A CASE STUDY OF FIRST GRADE MEANING MAKING IN
A TECHNOLOGY RICH ENVIRONMENT

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A CASE STUDY OF FIRST GRADE MEANING MAKING IN
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Dissertation

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ABSTRACT

The purpose of this study was to describe first grade meaning making in a technologically rich classroom environment and to explore the ramifications of technology on early literacy learners. Currently, few in depth research studies have examined meaning making in a technologically rich classroom setting, especially with first grade students in an urban setting. Over the past 50 years, the literacy community has investigated issues central to the meaning making process, including whether meaning resides solely in the text or in a transactional relationship between the text, reader, and the context. Today this sociopsycholinguistic view of meaning making supported through a constructivist theoretical framework has been further impacted by technology and the new literacies. In response to the growing force of technology in the lives of young students, this study wanted to describe literacy behaviors of these students by documenting student behaviors as they engaged and interacted with a range of literacy activities. Ultimately, the study sought to investigate how students used these opportunities to make meaning. The results of this study were based upon data gathered in support of the following research questions that guided the study: (1) what kinds of interaction happen when a teacher purposely constructs an environment using technology in a first grade classroom; (2) how do students use these interactions to make meaning?
These research questions were analyzed through a qualitative single case study methodology. Data collection included classroom observations, interviews, student artifacts, and pertinent classroom documents. This study employed the use of QSR* NVivo 7 computer software to manipulate the data. The analysis of the data began with an a priori code structure derived from a review of the research literature and evolved through a reiterative reading of the data from which themes emerged.

The findings from the study detailed three types of interactions used by students in the technologically rich classroom environment for meaning making. These included interactions with 1) the print environment, 2) the “real-world” environment, and 3) the technology environment. Through these interactions students were found to make meaning in three ways; specifically, through 1) social construction, 2) experience-based inquiry and interpretation, and 3) multimodal encounters. Throughout the study, the three types of interactions were rarely seen as distinct from one another but rather were often viewed working in confluence. Further analysis of the data revealed that all three types of interactions included two pervasive features: 1) opportunities for social collaboration and 2) the incorporation of multiliteracies. Moreover, this study recognized the potential impact of a technologically rich instructional environment on students’ meaning making through the new literacies. Results of this study suggest that a curriculum that actively incorporates the new literacies may provide a powerful framework for classroom instruction.
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A Prayer of Thanksgiving

Thanks be to G-d from whom all works find their source,
Gifting us with minds to imagine and fashion our course.
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That something was beyond my grasp or a gulf was too wide-
Thus, today, I think they might be “very satisfied.”
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This was not the task that you would ever have selected,

Thank you so much for loving me and my choices respected.

To my dear husband, Brian, let me say promises kept-

You have been dedicated to the task and have never slept

Or allowed me to falter without catching me in your supporting embrace

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So to the love of my life and also my best friend,

To the husband who thought that this dissertation would never end,

Let’s take this moment to hold hands, walk and smell the roses

And then take a peek at what other opportunities life poses.

Life is a journey-though this task draws to an end,

So now I shall discover what treasures await me around the next bend.
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CHAPTER I

INTRODUCTION TO THE PROBLEM: EVOLVING POSSIBILITIES

In the middle of the last century, life in America was seemingly much simpler. The author remembers watching the western movies of this era. These early films were the essence of simplicity, complete with heroes and villains differentiated by color-coded Stetsons. The scripts glorified the pioneers as they bravely outfitted their Conestoga wagons and raced their teams of horses across the threshold from the familiar onto an unknown western frontier. Little had Americans imagined that by the end of the 20th century we each would have been given the opportunity to become pioneers and cross the threshold from the known into the frontiers of cyberspace.

Even in a seemingly simpler time, however, educators understood that change was constant and that we were generally poised at the brink of a new frontier (Dewey, 1952). Indeed, education itself has always been in a constant state of transformation. Bruner (1960) understood that “each generation gives new form to the aspiration that shapes education in its time. . . [deliberating] “what shall we teach and to what end?” (p. 1). Today a young generation is forming aspirations which will shape a new vision of education for our times (Kress, 2003; Yelland, 2007). Within this new vision, literacy education is being defined by change in significant ways. As the ways of communicating through information communication technology (ICT) transform rapidly so too must our
ability to effectively engage their potential through new literacies (Karchmer, 2001; Leu, 2000a, 2000b; Leu, Kinzer, Coiro, & Cammack, 2004; Luke, 2000; Meyer & Rose, 1998; Reinking, McKenna, Labbo & Keiffer, 1998; Warschauer, 1999). Leu et al. (2004) explained that “new forms of information and communication technology (ICT) such as the Internet are rapidly generating new literacies required to effectively exploit their potentials (Karchmer, 2001; Leu, 2000a, 2000b; Luke, 1997; Meyer & Rose, 1998; Reinking et al., 1998; Topping, Warschauer, 1999).

From our current vantage point, 25 years after the advent of popularized technology in 1982, we are living amidst evolving possibilities as people imagine new forms and functions for literacy opening thresholds into future worlds. Leu et al. (2004) maintained that “new literacies are new literacies not because they appear now, but because they will continuously appear as new technologies for information and communication. . .” (p. 326). The elements of change surround us. There is today an entire generation of digital natives, the Millennials, that have never known a world without the computer (Yelland, 2007). Additionally, the pervasiveness of Internet technology and computers in our lives is evidenced by the fact that more than two-thirds (68.1%) of current American households reported using the Internet (Annenberg Digital Future Project, 2007).

Schools have also witnessed the expansion of technology within their walls. In fact, during the seven years between 1994 and 2001 the percentage of “public school instructional rooms” in the United States having at least one computer with Internet access has grown from 3%-93% (National Center for Education Statistics, 2007). This is the largest growth of any technology, surpassing even the popularity of television.
As educators we are groomed to embrace the future. Indeed, Greene (1988) said that “teaching is about futuring” noting how at our best we, as teachers, welcome our classes with an eye for each student’s future possibilities. Indeed educators have always prepared students for their future in the workplace. Unlike the past, however, educators today no longer have a clear vision of the future workplace (Bruce, 2003). Thus, in our expanded technological world we also need to expand the concept of future by a factor of three. As teachers we must construct meaningful learning while imagining the future, the roles our students will play in that future, and the demands of the imagined future workplace (Yelland, 2007). Without a doubt this is a daunting task.

Models of Literacy

In this new world, literacy as an avenue to meaning making is essential. As Leu et al. (2004) noted, “the new literacies call upon new aspects of meaning construction…[which in turn] become far more important in complexly networked information resources such as the Internet” (p. 316). Yet the current transformation is not without precedent. This new era is founded on a half century of evolving theory in literacy during which educators grappled with issues central to the meaning-making process. Certainly, during the past 50 years, the literacy community has reshaped and reevaluated its philosophical stance, debating if the meaning resides in the text or in a transactional relationship between the text, reader, and the context (Foster, 2004; Goodman, K., 1986; Rosenblatt, 2005; Smith, 2004).

At times mirroring the theoretical debate between perennialism and progressivism, proponents of the bottom up approach viewed meaning as emanating from the text and situated outside the learner (Jefferson & Robey, 1986). Thus, this view
understood reading to be a translation from the printed (graphic symbols) to oral code which was subsequently decoded by the brain (Pearson, 2002). The teacher, as in perennialism, was the possessor of the knowledge. The passive student gained the meaning beginning with translating of the smallest part, the symbol, then progressing to decoding the word and finally comprehending the text. Indeed, advocates of the bottom up approach considered the meaning of the text to reside in the translation with “accurate deciphering of printed symbols. . . [unearthing] the text’s intended meaning (Newton, 1992). Chall (1967) exemplified this limited view of meaning-making by explaining that “all code-emphasis programs give some practice in reading for meaning during the initial stages. . . Reading for meaning really cannot be avoided unless, of course, only nonsense syllables are used, and no code-emphasis program has ever gone to that extreme” (p. 137). Others would disagree with Chall’s limited path to meaning making through decoding, instead believing the path to meaning making to be multifaceted (Goodman, K., 1986; Goodman, Y., 1984; Smith, 2004).

