including IMing, social networking, and fan fiction (e.g. Alvermann & Hagood, 2000 & Lewis & Fabbos, 2005). Scholars of new literacies posit that schools and classrooms need to keep up with the times and often criticize educators for not taking up these new literacies (Lankshear & Knobel, 2003; 2006). However, in my review of the literature I became frustrated by the lack of new literacies research that takes place in the public school classroom. It appears that I am not alone in this frustration. In a recent review of the *Handbook of Research on New Literacies* Robert Tierney (2009) argues:

> Perhaps the area in which I am most reserved or concerned pertains to schooling. I find myself concerned about the questioning or lack of questioning about schooling in the volume…I am concerned that schools are not sites from which these or other developments are being launched, spurred, or expanded. (p. 338)

While there may be an assumption that new literacies should be a part of classroom discourse, as Tierney points out limited research exists. What is needed is research that directly focuses on the teacher either as the participant or co-researcher (Marsh, 2008; Moran, Ferdig, Pearson, Wardrop, & Blomeyer, 2008; Unsworth, 2008). While very few studies describe what these new literacies might look like in classrooms (Cervetti, Damico, & Pearson, 2006; Kist, 2005), even fewer have investigated K-12 teachers' perceptions of new literacies (see Karchmer, 2001; Hagood et al., 2008; Hagood, Skinner, Venters, & Yelm, 2009; Stolle, 2007). Furthermore, what is missing from the literature are teachers' stories that focus on the intersection of new literacies and content

area literacy. Therefore, this study fills a gap in the literature as it is classroom-based research with a focus on the teacher, new literacies, and content area literacy. Specifically, I sought to answer the following question: What is the lived experience of upper elementary and middle school teachers as they integrate new literacies in their math and science content?

This question laid the foundation for the study. As a result of this research question I relied on the work of Max van Manen (1990) in constructing a hermeneutic phenomenological study. This methodology enabled me to develop a deep understanding of the lived experience of the teachers as they integrated new literacies in their content areas in their own words. Six teachers participated in this study including two elementary math teachers, two middle school math teachers, and two middle school science teachers. Data were collected from December 2008 through May 2009 and included: five in-depth phenomenological interviews (Seidman, 2006; van Manen, 1990), weekly classroom observations, teachers' weekly reflection journals, and one principal interview at each of the three schools.

Underpinning this study is the belief that literacy is a social practice (Barton & Hamilton, 2000; Gee, 1993; Street, 1995). Literacy as a social practice takes into consideration how literacy is used and for what purposes. This lens was of particular importance as I sought to understand and make sense of the teachers' lived experiences of integrating new literacies in math and science content through literacy events that included their words and actions. An analytic and thematic approach (Seidman, 2006; van Manen, 1990) were used to guide data analysis throughout the study. Reconstructed stories of the teachers were compiled through an analysis of their observations and

reflective journals using a selective approach (van Manen, 1990), labeling (Seidman, 2006) cutting and sorting (Bernard & Ryan, 2010), and reflective writing (van Manen, 1990). The purpose of the reconstructed stories was to highlight the dominant themes; and to situate the teachers' experiences in context, thus, providing insight into the teacher as an individual. The next phase of analysis involved reading across the teachers' stories to identify commonalities. Again using the selective approach (van Manen, 1990), sentences or phrases from the transcribed data were used to identify themes that were prevalent across the collective stories of the teachers. Van Manen (1990) argues that the central question in phenomenology is "What is it like?" Therefore, throughout my analysis I kept this question in mind as I specifically sought to answer the question: "What is the lived experience of upper elementary and middle school teachers as they integrate new literacies in their math and science content?" I found, through the teachers shared stories, that their experience is filled with uncertainty and a search for stability. The analyses of the data resulted in the identification of the following five essential themes. For these teachers the integration of new literacies in math and science content means:

- Technology exclusively
- Rethinking who they are as teachers
- Stabilizing rather than challenging the content
- Rethinking student learning, circumstances, and futures
- Serving official context and disourse
- Define this

Discussion

As the teachers shared their lived experiences of integrating new literacies in their content areas of math and science it became clear that their experiences were complex and filled with ambiguity. The teachers were constantly negotiating and grappling with internal and external demands. In this section I discuss the findings through examples from the data and the new literacies research in an effort to juxtapose the lived experiences of these content area teachers with the current research in the field of new literacies.

New Literacies Means Technology Exclusively

When I first began to construct this study I did not expect to find classrooms where teachers were using the term new literacies as part of their daily vernacular. I did not expect to have conversations about the works of Don Leu and Michelle Knobel. However, I was surprised to find that the term was not at all familiar. While the teachers shared their beliefs about the importance of technology and, in a general sense, the importance of literacy, a new literacies perspective (Coiro, et al., 2008) was not evident. In fact, very few of the teachers discussed a connection between literacy and technology. From the results of this study, new literacies and the opportunities it affords have not found their way into the classroom.

In the opening chapter of the *Handbook of Research on New Literacies* the editors, Coiro, Knobel, Lankshear, and Leu (2007), describe four characteristics that make up a new literacies perspective. The characteristics include:

- New technologies for information and communication and new visions for their use require us to bring new potentials to literacy tasks that take place within these technologies.
- New literacies are central to full civic, economic, and personal participation in a world community.
- New literacies are deictic; they rapidly change as defining technologies change.
- New literacies are multiple, multimodal, and multifaceted (p. 14).