Much as the explosion of knowledge in the post World War II period gave rise to a resurgence of progressive concepts, so, too, the attention of the growing social sciences focusing upon literacy concepts presented an alternative literacy perspective to the bottom up approach. Beginning with linguists, Chomsky (1968) hypothesized that children were outfitted from birth with the cognitive gear to acquire language. Chomsky, a giant in the field of linguistics, was followed by other renowned educators in the fields of psycholinguistics and sociolinguistics. Each pushed the conceptual framework for literacy from a bottom up approach to a sociopsycholinguistic, top down, approach in which the learner was seen as an active constructor of knowledge and the teacher a
facilitator to meaning construction (Goodman, K., 1986; Smith, 2004). Indeed, the top down approach does not disagree with the importance of text, or even the decoding process; however, meaning in the sociopsycholinguistic model is a function of “how much active control the reader exerts, how important reader characteristics are, . . . [and] how much text characteristics control the process (Goodman, 1986, p. 827). In contrast to the bottom up approach where meaning was seen as residing outside the reader and was the sum of the text’s phonetic parts, the top down, sociopsycholinguist, approach viewed meaning as constructed through noting the linguistic, situational, and cultural context in which the literacy processing occurred (Harste et al., 1984). Or, as Rosenblatt (2005) explained, “Meaning . . . happens during the interplay between particular signs and a particular reader at a particular time and place” (p. x).

As we approach the new literacies, issues of meaning-making continue to remain central to the discussion. Viewed from this perspective the new literacies are not separated from the field of traditional literacy by a growing chasm. Rather, they are the extension of a thread of research and pedagogical debate that has been developing over a half century. Evolving technologies have widened the discussion, however, and we now must envision the role of technology in this ever expanding transactional relationship.

Advent of Technology

In the broadest sense there has always been a transactional relationship between the forms and functions of literacy and the technology forged by a society (Leu et al., 2004; Reinking et al., 1998). Certainly, as technology has exploded this relationship has been expanded to new limits. Beginning changes were subtle, involving simply moving the format from textbook to a new display system, the screen. Then, text in the new
computer format was digitized, thereby allowing for the creation of databases and indexed information. In the most recent versions the addition of sound, graphics, video, and animation augment possible meanings in the interactive learning environments, while necessitating the increased need for critical literacy. The practices in this new learning environment “are not rote and mechanistic; they are knowledge based and require thinking and problem solving as an inherent part of their enactment” (Yelland, 2007, p. 3). With each innovation technology has engaged more of our senses, beginning at the visual, to the auditory, to the kinesthetic, and ending, some believe, in a virtual reality in which we can have the sense that we are totally living in a space which is in fact a technological creation (Lemke, 1998). Seen from this perspective, the evolving possibilities of the new literacies rise to a level of paramount importance for our students. Indeed, Leu et al. (2004) suggested that

In an information age, we believe it becomes essential to prepare students for these new literacies because they are central to the use of information and the acquisition of knowledge. Traditional definitions of literacy and literacy instruction will be insufficient if we seek to provide students with the futures they deserve. (p. 1571)

Areas of knowledge in this new learning environment reflect innovations integral to life in this new century. The emphasis on new skills formerly neglected in a curriculum dominated by mechanistic actions and memorization now encourage students to be an investigative, collaborative and reflective learner.

Technology and the New Literacies

The mandate has been adopted by the International Reading Association which proffered that educators own a great responsibility to prepare their students for a future that includes Information Communication Technologies (ICT) (IRA, 2001 position
statement). In a practical sense this may also be seen by the proliferation of technology related subjects in journals, conference presentations, and the “obligatory” inclusion of technology in literacy textbooks (Labbo & Reinking, 1999).

Concern for the evolving possibilities inherent within two elements, technology, including the full range of digital hardware and software, and emergent literacy, was at the core of this study. Specifically, how do young children who were moving from emergent conventional literacy engage with technology? These young learners, especially at the first grade level, had the longest growth time before actually using literacy and technology in their adult lives; hence, they needed to be engaged in the most futuristic approach to literacy learning through technology. The younger the child, the more futuristic we must be in our approach to literacy learning, meaning making, through technology. Their world is less formed and their future possibilities are evolving at a more rapid speed.

In response to this compelling new agenda, the discussion has changed from questioning whether technology should be incorporated into the literacy curriculum and is now focused upon how this integration should be accomplished. Moreover, the original concepts of simply digitizing traditional texts for classroom use are being abandoned; while, a focus is now directed upon understanding the nature of the new literacies and its potential for meaning making in the classroom.

The new literacies are both amorphous and “deictic.” They are by their innovative nature in the process of evolving a definition. At the simplest level there are now post typographic literacies which require new technological skills, especially meaning making and critical reasoning skills, essential for information and
communication technologies (ICT) such as the Internet (Coiro, 2003). In addition, there are new formats which the New London Group (Cope & Kalantzis, 2000) connect to multimedia technologies, specifically the “understanding and competent control of representational forms” (p. 9). For example, this skill supports understanding of design principles for including graphics in desktop publishing programs to extend and highlight the author’s meaning. Researchers also speak to the multiplicity of Discourses or way of being in the world. Discourses are reflective of our cultural identities; consequently, literacy refers to connecting the “right” use of language correctly within a Discourse. Since language is culturally based, people must be able to “read” the correct form of the language to employ in the appropriate setting. Finally, Dalton and Proctor (2008) is currently investigating the new literacies of diverse learners as they engage in the rigor of academic learning. The emergence of a perspective focused on the new literacies can be seen as it is informed by these multidisciplinary works. This perspective has the powerful potential to begin redefining what it means to be literate in the 21st century (Coiro, Knobel, Lankshear & Leu, 2008).

**Emergent Literacy**

Certainly the field of early literacy, much like the field of technology, has also experienced significant changes in the past quarter century. Indeed, at about the same time period as the birth of the digital native, the 1980s, scholars in another field of literacy were transforming the concept of early literacy. Currently, the fundamental concept of a comprehensive literacy curriculum involving reading, writing, listening, and speaking is well established although the predominance of reading instruction during the school day overshadows the other components of the comprehensive literacy curriculum.
(Halliday & Hasen, 1976). The original proponents of Reading Readiness historically believed reading to be skill-determined; therefore, they defined reading as the child’s ability to “say and interpret the words in simple texts like basal pre-primers and primers” (Sulzby & Teale, 2003, p. 301). Prior to exhibiting this skill, the child was considered to be engaged in prereading, thus requiring instruction on the necessary precursors to reading in order to advance to conventional literacy. In contrast to this prevailing view, Sulzby (2003) considered emergent literacy to be “the reading and writing behaviors of young children that precede and develop into conventional literacy” (p. 300). Indeed, with the work of Harste et al. (1984), the literacy community has come to believe that there is no formal time initiating the beginning of literacy, considering it an emerging behavior from birth.

Connecting New and Emergent Literacies

What was strikingly absent from the discussions in emergent literacy was the evolving possibilities that technology presented to these young learners. Although scholars from the techno-literacy camps have offered theoretical perspectives, there had been little research conducted which focused on the emergent literacy learner working with the technologies that abounded in their present world and would most certainly be an earmark of their future world (Karchmer, Mallette, & Leu, 2003). Ironically, research conducted in this area, had focused technology on improving traditional book literacy (Barker & Torgeson, 1995; Medwell, 1998; Wise, 1992).

Several scholars extended theoretical perspectives that called for research into those literacy capabilities that were unique to technology, most especially those capabilities related to the Internet or ICTs (Labbo & Reinking, 2000; Leu & Kinzer,
2000; The New London Group, 1996). This minimal group of research studies was divided once again according to the focus of the research. In the past few years studies began to appear that investigated the problem from the teacher’s perspective. If the spotlight was shifted to the student, however, there were few substantive research studies to illuminate the frontier.

Labbo (1996) as well as Labbo and Kuhn (1998) investigated “electronic symbol making” of kindergarten students in an urban public school in a southeastern U.S. city. Through the use of computer graphic software, young learners were able to construct and communicate meanings through symbols. Within 5 years of Labbo’s initial work, Carroll (2000) also ventured into the early childhood (K-3) classroom to engage in ethnographic research. Her site was located in a suburban, northern California school district and included students in a 2/3 grade class in this middle class setting. The researcher examined the role of technology in the literacy curriculum through an exploration of the symbol systems as they led to meaning construction, the cognitive elements, and the connection between classroom technology and student affect. Carroll (2004) delineates three emerging themes: student exploration, collaboration, and play which she explained both encourages and delays literacy growth in the participants.