I thought it important to revisit this perspective in regards to my findings. The teachers in this study acknowledged three of the four characteristics throughout their interviews. The teachers were aware of the centrality of technology in the students' current and future lives. The teachers were aware that technology was in constant flux with new developments. The teachers were aware that technology was complex and included a variety of modes. However, the first characteristic, and perhaps the key characteristic of new literacies, was not present. New visions and new potentials for literacy tasks were not discussed. Therefore, it is not surprising that technology was viewed as a teaching tool as opposed to an opportunity to rethink their curriculum (Wilder & Dressman, 2006).

When technology is taken up as a tool or an add-on it limits the affordances of new literacies. Instead of thinking, for example, "what does the internet make possible that once was not?" the teachers in this study typically used the internet, among other technologies, to provide instruction on the daily objectives. The technology was simply a tool of presentation. Cuban (2002) noted, "When teachers adopt technological innovations, these changes typically maintain rather than alter existing classroom practices" (p. 71). Leander (2007) reported similar results in a study of one to one laptop

integration at a private secondary school for girls. Teacher interviews revealed a resistance towards change in the structure of the curriculum. Therefore, technology was viewed as a support or add-on to the established curriculum (Leader, 2007). In a discussion of the teachers perspectives Leander argued, "Technology in particular, is seen as an add-on, a 'tool' to support forms of practice that are well-rehearsed circuits that travel along deep grooves" (2007, p. 46).

The perspectives of the teachers in my study, along with those in the prior study, confirm Cuban's (2002) argument that technology does not reform education. What is missing from classrooms is a new literacies perspective. Without this perspective or mindset, technology will continue to be an add-on to the curriculum. Given the newness of the field of new literacies perhaps it is not surprising that the teachers were unaware of this specific term. However, a definition of new literacies accomplishes little if a new literacies perspective or mindset does not accompany it. When technology is viewed as a tool for presentation or a hook to engage students, it is easy to put it to the side and carry on with business as usual in the classroom. However, a new literacies perspective offers more than a new program, buzz-word, or gadget; it provides teachers with the opportunity to rethink teaching, learning, and content (Lankshear and Knobel, 2006). However, as evidenced by my findings this perspective was rarely found. The absenteeism of a new literacies perspective in the public school classroom eclipses the affordances of new literacies.

It is not my intention to be critical of these six teachers. I am critical of the lack of support they receive. As I reflected on the transcribed data and reviewed the literature, I often found myself wondering how these teachers were supposed to gain the knowledge,

skills, and dispositions necessary to integrate new literacies. There is an assumption that classroom teachers do not engage in out of school literacies. Lankshear and Knobel (2005) propose that if teachers are familiar with new literacies as insiders then they would "make productive connections between learners' prior knowledge and experiences, the potential of new technologies to expand student learning, their own knowledge…, and the learning goals" (p. 26). While this seems commonsensical, it was not the case in this study. Most of these teachers identified themselves as high users of technology in their personal lives; however, this did not translate into classroom practice.

In a review of the levels of integration of technology in classrooms, Schrader (2008) discusses the three levels that are typically taken up in classrooms which include learning about, from, and with technology. When teachers take up a learning about technology perspective the focus is on the technological tool; the tool is the content. The next level of integration is learning from technology. Schrader (2008) notes that through this perspective teachers use technology as the vehicle to deliver the instruction. Much like the previous perspective, learning from technology does not require the teachers "to adopt any special or additional pedagogies in order to integrate technology into their practice" (p. 464). The final perspective is learning with technology. This level of integration requires teachers to rethink their roles and to carefully select the technologies that are used in the classroom. As teachers' take up this perspective the focus is on the process of learning rather than the outcome. Schrader (2008) states that this perspective is "predominately opposed to our existing system of education" (p. 465) because of the emphasis on student outcomes rather than learning processes.

The Integration of New Literacies (Technology) Means Rethinking Who They are as Teachers

As previously mentioned, the level of integration of new literacies at each of these schools was not deep. Occasionally the teachers provided opportunities for the students to learn with technology (Schrader, 2008). However, technology was typically used as a vehicle for instruction. While this level of integration is simple or basic, it challenged the teachers' identities. I contend that teacher identity is a key component to the integration of new literacies in content areas.

In a study of preservice teachers and new literacies, Lewis and Finders (2004) sought to make sense of their students' reluctance to embrace new literacies. They attribute this reluctance to the preservice teachers' preconceived notion of the "implied teacher" (p. 108). These students held firm beliefs about what a teacher should do and how a teacher should act.

The notion of the implied teacher was prevalent in my study. Even though Naveed expressed a new literacies perspective as he talked about scientific literacy, fluidity of knowledge, and his inability to separate technology from science, he also shared his fears of classroom management and student collaboration. Naveed's identity as a teacher was in conflict with this identity as a scientist. Issues of identity and power are crucial in understanding cultural and social contexts. Street (1995) stated, "The uses and meanings of literacy entail struggles over particular identities up against other identities, often imposed ones" (p. 135). This struggle of identity was made even more evident as Naveed shifted his identity and role a science teacher to a teacher that prepares students for year-end tests.

During an interview Sophia commented, “I guess if [the students] change how they learn, you have to change how you teach them.” It was evident in the findings that the integration of new literacies shifted the teachers’ pedagogies from telling to showing. And while students actively used technology in the classroom, each of the six teachers was a permanent fixture at the front of the room. A shift in pedagogy did not shift their identities.