Statement of the Problem

Specifically, while technology was becoming a more potent force in the lives of our students, there was little information available about the effect of technology on the literacy behaviors of learners in K-3 classrooms. Understanding this relationship through the experiential lens of young children at the nexus of literacy development was critical.
This study, then, documented and analyzed the meaning making behaviors of students in a first-grade technology enriched classroom as they used a variety of technologies.

Purpose of the Study

Despite the scholarship brought to bear on the topics of emergent literacy and technology as well as literacy individually, there were few works that combined to investigate the learners in the early childhood (K-3) classrooms and their relationship to literacy in the technologically enriched environment. There was an urgent need for such research to add to the small body of knowledge which serves as a basis for curriculum and instruction. Educators are touched by the excitement of the new literacies as well as the challenges of preparing young learners to live purposefully in this future world. They are forced to ponder how best to forge integration between this new information age with early learning experiences (Bruce, 2003). What seems to become clear as educators consider this integration is the need for a “willingness to move beyond a singular book literacy to a community that supports and nurtures young readers and writers as consumers and produces of multiple literacies” (Karchmer et al., 2003, p. 190). Thus, a primary purpose of this study was to describe literacy behaviors of students in a first grade technology rich classroom and to document what the students did while engaging and interacting with literacy activities in this environment.

Moreover, this study also strived to generate new ideas by illuminating elements of the new literacies as experienced and understood by learners in the K-3 classroom. Therefore, a second purpose of this study was to investigate how students perceived and described what they were doing while interacting in this technology rich environment.
Leu, Mallette, Karchmer, and Kara-Soteriou (2005) highlighted the interactive nature of technology as he proposed that “it will take a truly collaborative effort to respond to the fundamental changes we see taking place in literacy and learning” (p. 9). Bruce (2003) questioned what today’s students need to learn and to do while interacting in the new technology rich environment. Murnane and Levy (1996) who suggested that the new basic skills also included abilities to “communicate effectively both orally and in writing, to work productively with people from different backgrounds, and to work with complex, messy situations” (as cited in Bruce, 2003, p. 7).

Theoretical Framework

The theoretical framework of this study was based on a belief that knowledge or “knowing” is the result of a “constructive” process through which learners develop their own understandings. From this perspective, the meaning making behaviors that were investigated in this work are intrinsic to a constructivist theoretical framework (Fosnot, 1996).

A central tenet of this perspective is a belief that learning is a unique construction, one forged for individuals by the merger of their abilities, learning styles, experiences, prior knowledge and filtered through social constructions. This belief that the learner’s construction of meaning occurs through the processes of exploration, equilibration, and scaffolding of knowledge construction through the social world framed the present study (Bruner & Ratner, 1978; Piaget, 1977; Vygotsky, 1962/1986).

In particular, this process of exploration is present in literacy. As children interact with literacy events, be they print, multiliteracies, numeric, or technological, they construct hypothesis about the function and purposes of the literacy. Young learners
come to understand that “learning language is learning how to mean” (Goodman, 1984, p. 102). Immersed in literate events, children come to appreciate that they can make sense through the use of literacy.

The following illustration was informed through the literature and expressed the researcher’s conceptual thought in constructing the study in general and the research questions that framed the construction of the study. In this illustration (Figure 1), the teacher was considered the creator of a technologically enriched environment that was the background for particular interactions. The web of interactions included the teacher with student, the teacher with technology, as well as the students interacting with the teacher and with technology. These interactions facilitated meaning-making behaviors both on the class or group level and individually for particular students.

Methodology

This study employed a qualitative single case study design. The descriptive purpose of this study was consistent with the elements of qualitative methodology (Yin, 2003). In so far as, qualitative research emerged from a social constructivist epistemology in which “the researchers are interested in understanding the meaning people have constructed, . . . how they make sense of their world and the experiences they have in the world” (Merriam, 1998, p. 6). To aid in this understanding the study conducted classroom observations, student and teacher interviews, created a student free list, and analyzed classroom artifacts, as well as digital and video pictures of the classroom interactions. The proposed study was conducted within the context of a particular first grade classroom. The first grade classroom was located in an urban elementary school within the Great Lakes region. Researchers concurred that a case
Figure 1. Conceptual framework.
study was differentiated from other qualitative designs in that it exhibits a “bounded context” (Merriam, 1998; Miles & Huberman, 1984; Smith, 2004).

Research Questions

1. What kinds of interaction happen when a teacher purposely constructs an environment using technology in a first grade classroom?

2. How do students use these interactions to make meaning?

Assumptions

The following assumptions apply in this study:

1. The study assumes that the integration of technology is developmentally appropriate practice for the beginning literacy instruction.

2. The technology rich environment employs technology in ways that are compatible with literacy development.

3. The teacher in the study is “exemplary” as validated through recommendations from school administration and experts in the field of technology and education, national awards, and initial researcher interviews and observations which confirmed the alignment between the teacher’s practices with national and state literacy and technology standards.

4. First grade students are capable of articulating their perceptions and feelings.

5. The results speak to only one particular classroom under one particular set of conditions.
Definition of Terms

**Case study** – “A case study is a qualitative methodology that is an intensive, holistic description and analysis of a single unit or bounded system” (Merriam, 1998, p. 12). In general, “case studies are the preferred strategy when ‘how’ and ‘why’ questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context” (Yin, 1984, p. 13).

**Comprehensive literacy** – an approach to instruction that adheres to the belief that teachers need to possess a strong knowledge of multiple methods for teaching reading so they can create the appropriate balance of methods needed for the children they teach (Vacca & Vacca, 2006).

**Educational Technology** – the full range of digital hardware and software used to support teaching and learning across the curriculum including: desktops, laptops, and handheld computers and applications; local networks and the Internet; digital peripheral such as cameras, scanners, and adaptive devices (Center for Applied Research in Education, 2000).

**Emergent literacy** – the course of a child’s early interaction with books and other print, as from pretend reading to genuine efforts to understand the nature and meaning of print. The development of the association of print with meaning that begins early in a child’s life and continues until the child reaches the stage of conventional reading and writing (Harris & Hodges, 1995).

**Expert teacher** – A teacher demonstrating qualities as specified in the professional standards set forth by the International Reading Association (IRA) and the International Society for Technology in Education which for IRA include: knowledge of foundations
of reading and writing processes; candidates using a wide range of instructional practices, approaches, methods, and curriculum materials to support reading and writing instruction; candidates creating a literate environment that fosters reading and writing; candidates viewing professional development as a career long effort and responsibility; and for ISTE includes: evidence of technology operations and concepts; teaching learning, and the curriculum; assessment and evaluation; planning and designing learning environments and experiences; productivity and professional practice; attendance to social, ethical and legal and human issues.

**New literacies** – “the skills, strategies, and insights necessary to successfully exploit the rapidly changing information and communication technologies that continuously emerge in our world” (Leu et al. 2004, p. 313).

**Summary**

Throughout history there has always been a transactional relationship between technology and literacy; transformation in one area elicited changes in the other (Reinking, 1998). This transactional relationship is placed on fast forward mode in an increasingly technological world due to the pervasive appearance of the computer and computer related technologies in our society.

The classroom has also been affected by the expanding influence of technology. This chapter offers a brief review of the two main elements of the study, technology and emergent literacy in the primary classroom. Through these reviews there emerges a glaring lack of research to connect these two topics; thus, substantiating the need for descriptive research conducted in the naturalistic setting of a first grade technology enriched classroom to describe the meaning making behaviors of these young learners.
In order to investigate the nature of the literacy or meaning making behaviors the study prefaced the quest with a framework for both new and emergent literacies. In addition, two studies (Carroll, 2000; Labbo, 1996;) that explored this intersect are also highlighted as precursors to this study.

The purpose of this study, the investigation of meaning making behaviors and interactions of first grade students in a technology rich environment and their descriptions of these behaviors, necessitates a qualitative methodology conducted through a social constructivist framework (Fosnot, 1996). Through a rich description of one exemplary classroom this study highlighted the evolving possibilities that might be imagined as new and emergent literacies are bonded.
CHAPTER II

LITERATURE REVIEW

Introduction

Without a doubt, man’s attempts at meaning making are longstanding and have occupied civilization’s conversation for many centuries. As this investigation into first grade meaning making in a technology rich environment commenced, it was important to understand the concept of meaning making both philosophically, in the educational realm of emergent literacy, and ultimately as it impacts the new literacies. Within this evolving discussion of meaning making, attention was directed both to a review of the theoretical positions and current practices related to meaning making in technology-enriched, elementary classrooms.