The teachers’ identities were rooted in the belief that they were responsible to teach the content objectives. However, while the integration of new literacies did not shift their identities it did destabilize them as they struggled to understand how to integrate new literacies, engage the students, and cover the mandated curriculum. The integration of new literacies provided teachers with opportunities to share the role of teaching and learning. For example, as Angela struggled to learn the intricacies of the Promethean Board she reflected, “I think that the most learning that I go through is just right in front of the kids. We kind of learn as we are going.” The teachers were aware of these opportunities but did not always embrace them. During an interview with Evan he justified his dominant role as an instructor and user of the technology as he stated, “The kids, I think, kind of have this feeling that the Promethean Board is the teacher’s toy but multiple times a week I ask kids to come up and do stuff on the board.” There was pressure from the administration to have the students use the technology. In fact two of the three principals stated that the technology was not really for the teacher. As a result, the teachers struggled to maintain their identities as math and science experts against the opportunities of new literacies.

New literacies challenges the role of the implied teacher. The implied teacher always

knows the content. The implied teacher delivers instruction. The implied teacher manages student behavior. Through interviews, observations, and reflective journal entries I gained insight into the teachers' struggle with identity as they sought to maintain control of their role as a teacher in an area like new literacies that demands fluidity. At the close of their chapter, Lewis and Finders (2004) state:

> Perhaps what is required of all of us…is to develop a bit more comfort with the ambiguous nature of identity so that more dynamic and multivoiced versions of what it means to be…a teacher can flourish (p. 113).

The Integration of New Literacies (Technology) Means Stabilizing Rather Than Challenging Content

Eight years ago William Kist (2002) described a new literacies classroom that comprised of a team of high school educators who taught Western Civilization through an art seminar. Kist described these teachers as pioneers in the field of new literacies as they broke down traditional curricular barriers in an effort to provide students with the opportunity to collaborate and create multimodal projects (2002; 2005). Kist noted there was speculation within the school that these teachers were forgoing content. However, Kist (2002) questioned, "What is 'content' in a 'new literacy' classroom?" (p. 376) It has been eight years since Kist first posed this question, and I would argue it has not been answered.

In defining new literacies, Lankshear and Knobel (2006) argue it is composed of "technical stuff" and "ethos stuff." They explain that "ethos stuff" is "more 'participatory,' more 'collaborative,' and more 'distributed,' as well as less 'published,' less 'individuated,' and less 'author-centric' than conventional literacies" (p. 25). As

teachers take up the "ethos" of new literacies (Lankshear and Knobel, 2006), it provides opportunities to rethink curriculum and instruction (Johnson & Kress, 2003). Furthermore, new literacies offers teachers and students the opportunity to develop "dispositions towards innovativeness [and] creativity" (Johnson & Kress, 2003, p. 13). To return to Kist's (2002) question, it would seem that in order to define content in a new literacies classroom it is essential to ask what counts as knowledge in a new literacies classroom. Furthermore, it is necessary to question who the knower is and where the knowledge is located.

Kelly et al. (2008) address these questions in a theme issue of *Review of Research in Education*. They purport:

> [Content knowledge] entails more than acquiring basic skills or bits of received knowledge. It also involves developing identity and affiliation, critical epistemic stance, and dispositions as learners participate in the discourse and actions of a collective social field…knowledge is not held in archives and texts, but is constructed through ways of speaking, writing, and acting. (p. ix)

This definition of content knowledge aligns with Moje's (2008) call for disciplinary literacy. While new literacies are not specifically mentioned by Kelly et al. (2008) it is implied that ways of speaking, writing, and acting change according to the technologies that are available and according to the practices of the content areas.

In contrast, content area teachers often view knowledge as a "corpus of 'basic skills,' core knowledges or competencies that have self-evident educational value" (Kelly et al., 2008, p. viii). When content is defined in static ways, such as this, there is little room for creative or innovative teaching or learning. In my study the teachers were familiar with

the “technical stuff” of new literacies however there was little evidence that the “ethos stuff” (Lankshear & Knobel, 2007) had been considered. As a result, content was not considered or rather reconsidered. In contemplating the impact of new literacies integration on her content Eden stated, “I think it’s just the medium that’s different. I don't think the curriculum, the content, I don't think it’s changed at all.” Additionally, Evan commented:

> [Math is] kind of a constant thing. I don't think fundamentally anything is really different [in math because of technology]. I mean it’s been around for thousands of years. But I don't think the fundamentals of how I understand math I don't think [they] have changed at all. I like that math is, one of the things I told the kids when they first came in is “I like that math is constant. It’s not going to lie to you. Like sometimes, in English, you have words that look like they’re pronounced one way but they’re not, you know, there’s trickery, where in math, it’s always the same thing.” I just kind of like that it’s uniform.

The teachers’ personal epistemologies were evident in the observations and interviews. In a study of teachers epistemological worldviews Schraw and Olafson (2008) noted that an “epistemological realist would believe that there is an objective body of knowledge that must be acquired” (p. 33). This belief was evident as the teachers sought to prepare students for year-end tests. District benchmarks, curricular guides, and scripted programs dictated their instruction. As previously mentioned Sophia was required to use a scripted math program, the only adaptation she could make was the inclusion of technology. While Angela did not have a scripted math program, she relied heavily on the teacher’s guide during math instruction. I noticed in every observation that Angela held

onto the teacher's guide throughout the lesson. When I asked her about this she stated that her reliance on the teacher's guide was due to the fact that the math program and the fourth grade curriculum were new for her.

When I asked the teachers what they would do if all of their technology was taken away, the teachers were confident in their content knowledge and pedagogy and assured me that nothing would change. Kevin noted, "I think the technology supplements me. Because I think if I lost this [Promethean] board I could still teach; I don't think that's a question." And Sophia said, "When it comes right down to it I remember having a chalkboard and that (makes a clicking sound and pretends to crank a wheel) to make the dittos." The teachers were very untrusting of the technology. Their professional lives were always changing in regards to programs and materials, administrative expectations, and student needs. Because of these continuous changes I believe the teachers held firm to their content knowledge. It was viewed as a stable construct in the classroom. These responses relate back to issues of identity and epistemology. In these classrooms it was possible to reimagine pedagogy but content was static.

In contrast to the teachers' perspectives discussed above, Naveed held a unique perspective of content. Naveed was a middle school science teacher at Washington Middle School. Naveed taught seventh grade science for two years as part of the Teach For America program before leaving to attend medical school. Through my single interview with Naveed he articulated a new literacies perspective. It was Naveed's goal for his students to become comfortable with uncertainty as he worked towards apprenticing them into the scientific community. Naveed stated:

> Definitely [technology] has the capability of redefining what science is because I think in general, the perception for students is that scientific understanding, what scientists know, what we know through science is concrete fact. Like if I tell you, "This is what evolution is" that's just what it is, that's what you accept. I feel like what science instruction should do is try to mimic the scientific community and the processes that go within the scientific communities. Specifically, how scientific knowledge is developed and how scientific knowledge is revised constantly over time.

For Naveed, content was not static it was dynamic, complex, and always in flux. Because of his broad views of education and his passion for his content I was beyond surprised when he informed me that during the next four months he would forgo science instruction to prepare the students for year-end tests.

Naveed's beliefs about science content are consistent with the views of many math and science scholars. Nasir et al. (2008) argue that math is a socially constructed discipline. Furthermore, they argue that math knowledge directly relates to cultural practices (Nasir, et al., 2008). As a result, teachers should provide students with the opportunity to learn about math through culturally relevant practices. Similarly, science scholars state that scientific knowledge is consistently changing along with the methods of understanding science (Duschl, 2008). Furthermore, Duschl (2008) argues that when content learning is separated from process learning, then students are not afforded the opportunity to become insiders in the discipline.

As evidenced in Chapters 4 and 5, literacy was most often viewed as an independent content; it was separate from the math and science content. In fact, the two elementary

teachers explicitly stated that they did not see a connection between literacy and their content areas. Angela said, “I want to say yes [literacy does have a connection to math] because I know that’s the proper answer. You really don't think about [literacy in math].” Additionally, Evan stated, “Since I started teaching only math I’ve really just only thought about math. I really haven’t thought too much about literacy.” These teachers were working within an autonomous model of literacy (Street, 1995). There was an assumption that one type of literacy existed and that this dominant literacy was not part of their math content.

Given content teachers focus on their specific subject matter, it is not surprising that they view literacy as a separate content. Hagood et al. (2009) reported similar findings in their study of two content area teachers. One of the teachers repeatedly stated that he was only a social studies teacher; he did not view literacy as an important component to his instruction. However, when the research team observed him he consistently implemented a variety of literacy practices that assisted students’ understanding of social studies content. My findings parallel these. While the teachers viewed literacy as a separate content, as an observer I viewed literacy events in every lesson. The teachers analyzed images, interpreted graphs, and focused on vocabulary. However, when I shared the observed literacy events with the teachers they typically commented that their instructional practices were focused on content learning and that literacy instruction was not intentional.

Although I observed literacy in all of the classrooms, the two science teachers explicitly discussed a connection between literacy and their content. Kevin noted:

> I think science encompasses a lot of literacies. With the math equations that we can solve, obviously with reading technical articles, reading out of the book, answering questions, things of that nature; even just the literacy or how to use the tools in a lab setting. So, I mean, that's a literacy all on its own.

Kevin's beliefs about literacy is consistent with what Moje (2008) defined as disciplinary literacy. Kevin intentionally provided literacy instruction to students that supported their understanding of the content. The literacies he taught were specific and integral to science.

Admittedly, I had hoped that the teachers in my study would rethink content and literacy with the integration of new literacies. I hoped that new literacies would open another avenue for literacy in the content areas given the long standing resistance of literacy by content area teachers (O'Brien et al., 1995). However, I did not find that. All of the teachers talked about the importance of literacy in students' lives. However, when I asked them to connect those beliefs to their content, only Kevin articulated a specific connection between science and literacy. The teachers were not resistant to literacy; they just did not view it as an important element in their subject.

The Integration of New Literacies (Technology) Means Rethinking Student Learning, Circumstances, and Futures

Angela reflected, "[The integration of technology in math] just means more growth. It just means there's…change. You constantly have to keep updating and changing with times." The teachers in this study expected change. They noticed changes in their students because of the advances in technology. And though they believed technology should change education, they were aware that progress was slow. Kevin argued, "The

school is a dinosaur and we're just not teaching [the students] what's going to prepare them for the future. Our job is to prepare students for the future, and I don't think that we are." The concept of future was discussed in all of the interviews. The teachers felt an obligation towards their students in particular, because of the limited opportunities their economic situations provided. However, while access to technology is necessary it is not sufficient in changing the social inequalities that these students face.

While Leander's study (2007) among others has argued that teachers are holding back the needs and abilities of adolescents, I found that the teachers in this study were seeking to support their students' access to technology the best they could with the knowledge they possessed. There is a preconceived notion in the new literacies research that adolescents magically possess technological skills. However, at some point adolescents have to learn the basics, the ins and outs, of a technological tool. Research on new literacies describes instances of adolescents using their skills to develop websites, create memes, and participate in online discussions (Alvermann & Hagood, 2000; Lankshear & Knobel, 2006; Lewis & Fabbos, 2005). The students in these studies, and a great many more, have developed and honed these skills as they interacted with new literacies outside of school. However, in order to develop these skills access to new literacies and specifically Information and Communication Technologies (ICTs) is a requirement.