The position of the learner is central to this discussion: indeed, as the view of the learner changes the philosophical or theoretical stance towards meaning making also changes. For example, if the learner is understood as a receptacle, then meaning is deposited in the student from a teacher who is the repository of knowledge. The learner is passive, receiving the meaning from a knowledgeable source. Inversely, if the learner is active there is continual engagement in problem solving and active learning through which the learner constructs meanings with the help of a teacher facilitator (Friere, 1972).
Theoretical Framework

“He, [Dewey], too, was concerned about the attentiveness to the actualities of life, about the need for all sorts of persons to learn to read their own lived worlds. . . . It will be argued as well that children who have been provoked to reach beyond themselves, to wonder, to imagine, to pose their own questions are the ones most likely to learn to learn” (Greene, 1988).

Constructivist Theory

This dichotomous view of the learner framed the arena into which Dewey (1900) entered and proposed tenets of progressivism. Writing soon after the turn of the last century he was faced with adjusting an educational system that would complement the America of his day, one then transitioning from an agrarian to an industrial society. Opening the laboratory school in Chicago (1896), Dewey rejected the traditional education of his upbringing believing that students’ active problem solving was crucial. Dewey realized that “in critical moments. . . the only discipline that stands by us, the only training that become intuition, is that got through life itself” (Dewey, 1900, p. 41). In order to engage with “life itself,” Dewey understood the importance of classroom architecture. Writing in Child and the Curriculum (1902), he recalled his attempts to secure desks that would allow students to engage in experiments, only to locate desks sold for only listening.

During the 1920s and 1930s, Dewey met with Jean Piaget who was interested in how humans adapted to the environment. Concepts that Dewey held theoretically Piaget was confirming scientifically through his studies in equilibration. Testifying to the learner’s individually constructed meaning Piaget argued that a student’s perception
might not be exactly what the teacher was suggesting (Marlowe & Page, 1998).

Consequently, what the teachers taught was not always the lesson learned by the student (Piaget, 1941/1995).

It is ironic that the original work of Piaget that later led to the educational concepts associated with constructivism began with the biologic study of snails. Piaget understood that snails in tranquil waters had a different shape from those in agitated waters. He investigated by moving a snail from an agitated water environment to an aquarium or tranquil environment and noted the changes in the organisms. Piaget noted this as an example of biological equilibration (Gallagher & Reid, 1982).

The scientist, Piaget (1985) was able to bring his findings to bear on the cognitive structures of human learners postulating that like the snails, the learner enjoys being in a state of equilibrium. The learner’s world, however, is ripe with discrepant events that challenge this sense of equilibrium between two forces, assimilation and accommodation. When encountering the discrepant events, the learner has three choices: assimilation, accommodation, or rejection and perseverance in original path.

From the point of view of equilibration, it is obvious that one of the sources of progress in the development of knowledge must be sought in disequilibria as such. Disequilibria alone force the subject to go beyond his current state and strike out in new directions. It is also obvious that, while disequilibria provide an essential motivational factor, they do not always lead to progress. They do so only when they give rise to developments that surpass what has previously existed and go on to specific reequilibrations. (p. 10)

Simply stated, if the learner, according to Piaget (1985), has the necessary structures in his/her cognition they will be able to assimilate the new discrepancy into their body of current knowledge. On the other hand, if these structures do not exist the learner is challenged to grow and accommodate the new information. Finally, if the
information is so far beyond the reach of the learner, the learner will neither assimilate nor accommodate but simply reject. In this sense, Piaget viewed the learner as a unique individual in this complicated dance. The learner individually approached the discrepant insight and balanced it against his/her individual body of knowledge. As an individual the learner took the decisive step to assimilate, accommodate or reject. Thus, Piaget viewed the individual as constantly under construction in that “each end point, even if it is more or less lasting, remains pregnant with possibilities for further construction” (p. 26).

Piaget did acknowledge the influence of the society as important in the experiential surroundings, or the social equilibrium, of the individual, but it was Vygotsky who turned his direct focus upon the society of which the individual was a constituent. Indeed, Vygotsky understood that man is a social creature who engages in the dialogic nature of learning. Whereas, “Piaget understood the construction of meaning through confrontation, Vygotsky sought dialogue” (Vygotsky, 1997, p. xxiv). He understood that learners forge spontaneous concepts, formation much as those suggested by Piaget, originating from the learners’ interaction with their experiences. Vygotsky postulated that there was, however, another force at play, scientific concept formation. Unlike the spontaneous concept formation which originates in the individual, the influence of the scientific concepts grows from structured learning defined by societal recognized concepts. As Vygotsky (1997) explained:

Though scientific and spontaneous concepts develop in reverse directions, the two processes are closely connected. The development of a spontaneous concept must have reached a certain level for the child to be able to absorb a related scientific concept. . . . In working its slow way upward, an everyday concept clears a path for the scientific concept and its downward development. It creates a series of structures necessary for the evolution of a concept’s more primitive, elementary
aspects, which give it body and vitality. Scientific concepts, in turn, supply structures for the upward consciousness and deliberate use. (p. 194)

Speech and thought, then, served as prime examples to both Piaget (1985) and Vygotsky (1997). While studying the language of young learners Piaget (1985) concluded that often they employed egocentric speech which although spoken aloud served no social communicative function. Vygotsky in revisiting these studies determined that all speech is social; moreover, he concluded that the “egocentric speech” as qualified by Piaget was truly “inner speech” directly connected to the development of spontaneous concepts. Indeed, he reasoned when a child encountered a “difficult cognitive task involving verbal material, inner speech helped to imprint and organize the conscious content” (Vygotsky, 1997, p. 3). Additionally, inner speech was seen as powerful in bridging thought and language by “facilitating the selection of essential material from the nonessential” (Vygotsky, 1997, p. 3).

Inner speech according to Vygotsky (1997) serves a significant function in the formation of the spontaneous concepts. It is here that children mold their unformed understandings into concepts and then search for the appropriate speech to communicate it to others. It is at this junction, where children are reaching up from their level of the spontaneous concept and the model is reaching down grabbing the learners through scaffolding from the scientific concepts that the zone of proximal development (ZPD) occurs.

Bruner (1978), as reflected in Fosnot (1996), in his writings with colleagues Ratner and Ninio, continued the investigation on this dialogue of learning and suggested the term “scaffolding” to explain the challenging communication employed by the knowledgeable other to stretch the learner to new understandings and jointly constructed
meanings. Unfortunately, continued research to investigate this relationship has enjoyed mixed results, leading researchers to conclude that “although the effects of language and abstract formalisms do not seem to be direct, there does seem to be an interaction between symbol and thought when one compares representation across media” (p. 22).

Perhaps Bruner’s thoughts on concept formation were forged during his collaboration at the Woods Hole Conference, in 1959, and in conceptualizing the resulting notes on the conference (Bruner, 1960). Seeking an answer to concerns about American education raised by the Russian’s Sputnik launch, the conference investigated the issue of “what shall we teach and to what end” (p. 1). Students of the day, products of the behaviorist model dominating school curricula at the time, were skilled responders to teacher-directed stimuli, but were unfortunately poorly positioned to be the problem solvers needed to meet the competitive space challenge. Indeed, the situation seemed systemic in that the nation had schooled a generation to provide required answers but lacking the inquisitive nature to pose the generative questions.

According to Bruner (1960), it was in this atmosphere of regeneration that the four major themes of the conference, infused with essences of constructivist thought, were manifested. First and foremost there was an emphasis on “learning the structure of a subject, rather than simply mastery of facts” (p. 12). Secondly, in contrast to maturationist thought of the time, the conference maintained that “the foundations of any subject may be taught to anybody at any age in some form” (p. 12), thus, establishing the foundation for the spiral curriculum. The spiral curriculum is a curriculum that presents concepts for additional study at successively more complex levels according to maturity. .. Next, the conference upheld the importance of intuition, much neglected prior to this
point in time. The examination of this area would eventual find its way into the discussions of Vygotsky (1997) as he considered inner speech. Finally, motivating the desire to learn was framed as a concluding theme and emphasized the shift to learner centered curriculum.