As previously discussed the students at these three school had limited access to technology outside of school. Mr. Jones, the principal of Kelly Middle School stated:

> For the population that we serve here, it is more crucial because if the kids don't acquire technical literacy skills not only are they at a disadvantage in terms of acquisition of information, they're flat out at a disadvantage in terms of ability

> skills. The only jobs that are going to be open to them are the jobs that are historically open to this demographic and that is manual labor, low-tech jobs with no future.

Additionally, Mr. West, the principal at Washington Middle School argued, "If I don't expose these kids to technology they are going to be that much further behind. So that's a big part of what we do is give them a chance, a fighting chance to know what's going on." For the principals and teachers at these three schools exposure and basic skills were a top priority in regards to technology. The educators all believed that technology led to future opportunities. As I spent time in each of the schools, I did not sense that the educators believed that they were stifling students' out of school literacies. In fact, they were trying to support them through the technologies that were available at the schools.

As I observed in these classrooms technology often took precedence over content because of the students' lack of knowledge of a particular technology. When speaking about students' inexperience with computers, Sophia related a talk she had given her classes at the beginning of the school year. She wanted the students to be comfortable with the technology and told them, "Go on and give it a shot. Don't throw up on it and no gum. Aside from that you really can't hurt it." This classroom talk was given to sixth grade math students who are supposedly "digital natives" (Prensky, 2001). As another example, when preparing for an in class science experiment Kevin noted:

> I went through five minutes of, 'this is how you bypass a childproof lighter so you can light the candle so we can do this experiment.' For them it's a tool, so hopefully they won't burn down the home, but it's still a tool that they may not be familiar with.

The teachers at these schools felt an obligation to familiarize the students with a variety of technology. At the conclusion of a unit on graphing, I accompanied Evan's class to the computer lab as they created graphs of student conducted survey responses. Typically this assignment would be viewed as mapping technology onto an old practice (Lankshear & Knobel, 2003) because the students could have simply drawn a graph by hand and obained the same results that were achieved on the computer. However, Evan felt the students needed to be familiar with the Excel program. As we walked toward the computer lab, Evan commented that experience was a way for students to learn the math objective, interact with a new program, and create a "cool graphic." Throughout my data there are several examples of teachers stopping content instruction to provide basic instruction on technology. The teachers are frustrated by the time these moments take away from content instruction but each approached it as "If I don't teach them then who will?"

It can be argued that teaching basic technology skills marginalizes an already marginalized population. Leu et al. (2009) state that students in poor school districts are disadvantaged because they have limited exposure to the internet at home and new literacies are often not a focus in school because of testing pressures; as a result they fall further behind. Furthermore, Leu et al. argue that technology will continue to widen the achievement gap because students in more affluent schools have greater access to the internet and new literacies at home and teachers in these schools often have more freedom to integrate new literacies in the curriculum. The authors report, "It is the cruelest irony of No Child Left Behind that the students who most need to be prepared at

school for an online age of information are precisely those who are being prepared the least" (Leu et al., 2009, p. 267).

The teachers in my study are aware that they are not doing enough to prepare their students for their future lives, but they are making attempts to integrate new literacies in spite of the challenges and pressures they face. It appears that the administrators and teachers believe that the use of technology will alleviate the social inequities their students face. Again, as previously mentioned, access to technology is necessary but not sufficient in preparing these students or in closing the achievement gap.

The Integration of New Literacies (Technology) Means Serving Official Context and Discourse

"Woe to the school leader unable to show patrons and visitors rooms full of machines" (Cuban, 2002, p. 159).

Technology was a high priority at all three of these schools. As I spoke with the principals, each boasted of the technologies that were available. The principals of these high-needs schools believed that technology was essential to student engagement. Therefore, any extra money was devoted to increasing technology. Because of the principals' dedication to technology, in terms of money and beliefs, the use of technology was an expectation at each of the schools. Technology named the context.

As noted in Chapter 5, as the year-end tests drew near the use of technology diminished or was used as a vehicle for test preparation. These findings are similar to those of Hagood et al. (2008) who reported that a "culture of test preparation" (p. 81) greatly influenced the teachers' practice. New literacies practices were replaced with print-based practices that mimicked the year-end tests.

The teachers in my study reported external and internal pressures to raise year-end test scores. Preparation for these tests took precedence over everything. The teachers were diligent in their efforts to prepare their students; however all of them discussed the difficulty in meeting the testing goals given their high-needs student population. As year-end testing approached, I conducted an observation in Sophia's sixth grade math classroom. I noticed a new chart on her wall that stated, "If 80% of students score > 74% on CRTs then Ms. S will…" In an effort to motivate the students, Sophia allowed them to vote on what she would do. While the students worked on an assignment Sophie talked with me about this new challenge. She informed me that the popular choice was to shave her head. I asked Sophia if she was prepared to follow through with the challenge and she responded that as a cancer survivor being bald was not a big deal. She then leaned down and whispered, "It might as well say 'Ms. S will shoot a chicken out of her ass,' it won't matter." This was not a disparaging comment about the students, rather a reality she faced.

Tierney et al. (2006) acknowledged the difficulty of integrating new literacies in a high stakes testing era. They noted:

> Unfortunately, although the students we observed utilized multiple literacies to discover 'genres of power'—new texts, new ways of negotiating meaning, and new ways of knowing that have been extremely beneficial for them—these are not practices that are easily testable. In this era of accountability, how likely is it that schools will value expanded notions of literacies? (p. 366)

Similarly, Hagood et al. (2008) noted that "In an era where standardized tests results determine school status, little, if anything will change" (p. 84).