Constructivist Practice

Even at the time of Dewey’s original work, the Progressive Education Association committed to the “Eight Year Study” which assessed high schools employing active learning techniques. When both Aiken (1942) and Greene (1942) compared students from traditional high school programs with college students from the high school study group, the latter were found to be much better prepared. More recently, studies with middle school students found that direct instruction increases initial recall but the discovery through active learning increases long term retention and transfer of knowledge (Worthen, 1968). In the elementary school environment, Sharan and Sharan (1990) concluded that students using their formula of constructivist cooperative learning, Group Investigation, scored higher on measures of academic achievement than counterparts using traditional classroom methods. Finally, Secules et al. (1997), noted that students involved in the constructivist-oriented Schools for Thought Project (1993) conducted by a collaboration of researchers from Vanderbilt University, The University of California, Berkely, and the Ontario Institute for Studies in Education found that students scored better than comparison classes on a standardized test.

Even the best practices and implementations of constructivist approaches, come with cautionary codicils. The constructivist family tree has grown and indeed comprises many branches. There are controversies even among educators who all honor
constructivist learning strategies. Even a basic concept such as the Zone of Proximal Development (Vygotsky, 1978) elicits concern in the mind of some constructivists. The Zone of Proximal Development or the ZPD (as referenced by Harris & Hodge, eds., 1995) is “the distance between a child’s actual developmental level as determined through independent problem solving and his/her potential development [level] as determined through problem solving under adult guidance or a collaboration with more capable peers” (p. 288). In the scaffolding scenario, some question if the “scientific concept is being viewed as truth in the objective sense, and is the teacher’s role being perceived as one that facilitates a learner’s adoption of it” (Fosnot, 1996, p. 21). Certainly, this is the issue addressed by Bailey and Pransky (2005) as they investigated the scaffolding of dominant culture norms even when they are a mismatch for the culturally and linguistically diverse subculture.

Sociopsycholinguistic Framework

“Language whether spoken or written, produced or comprehended always is related to intentions and purposes, and children learn about language as they strive to use it” (Halliday, 1975).

The Nature of the Interaction

The influence of theorists such as Piaget (1985) and Vygotsky (1997) was clearly evident as educators began to understand the importance of learners and their environment while considering the construction of meaning. Rosenblatt (2005) related how the embryo for the transactional theory proposed in the Reader, the Text the Poem, reflects Vygotsky writings concerning the meaning of a sign or word suggesting that the
“sense of a word is the sum of all the psychological events aroused in our consciousness by the word” (Vygotsky, 1997, p. 244). The relationship between the reader, the text, and the environment was the foundation for the transactional theory as Rosenblatt (2005) explained that:

> There is always a personal and social context within which the reading event occurs. The individual internalizes, draws on, a socially produced language presented by family and society. We have not only a particular moment in the personal life of the reader, but also a particular social and cultural environment. (p. xxii)

These elements enjoy a reciprocity that is organic in that each alters the other in a spiral relationship forging a meaning for a particular environment, reader and text.

Yetta Goodman (1984) supported this proposition as she explained that literacy learning is learning “how to mean” in that as a child “interacts with the literacy events and implements into their culture, they grow curious and form hypotheses about their function and purposes” (p. 102). From a sociolinguistic framework Smith (2004) purported that the “basis of all learning-especially of language learning- is sense” (p. 153). The sense or meaning in literacy is nourished by roots grounded in the functions that the literacy acts serves, the reflections of society’s values and attitudes toward the oral or written language, and finally a consciousness about the functions of literacy (Goodman, 1984). Moreover, Smith maintained that “literacy is not to be achieved by learning the so-called basics or mechanics of reading and writing. . . Learning such mechanics would be pointless and difficult unless a child had already developed a foundation of insights into the nature and functions of written language” (Smith, 1984, p. 144).
As Holdaway (1978) explained:

a traditional error of thinking about reading and writing was to see them as
discrete subjects isolated from the world of language and spoken culture and then
to teach them as if they had no relationship to listening and speaking. (p. 12)

Holdoway (1978) explained that processes of literacy are connected to human
language and language learning in general. The study of language is concerned with “1)
semantics, the study of meaning, 2) grammar, the study of syntax and morphology, and 3)
phonology, the study of the sound systems of language” (p. 13).

The Nature of the Young Learner

Although illiteracy is often viewed as a deficiency, it is as Smith (1984) noted the
beginning from which each child moves towards literacy. Young children, who
eventually become literate, gain insights through interacting with their cultures.
Specifically, children are ushered toward these insights and understandings through
engagement in relevant demonstrations; thus, children are “entirely dependent on literate
others to lead them into literacy, to show them how written language can be used” (p.
145). This apprenticeship, however, is powerful and by the age of three many children in
our culture can recognize their favorite cereal or fast food restaurant (Goodman, 1984)
and the use of writings for notes (Harste, Burke, & Woodward, 1981).

As postulated by Vygotsky (1978) and later referenced by Ferreiro (1984), the
path from demonstration to meaning-making is more than merely memorization. Rather
it is an intricate and thoughtful act evolving from assimilation to transformation, whereby
children construct their own knowledge from the interactions with the knowledge of
others. As children engage in literate encounters they

pose deep questions to themselves. Their problems are not solved when they
succeed in meaningfully identifying a string of letters, because they try to
understand not only the elements or the results but also, and above all, the very nature of the system. (Ferreiro, 1984, p. 172)

Bissex (1984) explained that “children are small; their minds are not” (p. 100). The young learners set the goal of literacy learning as they need simply to be like others in that the child is their own “inner teacher . . . [as they are] interacting with the information and structures provided by . . . [their] immediate environment” (p. 101). To this end the earliest literacy is oral language as the infant matches their parents’ sounds. As the parents respond in a supportive fashion honoring all approximations, the child engages in one of the most difficult tasks, learning a native language. Despite the intrinsic difficulty, almost all children learn to speak with such apparent ease that we term it natural (Cambourne, 1995; Holdaway, 1979). In this sense as Holdaway (1979) explained, “developmental learning is highly motivated, consistently purposeful, globally activating, powerfully reinforced . . . and meaningfully related. . .” (p. 22).

The Nature of the Learning

Harste et al. (1988) cautioned against three major misconceptions while investigating the nature of the learning during a literacy encounter. First, “confusing product with process, confusing growth with experience, and confusing convention with language” all combine to confuse issues of literacy learning (p. 15). By valuing the product rather than the process, we fail to realize the early onset of literacy in the young child, while we await literate behavior similar to those constructed in the adult literate community. Halliday (1978) maintained that “language arises in the life of the individual through an ongoing exchange of meanings with significant others” (p. 1). In much the same way, Halliday (1973) continued that written language, in particular, also engages in
an odyssey of coming to mean through signs which both provide context and assume meaning through exchanges with others in your culture. Second, adults tend to assess the final literate activity rather than the amount of learning to arrive at that activity. In so doing the potent variable of experience is negated. Third, Harste (1988) cautioned that a myopic lens on the importance of language conventions at times can imprison creativity. For some time now we have gauged language development through conventional control. This causes us “to see convention when we wish to see language . . . when convention is the lens, we fail to see linguistic growth as continuous throughout the life of the language user and so, fail to appreciate linguistic achievement. . . ” (p. 27).

Smith (1984), while honoring the necessity of contextualization and conventionalization in becoming literate, also viewed these two aspects of written language as guideposts for the young learner. The finding that many young preschoolers are able to distinguish environmental print when it is contextually bound bears witness to the hypothesis that “text is best appreciated when it is situation dependent” (p. 146). Indeed, even fiction can be said to be contextualized through specific linguistic conventions that are consistent within that genre. Moreover, the spectrum realized by Smith that “all meaningful language is contextualized; it is sensitive to the environment [and the intentions of the author] and it is this sociolinguistic context that permits comprehension and learning” may be only a portion of the total picture (p. 148). It can be argued that sociolinguistic context is one of the three valued vertices in the transactional triangle of meaning making (Rosenblatt, 2005). The importance of sociolinguistic context to meaning is relatively transparent while the impact of conventions may perhaps be more obscure. Certainly, all languages adhere to
conventions and rules that must be respected within the particular language (Harste, 1988). As the focus is broadened to encompass language learning in general Smith (1984) noted that it is the, “conventional nature of all language, not their particular rules or reasons, that make them work” (p. 148). Moreover, Smith maintained that the conventional nature of language far from being a problem for the young learner is an expectation. Young learners understand the conventional nature of human behavior and are “eager to discover what the appropriate conventions are” (p. 149).

**Historical Framework**

*History teaches us that literacy refers to a malleable set of cultural practices that are shaped and reshaped by different, often competing social and cultural interest. As a result we do not view how to teach literacy as a scientific decision, but rather as a moral, political and cultural decision about the kind of literate practices that are needed to enhance peoples’ agency over their life trajectories. . . literacy education is ultimately about the kind of society and the kinds of citizens that could and should be constructed.* (Luke & Freebody, 1999).

Understanding of modern classroom literacy instruction finds support in learning theory. Additionally, instruction is grounded in social and historical roots from our country’s early history and growing through changes in the social, political, and economic tableau of the nation. Therefore, a review of the historical underpinnings of reading and language instruction provides an appreciation for the evolutionary foundations that support current thought and practice.

From the earliest colonial times education was centered in the family and concerned itself with religious matters which focused on knowledge of the Bible as well
as the ability to sign one’s name (Cremin, 1970). By 1647 Massachusetts had enacted legislation to create petty schools in settlements larger than fifty households (Cubberly, 1934); while, this custom spread to the remainder of New England and through the Mid-Atlantic states by the turn of the century (Cohen, 1974). Although these petty schools expanded the literacy curriculum, they were still centered on the study of religion unified under the Protestant banner of thought and behavior as mandated by the Old Deluder Satan Act of 1647 (Murphy, 1960 as cited in Shannon, 1989).

The instructional materials supporting this parochial curriculum were sparse and generally involved the alphabet, a syllabary, and religious texts (Huck, 1976). By the 18\textsuperscript{th} century, Vensky (1987) explained that the New England Primer became the accepted text. The well known beginning connecting the letter A with the parochial Adam’s fall from grace was the fulcrum upon which literacy education would balance for over 100 years.

There was not complete uniformity of educational thought even in colonial times. Benjamin Franklin sought a curriculum with a greater focus on freedom of thought which would generate economic and social development for the developing colonies. Indeed, the impact of the Revolutionary War was to also encourage a change in children’s literature. This evolution was exemplified in the New England Primer (1800 edition) which now connected the letter A with the angler who fished with a hook.

During the 19\textsuperscript{th} century teachers had already begun to entertain different approaches to literacy education. Certainly, the beginning of the century might be earmarked by the spelling method. Students would learn letter names and sounds and even drilled at reading nonsense syllables before moving to actual words. By the middle
of the century the emphasis had shifted from letter sound and spelling to a more phonics based approach. The phonics method, supported by the *McGuffey’s Eclectic First Reader for Young Children*, sought to guide students from the alphabet to words to simple sentences to stories (Cremin, 1957).

Shannon (1989) noted that even during the time that instruction centered on phonics, Horace Mann offered an alternative approach focused on discussion of familiar words rather than the alphabet drill. This approach would eventually be systematized by the Oswego Movement. At its best the movement required “teachers to redefine their goals of education from the reproduction of facts within textbooks to the examination of objects from their daily experience and then the interpretation of textbook facts in light of their observations” (p. 9). In practice, however, the word method was used most often for science and social studies, while phonics perpetuated during reading instruction (p. 9).

By the end of the 1800s the progressive or new education movement was growing (Cremin, 1961). This movement sought to “integrate literacy instruction into elementary curricula based on children’s interests, needs, and inclinations” (Shannon, 1989, p. 10). Beyond changes in practice this new movement was philosophically different in that it rejected the doctrine of child depravity and the need to constrain the urges from original sin to a concept of children’s natural goodness proposed by Rousseau.

Despite these moments of reform, as Rice completed his survey of the public school curricula for Forum Magazine in 1892 he found that reading remained a mechanical operation of word calling and phonics drill. Rice (1893) proposed three laws to which schools should comply which included divorcing themselves from politics,
strengthening the professional strength of teachers, and the need for teachers to grow professionally and intellectually.

Even though educational thought wavered between the progressivism of the New Education and the more traditional approaches, this period of the industrial revolution eventually aligned itself with a more traditional approach. In large measure this stance was due to the support of business tycoons. Indeed, as Shannon (1989) explained “school supervisors and superintendents began to see themselves as businessmen rather than scholars . . . seeking to separate decision making, curriculum development, and evaluation from instructional practice” (p. 17). Additionally, this business like viewpoint was based on an alternative belief in the nature of man. A belief in science led to a process that “dis-enchanted the things of nature by relying on physical rather than metaphysical explanations . . . because all things were made up of atoms-not spirits” (p. 17). The new Social Darwinism promoted a view of natural selection with a reliance on inquiry through the scientific method and supported by quantitative data gathering.

It is important to note that even at this time in history that elevated the use of quantitative data, progressives such as Dewey (1928) recognized a value in qualitative data noting that “all subjects pass through a qualitative stage before they arrive at a quantitative one” (p. 118). He connected the use of qualitative data to the transforming nature of progressive education and suggested that:

Possibilities are more important than what already exists and knowledge of the latter counts only in its bearing upon possibilities. The place of measurement of achievements as a theory of education is very different in a static educational system from what it is in one which is dynamic, or in which the ongoing process of growing is the important thing. (Dewey, 1928, p. 118)
While confirming an appreciation of quantitative data collection methods, Thorndike (1906) disavowed both the notion of the Bible’s explanation of human nature and the Roussean view of a natural sense of grace. Instead, he replaced them with a sense of learned behavior through stimulus response connections. As Thorndike (1918) explained:

> Education is concerned with changes in human beings; a change . . . is known to us only by the products produced by it-things made, words spoken, acts performed, . . . To measure any of those products means to define its amount in some way . . . that this knowledge may be conveniently recorded and used. (p. 16)

Shannon (1989) explained the business mentality continued to seep through educational thought. As the 19th century began, educational leaders such as Spaulding and Bobbitt viewed the educational process from a businesslike perspective. They delivered a three step method for economizing time which included an analysis of the learning environment to identify instructional methods, a measurement of different methods, and the adoption of the method delivering the best results. Ironically, they translated business tycoon’s concern for productivity to scientifically managed test scores.

Continuing the scientific research while directing it toward reading, Gray (1919) (cited in Shannon, 2007) directed his scientific eye toward oral and silent reading. Although he reported the scientific importance of oral and silent reading in the early grades he acknowledged that “Oral reading exercises should emphasize the content of what is read” (p. 30). In this way, Gray seemingly accepted a portion of the New Education philosophy. Ultimately, Gray embraced the “basic structure of traditional reading instruction” by focusing upon a “goal . . . to develop students’ abilities to retell or to answer questions about a passage . . . to learn that the material is to be reproduced” (p. 30).
The national interest in scientific instruction evident in research needed to find its way through the classroom door. In 1918 the beginnings of this entry was accomplished through the establishment of the Committee on Materials in Education. Even though there had been changes in textbooks, classrooms were now to be led by a teachers’ guidebook organized to direct both teachers’ and students’ actions during reading instruction. Distinctly, reading instruction had stepped down an alternative path with the introduction of the guidebook which stood in stark difference to former brief notes to teachers (Smith, N., 1965).

According to Shannon (2007), the appearance of the teacher’s guidebook in the 1920’s was the embryo of basal materials in today’s classrooms. They set the uniformity of science against personal idiosyncrasies in teaching practice since “directions to teachers . . . were offered as scientific facts to be followed regardless of the social context . . . or the abilities or attitudes of teacher and students” (p. 34). Reflecting current thought in the business world, the scientific management in the guidebooks provided the classroom procedures specified by an outside authority that both teachers and administrators were to follow. Shannon maintained that “although the contents of basals would change modestly during the next 80 years, the rationale for and the format of basal reading materials were set by the spirit of the first two decades of the 20th century” (p. 35).