As previously mentioned, a large amount of technology was available at each of the schools. However, the teachers were often frustrated by issues of access. Kevin noted:

> I think the biggest factor in slowing down the students' progress with technology is the teachers. Yes, every school has a computer lab or what is it 99% of all schools are hooked up to the internet but it doesn't mean the kids get to use it. The kids get to watch the teacher use it; they don't get to use it themselves.

Furthermore, the teachers all shared experiences when instruction was hindered because of issues of access. These issues include outdated technologies, downed servers, banned websites, and the inability to provide students with opportunities to use, rather than observe, the use of technology.

Implications

> Scholars in the area of teacher research also have important work ahead of them. We know that some exceptional teachers are developing new insights and new models of instruction on the Internet (Karchmer, 2001). We need to know how to take advantage of these learning experiences and use the insights developed by these exceptional teachers to support our work in teacher education and staff development. (Leu, Kinzer, et al., 2004, p. 1604)

Professional Development

The need for professional development was evident throughout the study. The teachers shared their frustrations about the lack of professional development which ranged from none to monthly one hour training sessions. I had the opportunity to attend a Promethean Board training at Fairview Elementary. The Educational Computing

Strategist (ECS) demonstrated a software upgrade for the Promethean Boards. As the ECS moved through multiple screens and discussed the changes Angela looked over at me, sadly shook her head and then laid it on her computer. This one hour training was the only formal opportunity to learn about the software upgrade.

It is obvious that current professional developments are not meeting teachers' needs. Sophia originally received no professional development when she was given a SMART Board; she was told to figure it out. As we talked about her needs she stated:

> We need to be properly inserviced. Properly inserviced is not 45 minutes after school for one day and it's not a full day either, to where your head is spinning and you can't remember the first thing you were supposed to do. If you would like us to do something, we need to practice it just like the kids do.

This captures what new literacies professional development should offer—an opportunity for teachers to learn about new literacies and then time to practice it. However, this is not sufficient for a deep level of integration. In order to support teachers in developing a new literacies perspective (Coiro, et al., 2008) and a learning with technology perspective (Schrader, 2008) teachers need to have time to reflect on and discuss the affordances of new literacies within their specific content areas. Currently one-shot professional developments focus on learning a new gadget with little reference to curricular implications. Lewis (2007) argues:

> Through professional development, teachers receive training in curricular uses of technology, but they do not learn about new mindsets, identities, and practices that come with new technologies, forms of communication, and economic flow. (p. 230)

Until professional development begins to address mindsets, technology will always be viewed as an add-on to the curriculum. Lankshear and Knobel (2007) purport that people think about and approach the technological advances through two mindsets. The first mindset views the world as essentially the same, "only now it has been technologized in a new and very sophisticated way" (p. 10). The second mindset views the world as radically different because the new technologies offer "new ways of doing things and new ways of being" (Lankshear & Knobel, 2007, p. 10).

I argue that current professional development does not encourage a second mindset (Lankshear and Knobel, 2007) or epistemological pluralism (New London Group, 2000). According to the teachers in my study, they are not provided with opportunities to think about or discuss how these new technologies relate to their content areas. What is needed are opportunities for long term professional development where teachers are provided with the time to share their questions, concerns, and fears about technology. Additionally, professional development needs to provide an opportunity for teachers to reflect on the literacies and new literacies that are specific to their content areas and the implications these literacies have for teaching and learning.

Hagood et al. (2008) provide a model of professional development for new literacies integration. The professional development included two-day institutes that were held twice a year. The first institute provided teachers with theories of new literacies and an opportunity to reflect on personal and student new literacies in their content areas. A second institute provided teachers with a day to work on new literacies projects, followed by a day of reflection and planning. Additionally, the authors arranged bimonthly study groups at the schools. During these meetings teachers discussed new literacies readings,

shared their successes and challenges, and discussed new literacies practices that supported content area learning.

This model of professional development provides teachers with an opportunity to develop a second mindset (Lankshear and Knobel, 2006; 2007). It was long term, provided opportunities to learn new literacies practices, provided time to develop and implement new literacies practices in their content areas, and provided support from professionals and colleagues. However, even with this amount of support there were challenges. Hagood et al. (2008) report that high stakes testing impeded the new literacies that were occurring in classrooms as teachers shifted back to print-based practices that mimicked the year-end tests. Coiro (2005) argues that "no teacher becomes an innovative technology user overnight, and in fact, the process often takes up to five years or more" (p. 204). This statement further supports the notion that professional development must be long term.

Teacher Education

I presented preliminary findings of this study at a literacy conference. At the conclusion of my presentation the discussant noted the lack of professional development and then admitted that as a professor his literacy methods courses were not preparing teachers for new literacies either. This disclosure was echoed by several other university educators. A discussion then ensued as to how teacher education can prepare future educators to integrate new literacies in their content areas.

Carmen Luke (2000) posed the question, "What better site to begin developing new frameworks for knowledge…than in teacher education?" (p. 425) Teacher education needs to become a site where new literacies are discussed, regardless of the content.

Furthermore, teacher education needs to address mindsets and identity in relation to new literacies. As Lewis and Finders (2004) reported, while the personal lives of preservice teachers may be filled with new literacies, they are often resistant to them because of their notion of the "implied teacher—the inscription of who and what a teacher should be and how a school or classroom should work" (Lewis, 2007, p. 235). The finding that preservice teachers, even those identified as "Millenials" (Gee, 2004, p. 55) or "insiders" (Lankshear and Knobel, 2006, p. 34), are resistant to technology challenges the idea that age or personal level of use can serve as an indicator for classroom use.

Additionally, teacher education needs to provide preservice teachers with opportunities to learn about new literacies within a classroom context. Again, while preservice teachers may engage in new literacies in their personal lives, it is not effective, nor encouraged to simply transfer these practices into the classroom (Lankshear and Knobel, 2006). Preservice teachers need opportunities to read, discuss, and practice new literacies. However, this cannot be limited to literacy methods courses. Rather, all content areas need to address the new literacies in their respective fields and the implication these have for teaching and learning content. For example, it is essential to question what new literacies are necessary for learning and understanding the discipline of mathematics. This type of question provides professors and preservice teachers with the opportunity to think and learn about new literacies and to discuss what counts as content in mathematics. Teacher education needs to explicitly address static notions of content. Kelly et al., (2008) argued that "there needs to be full acknowledgement that the boundaries and practices of academic disciplines are fluid and negotiated" (p. ix).

Finally, it is necessary for teacher education to infuse critical literacy and pedagogy in

preservice education. The New London Group (2000) argues that "traditionally…literacy pedagogy…has been a carefully restricted project—restricted to formalized, monolingual, monocultural, and rule-governed forms of language" (p. 9). However, this type of hegemonic pedagogy does not take into account the expanding culturally and linguistically diverse student population and the many linguistic and literacy practices that exist and are emerging. As a result it is vital that preservice teachers have an opportunity to read, discuss, and reflect on the importance of critical literacy and pedagogy. Because literacy is traditionally thought of as a neutral set of skills, preservice teachers are unaware of the hidden power structures. They need to be cognizant of the potential role literacy pedagogy plays in providing opportunities for certain students while marginalizing others. Furthermore, a critical pedagogy encourages preservice teachers to question "what counts as knowledge, who has access to such knowledge, and whose knowledge counts" (Kelly et al., 2008, p. ix).

Teacher educators need to provide preservice teachers with the opportunity to "see themselves as active participants in social change" (The New London Group, 2000, p. 7). Furthermore, there needs to be opportunities for preservice teachers to question their "ethical and social responsibilities as literacy educators" (Luke & Grieshaber, 2004, p. 9).

Future Research

The teachers' lack of familiarity with the term new literacies combined with limited classroom-based research leads me to believe that the affordances of new literacies is typically confined to professional literature and conference presentations. Though there is a growing body of research in the area of new literacies there appears to be many armchair quarterbacks. It is easy to stand on the sidelines and report what should occur in

classrooms; it is easy to point out the shortcomings of teachers. However, it is a very different reality to face the classroom and responsibilities of educating students on a daily basis. Therefore, future research in new literacies should focus on teachers and/or position them as co-researchers (Karchmer, 2001; Kist, 2005; 2010; Stolle, 2007; Unsworth, 2008).

In 2005 Leu, Mallette, Karchmer, and Kara-Soteriou stated, "What do we know about these new literacies, and how should we teach them? Unfortunately, we still know very little" (p. 5). A common belief among new literacies scholars is that classroom based research is vital (Kist, 2010; Leu et al., 2005; Tierney, 2009). However, there is a discrepancy among scholars as to how to proceed in the integration of new literacies in the classroom. Leander (2007) argues against a gradual integration as he stated "A key difficulty, of course, is that a 'keep doing what you're doing' discourse is not merely about refusal, but about giving reassurances to teachers that change can happen gradually and incrementally" (p. 46). However, at the conclusion of their study on two secondary English teachers' integration of new literacies, Lewis and Clandler-Olcott (2009) argued that classroom examples that combined new literacies and print-based literacies in instruction and practice have the potential to be "more helpful in guiding the field, than scholarship that positions teachers as progressive for adopting technology-mediated approaches or that paints them as resistors for not doing so (p. 213) Furthermore, O'Brien and Bauer (2005) argued that "changing school practices is bridging the new with the old rather than a revolution" (p. 130). I am in agreement with the latter arguments and believe that future research should continue to highlight pioneering teachers' efforts to deeply integrate new literacies thoughtfully and critically in the curriculum (Stolle, 2007;

Karchmer, et al., 2005; Karchmer, 2001).

Finally, the area of new literacies research that is significantly limited is the integration of new literacies with content areas beyond English and language arts. New literacies scholars have suggested that new literacies provides opportunities to rethink content (Johnson & Kress, 2003; Lankshear & Knobel, 2006). As a result, new literacies complicates teacher knowledge and content knowledge. It is nearly impossible to identify what teachers need to know, especially as new literacies are ever evolving. Unsworth (2008) states:

> Collaboratively, researchers, teacher educators, and teachers need to investigate the extent to which beginning and experienced teachers need to have discipline knowledge in areas like information technology, social semiotic theory, and multiliteracies pedagogy, in addition to their own specialist fields such as science, mathematics, and history, and how they can gain access to such knowledge, and the nature of this knowledge. (p. 401)

Therefore, future research needs to address the interdependent relationship between new literacies, content area literacy, and teacher knowledge and identity.

Final Thoughts

One of the challenges of conducting new literacies research is that it is constantly changing. It is impossible to keep up with the latest technologies. Therefore, it is essential to understand how to teach within a context of continual change (Leu et al., 2005). Before teachers' practices can be changed, it must first be known what they are doing. Before scholars make sweeping generalizations about schools and teachers, there needs to be an

understanding of how teachers are currently negotiating new literacies in relation to themselves, their students, their content, and context. At the end of this study, I emphatically agree with Marsh (2007) as she noted:

> One of the most important means of informing research, policy, and practice as they relate to new literacy practices in schools is to offer teachers a voice in order that their strategies, questions, and concerns can be heard loudly in the debates that surround this issue. (p. 1295)

My goal was to provide the teachers with a voice; to allow them to share their story of integrating new literacies in math and science content. At the conclusion of the study Kevin reflected, "It's neat to talk about what my opinion is because obviously it's not something that's always shared in an education environment. It's, 'learn this and assimilate it and move on.'" The teachers' stories were complex and filled with uncertainty and as van Manen (1990) cautioned, a singular description does not capture the complexity of the lived experience nor does it exhaust the possible meanings. Furthermore, Lyons (1990) states, "By attending to teachers' narratives, their words and experiences, we find a text that can be articulated but never exhausted, one that will remain there, the final arbiter of the correctness of our vision" (p. 178).