Wittick (1968) predicted that the endurance of basals is reflected by the acknowledgement in the 67th NSSE Yearbook that “the only thing that won’t change in reading instruction in the 1970s and the 1980s is that basal readers will continue to be used” (p. 124). In reality, over the time period between their beginnings in the 1920s
through the 1960s basals were researched by numerous literacy journals with many offering support. Most importantly, basals were successfully marketed to literacy professional organizations such as the International Reading Association and school systems in general ensuring them market viability. The omnipresence of basals is summarized by Shannon (1989):

Thus, wherever teachers and other school personnel turned in search of information on elementary school reading instruction since the late 1920s—whether they consulted research yearbooks, read methods textbooks, perused journals or professional books, or attended conferences—they found reading experts advocating the use of basals. (p. 36)

In 1955, Flesch fired a volley against the formidable basal empire suggesting in his book, *Why Johnny Can’t Read* that the fault rested at the doorstep of the basal and was only to be corrected by the adoption of early phonics programs. Investigating the best way to teach reading the government launched one of its most comprehensive investigations, *The First Grade Studies* (Bond & Dykstra, 1967). Apart from reclaiming the importance of the teacher in the classroom, this study between basal and nonbasal approaches produced mixed results (Bond & Dykstra, 1967).

Published the same year as *The First Grade Studies*, Jean Chall (1967) also commented on early reading behaviors in *Learning to Read: the Great Debate*. Although as Pearson (2002) explained her work centered on five major principles, including making changes to method, reexamining content, reevaluating grade levels, developing new tests for measuring growth, and improving reading research, it was the first of the principles to “make a necessary change in method (to an early emphasis on phonics of some sort)” which defines her legacy (p. 424). Ironically, the combination of *The First
Grade Studies and Chall’s work did signal the end of the look-say reading approach but did not end the basal approach (Pearson, 2002).

Nearing the end of the 1980s, basals were challenged by a grass root movement, whole language, popularizing the use of literature based, authentic, meaning-making approaches to literacy. This challenge was led by a former basal author, Kenneth Goodman (1986). Goodman placed forward concerns that the skill based agenda evidenced in the basals was inhibiting the student engagement of literate behaviors. The skill based agenda proposed learning the letter sound relations as well as other phonics rule governing word segments which would lead to readers having the skills to sound out portions and eventually entire words. Froese (1991) explained the whole language movement viewed literate behavior as the amalgamation of three operating systems: graphophonic, syntactic, and semantic. Therefore, Goodman (1986) suggested phonics should be incorporated to reflect the challenges of the text and was recast to be a portion of the holistic lesson rather than an isolated drill. In addition, basals were replaced with trade books, dittos with authentic writing activities and standardized tests with students’ work samples.

Shannon (2007) explained as the whole language umbrella began to cover the country, states through their educational departments responded. These movements were noted from California whose teachers witnessed the California Reading Initiative to Pennsylvania who in the 1977 revision of their reading curriculum noted their goal as “the first critical experience focuses on the development of active motivated readers who engage in reading for a variety of authentic purposes” (p. 93). Challenged for survival, the basals were ultimately able to adapt to the ever growing popularity of this literature
based movement. Their titles changed to include terms such as literature experience while “teachers’ directions became invitations, responses to direct questions were personal responses to literature . . . [indeed] . . . basal publishers did their best to rename traditional basal practices with the terms used by their critics” (p. 136).

Always skill based, Pearson (2002) noted that basals were able to mutate content adopting scientifically based research and thus emerge reinvigorated with a new attention to systematic phonics (National Reading Panel, 2000). Throughout the process, “readers still accomplished the reading task by translating graphic symbols on a printed page into an oral code, which was then treated by the brain as oral language” (p. 422).

As the calendar marked the beginning of a new millennium, Shannon (2007) recognized the development of a new age of accountability marked by a new and powerful player, the federal government. Through such federal programs as the No Child Left Behind legislation and the initiatives such as Reading First the current administrations have charted an accountability path for today’s schools. Far surpassing their former star product, the basal, these businesses are now engaged in the promotion of testing materials, both the tests themselves and the supporting workbooks. They are able to produce one product for the entire country and for many cycles. Five major companies control 90% of the testing market which “conservative estimates total the market at 2.3 billion annually” (p. 139). Also, basals are still alive and well, as they adapted to the current focus on skills and the five essentials as determined by The National Reading Panel.
Early Literacy

“Developmental learning is highly individual and non-competitive; it is short on teaching and long on learning. . . ” (Holdaway, 1979, p. 14)

As literacy educators worked to establish a theoretical base for meaning making (Harste et al., 1984; Smith, 2004)), early childhood literacy educators attempted to adapt these concepts to the young learner (Bruce, 2000; Goodman, Y., 1984). They sought to define the nature of early literacy while marking the beginnings of literacy in the form of meaningful early reading and writing behaviors. This discussion will focus first on what educators have come to define as early literacy and secondly how young readers and writers develop.

According to Teale and Yokota (2000), through much of the previous century early childhood educators viewed the years before first grade as a preparation period to reading . . . in reality, a time of waiting until the student had matured sufficiently to be ready to read. Simply stated, the model relied upon the maturationist principle of “neural ripeness” (p. 4). The concept was unadorned; all students would have the maturity required for reading by first grade and not before that time.

Eventually the reliance on chronological age was brought into question, and educators began to investigate the applicability of the student’s mental age as well as differences in experiences. The test for reading was now the ability to read simple texts from basals. Indeed, the student needed to be ready, or sufficiently mature (approximately 4 or 5 years old), to engage in reading, and before that moment the child was prereading. During this period the child should be occupied with a reading readiness
curriculum through which the prereader might engage in precursor activities that led to reading behaviors (Betts, 1946).

In 1980, the literacy community was to undergo a dramatic paradigm shift from their prior concept of reading readiness to a new model of emergent (early) literacy. Basically, this new model, in contrast to previous maturationist thought, disavowed the standard age of five or six for a readiness level to support the acquisition of reading skills, believing that learning to read and write may begin very early in a child’s life (Pappas, 1986; Teale, 1984).

It is important to note that throughout this work the terms “early literacy” and “emergent literacy” will be used to denote a framework that maintains that literacy development is emerging from birth. This framework is supported by researchers in the field, although at times the terminology varies between the terms “emergent” or “early literacy.” Indeed, Teale, as an invited essay author on the subject of emergent literacy for the Literacy Dictionary, suggested that

what is new and better about an emergent literacy perspective is that it views reading and writing development from the child’s point of view . . . emergent literacy examines changes over time in how the child thinks about literacy and in the strategies the child uses in attempt to comprehend or produce written language. (Harris & Hodges, 1995, p. 71)

From another viewpoint, Neuman and Roskos (1998) rejected the term emergent since “the term emergent [was used] to describe core features . . . highlighting the evolving nature of children’s understanding as they moved toward conventional reading and writing” (p. 2). Consequently, they stipulated that they will utilize the term “early literacy” because “it better reflects the nature of reading and writing as a developmental continuum rather than a skill that one either acquires or does not” (p. 2). Throughout this
work, this distinction is only significant to the degree that the terms differentiate a
departure from the maturationist position of reading readiness.

**Developmentally Appropriate Practice**

In response to the maturationist stage dependent readiness level for learning,
Teale and Sulzby (1986a) explained that “although children’s learning about literacy can
be described in terms of generalized stages, children can pass through these stages in a
variety of ways and at different ages (p. xviii). Moreover, children learn through active
engagement with the authentic literacy acts that reflect their stage of development and
hold meaning in their society (Goodman, 1984; Smith, 1984; Teale, 1984).

The shift in emphasis recognized by the literacy community was emblematic of a
national shift toward developmentally appropriate practice (DAP) by educators of young
children. Indeed, beginning with the work of Bredekamp (1987) and followed by the
work of Bredekamp and Copple (1997) the swing from viewing the student as a blank
slate to realizing that students are constructing knowledge long before they enter school
was evident. Indeed, as strands of constructivist theory became braided into practice, the
emphasis on the practice of isolated academic skills through a drill and skill approach
was replaced with a concern for conceptual learning. Assessing appropriate curriculum
and assessment for young children, Bredekamp and Rosegrant (1992) advocated “. . . for
schooling to place greater emphasis on active, hands-on learning; conceptual learning that
leads to understanding, along with acquisition of basic skills; meaningful, relevant
learning experiences . . .” (pp. 10-11). To accomplish this task, early childhood educators
envisioned a multifaceted developmentally appropriate structure including age, individual
growth patterns and cultural factors (Bredekamp, 1987; Bredekamp & Copple, 1997).