As I reflect on the teachers' lived experience of integrating new literacies in math and science content I am keenly aware that they have many questions that need to be answered. There is a great amount of research to be done. Van Manen (1990) states that phenomenological research "is also a critical philosophy of action" (p. 154). He argues that hermeneutic phenomenological reflection should lead to deep thinking and then action. Through this research process I gained an understanding of the complexities and

uncertainties that teachers face as they integrate new literacies in their content areas. As a result of this knowledge I have a responsibility to "engage in personal action" (van Manen, 1990).

At the conclusion of this study I find myself relying on the words of Kevin, a science teacher at Kelly Middle School, to articulate my feelings. He captured the complex, difficult, but exciting journey that lay ahead for me and others as we search to investigate and understand the field of new literacies. Kevin stated, "It's like trudging across a tundra mile after mile kind of deal. You know you're getting some place. You don't always know how far you have left to go."

APPENDIX A: IRB APPROVAL NOTICE

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

Social/Behavioral IRB – Expedited Review

Approval Notice

NOTICE TO ALL RESEARCHERS:

Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

DATE: December 4, 2008

TO: **Dr. Thomas Bean**, Curriculum and Instruction

FROM: Office for the Protection of Research Subjects

RE: Notification of IRB Action by Dr. Paul Jones, Co-Chair

Protocol Title: **New Literacies in the Classroom**

Protocol #: 0806-2785

This memorandum is notification that the project referenced above has been reviewed by the UNLV Social/Behavioral Institutional Review Board (IRB) as indicated in Federal regulatory statutes 45 CFR 46. The protocol has been reviewed and approved.

The protocol is approved for a period of one year from the date of IRB approval. The expiration date of this protocol is November 25, 2009. Work on the project may begin as soon as you receive written notification from the Office for the Protection of Research Subjects (OPRS).

PLEASE NOTE:

Attached to this approval notice is the **official Informed Consent/Assent (IC/IA) Form** for this study. The IC/IA contains an official approval stamp. Only copies of this official IC/IA form may be used when obtaining consent. Please keep the original for your records.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through OPRS. No changes may be made to the existing protocol until modifications have been approved by the IRB.

Should the use of human subjects described in this protocol continue beyond November 25, 2009, it would be necessary to submit a **Continuing Review Request Form** *60 days* before the expiration date.

If you have questions or require any assistance, please contact the Office for the Protection of Research Subjects at OPRSHumanSubjects@unlv.edu or call 895-2794.

APPENDIX B: INFORMED CONSENT

UNLV
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INFORMED CONSENT

Department of Curriculum & Instruction

TITLE OF STUDY: New Literacies in the Classroom
INVESTIGATOR(S): Thomas W. Bean, Ph.D. and Jennifer J. Wimmer, MA
CONTACT PHONE NUMBER: Thomas W. Bean (702) 895-1455

Purpose of the Study

You are invited to participate in a research study. The purpose of this study is to provide further insight into what the integration of technology, literacy, and math and/or science means in relation to the teacher's understanding of instruction, learning, content, and context.

Participants

You are being asked to participate in the study because you are a fourth through eighth grade teacher with an emphasis in either math or science at either Mack Middle School or Ferron Elementary School. Additionally, your principal identified you as an exemplar teacher, both in your content area and in your use of technology.

Procedures

If you volunteer to participate in this study, you will be asked to do the following: From September 2008 through December 2008 I will ask you to be interviewed three times. During these interviews I will focus on your experiences as you integrate technology into your science and/or math curriculum. You will also be asked to record your thoughts in regards to the integration of technology into your science and/or math curriculum once a week on a hand-held recording device that I will provide. Finally, you will be asked to allow me to observe in your classroom twice a week for three hours. During this time I will take field notes and collects documents such as lesson plans and teaching materials that relate to the integration of technology with math and/or science.

Benefits of Participation

There *may not* be direct benefits to you as a participant in this study. However, we hope to learn what knowledge and skills teachers need in order to effectively integrate technology into math and science to enhance student learning. Additionally, this research will provide you, as a classroom teacher, with a voice. The knowledge that is gained

through this study will be used to improve the quality of professional development and teacher education in this area.

Risks of Participation

There are risks involved in all research studies. This study may include only minimal risks. While the risks are minimal, you may become uncomfortable when answering some of the interview questions. You may also be uncomfortable having me sit at the back of your classroom.

Cost /Compensation

There *will not* be financial cost to you to participate in this study. The study will take one hour *a week from September 2008 through December 2008* of your time. You *will not* be compensated for your time.

Contact Information

If you have any questions or concerns about the study, you may contact Thomas W. Bean at **(702) 895-1455.** For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office for the Protection of Research Subjects at 702-895-2794.**

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for three years after completion of the study. After the storage time the information gathered will be destroyed.

Participant Consent:

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

_____ _____

Signature of Participant Date

_____

Participant Name (Please Print)

I agree to be audio taped for the purpose of this research study.

_____ _____

Signature of Participant Date

_____

Participant Name (Please Print)

Participant Note: Please do not sign this document if the Approval Stamp is missing or is expired.

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