Each of these dimensions of developmentally appropriate practice, age, individual
growth patterns, and cultural factors correlates with the work of significant theorists
investigating how young children make meaning. Piaget (1969), through his age-
criterion stages of development offered a fluid approximation when children might be
cognitively able to access meaning. Gardner (1983) provided a framework to highlight
the many paths to meaning via alternative intelligences that would influence individual
growth patterns. Vygotsky (1986) addressed the third and final component, cultural
factors, by uncovering the very social nature of learning.

Prompted by the onset of interaction with cultural tools such as language, the
baby begins the formation of higher mental functions. Definitely, “the early years are the
period during which the formation of higher mental functions goes through its initial
stages, when children’s use of oral language continues to transform their perceptions and
... their attention, memory, imagination, and thinking” (Bodrova & Leong, 2006, p.
245). These behaviors are social, interindividual, and shared; they become specific to the
individual only in the final stages of realization.

Every function in the cultural development of the child appears on the stage
twice ... first, the social, then the psychological, first between people as an
intermental category, then within the child as intramental category. (Vygotsky,
1997, p. 106)

This concept of sharing during learning extends beyond the knowledge of content to also
include psychological functions leading toward meaning making.

Holdaway (1979) offered a view of literacy development that rested upon these
concepts of developmentally appropriate practice as the young learners search for
meaning in their world. He also acknowledged the variables of age, individual differences, and culture by realizing that “development tends to proceed continuously in an orderly sequence marked by considerable differences from individual to individual” (p. 23). Further he noted supplementary criteria that influenced the seemingly natural manner in which students might engage in literacy learning. Many of these were determined externally by immersing the learner in the literate behavior, offering lively examples, intrinsic and extrinsic rewards, and reinforcement for almost every approximation. Indeed in this perceived learning environment bad approximations were not punished but rather simply not reinforced. In this secure and supportive environment, the “learner determines what aspect of the task to practice, the pace and length of practice and continues until essential aspects of the task are under comfortable automatic control” (p. 22).

Both Holdaway (1979) and subsequently his fellow Australian, Brian Cambourne (1995) understood the natural appearance and development of learning. While specifically investigating language acquisition, these two researchers noted the significance of a supportive adult (often parental) emulative model. Indeed, they suggested learning progressed from “the first attempts of the child to do something that is like the skill he wishes to emulate . . . [while] . . . the activity is shaped by the immediate rewards, intrinsic and extrinsic . . . and extended patience for inappropriate responses” (Holdaway, 1979, p. 23).

Cambourne (1995) suggested a continuum of learning activities encountered by the young learner that mirrored much of Holdaway’s (1979) initial work. The first segment of these included immersion, demonstration, engagement, and expectation and
reflect the environment for learning. Not only does the learner need to be immersed in
the literate behavior but must also understand it through observations while valuing the
behavior as purposeful and within the learner’s capabilities. Subsequently, the learner
has the responsibility of choice to engage in learning the behavior or not to attempt it at
this time. The learner is aided in learning the literate behavior by having approximations
rewarded, sufficient time and opportunity to employ the developing skill, and scaffolded
responses by significant others. When successful, the learner has transformed the
demonstrated meaning and skills of others into the learner’s own unique set of meanings.
According to Sheffler (1965), the learner (ripened) a response into a deep understanding
which will be continually clarified and explored through continued reflection and
discussion.

These concepts of developmental learning were transferred to the study of oral
language acquisition. Research (Cambourne, 1995; Holdaway, 1979) suggested that oral
language acquisition was accomplished through interaction with significant others and
often without direct instruction. Indeed, Clay (2003) purported that young children
“derive order and structure for language from massively different and diverse samples,
[then] test and refine their values . . . and are barely conscious of any of these processes”
(p. 47). Along with Graves and Read, Clay challenged the existing doctrine on writing
acquisition which suggested that motor coordination had to be in place along with the
ability to read and spell before a learner could engage in writing. Pursuing a much more
developmental stance these three educators were the pioneers to recognize the
developmental nature of writing beginning with the very young child. Clay also
proposed that the early forms of strategic reading also occur in young readers (Clay,
Regrettably, “unlike oral language and writing research, there have been few continuous longitudinal studies of reading processes in formation, with the result that young speakers and writers are seen as building their competencies and young readers receive them from their teachers” (p. 48).

Elkind (1989) reaffirmed the developmental nature of literacy by suggesting the creative nature of the developing individual and their construction of knowledge. He maintained that “from the developmental viewpoint learning always involves creative activities. Young children ‘try out’ literacy on their own terms in their construction” (p. 73). This concept is reinforced by Barone and Morrow (2003) as they explained the process by which young children naturally make sense of oral and written language by supportive significant others allowing young children to forge discoveries in literacy.

In conclusion, developmentally appropriate practice might best be summarized by Holdaway (1979) suggesting that:

developmental learning is highly individual and non-competitive; it is short on teaching and long on learning; it is self regulated rather than adult regulated; it goes hand in hand with the fulfillment of real life purposes; it emulates the behavior of people who model the skill in natural use. (p. 14)

Connecting Psycholinguistic Theory to Early Literacy

Many of the concepts developed by Holdaway (1979), Clay (1979), and Cambourne (1995) concerning developmental learning resonate with principles of the psycholinguistic philosophy. Reviewing the psycholinguistic concepts of reading, Holdaway (1979) noted that “essentially, the psycholinguists insist that reading is not a matter of perceiving or recognizing words first and then getting to the meaning but rather that meaning guides and facilitates perception” (p. 87). Certainly, the writings of Smith
(1973) seem a conceptual forerunner to the developmental theories of Holdaway (1979) suggesting that:

Reading is not primarily a visual process. Two kinds of information are involved in reading, one that comes from in front of the eyeball, from the printed page . . . and one that derives from behind the eyeball, from the brain . . . non visual information. Non visual information is what we already know about language and about the world in general. (p. 6)

Indeed, there is considerable agreement that students learn through demonstrations of what can be done and how it is accomplished (Cambourne, 1995; Clay, 1979; Holdaway, 1979; Smith, 1973). Interestingly, Short (1996) reminded us that demonstration is not modeling. She clarified that unlike modeling which requires reproduction,

demonstration assumes that mentally active learners consciously pick and choose what it is that they will attend to out of what is shown to them. Children . . . will attend to only those demonstrations that make sense to them given their current inquiry questions and what it is that they already know. (p. 13)

Language is but one of the sign systems that stands “between the world as it is and the world as we perceive it. These sign systems act as lenses that permit us to better understand ourselves and our world” (Harste et al., 1984, p. 14). Certainly, the comprehensive curriculum and the growth of multiliteracies have enlarged the scope of these sign systems beyond the historical spotlight focused upon reading, writing, and arithmetic. Eisner (1982) reminded us that sign systems possess varying potentials to express the author’s meaning. Moreover, as “authors move between and among sign systems they are able to expand the range of meanings they can express . . . or to reflect on their concepts in the process of inventing forms to express them” (p. 29).

Oral language, “talk” is a valuable component of the comprehensive curriculum. Staab (1991) sharing Lindsfor’s (1987) findings reminded us that “talk can expand a child’s theory of the world, make understandings more precise and increase a child’s
retention of knowledge” (p. 27). Halliday (1978) by terming language a “social semiotic” underscored the social aspect of the sign system of language including oral language. Through talk young learners expand their theoretical conceptions of the world by sharing their interpretations and experiences and listening to ideas of others. Additionally, talk increases the precision of understandings by encouraging the learners to endure the struggle to shape their ideas in words. Moreover, as students encode their thoughts retrieval is improved (Staab, 1991).

As Staab (1991) understood, talk underscores the interactive nature of learning. The earliest interaction with children’s first teachers, often the parents, or other significant adults “provide children with opportunities for talk, a model of talk, and feedback in terms of the meaning a child is attempting to make” (p. 23). In this way young learners begin to construct a framework for language. Froese (1991) suggested that “young children have internalized rules about language that are separate from phonics rules which they first tend to over generalize” (p. 8). Interestingly, these early demonstrations of oral language both from parents and subsequently teachers do not attempt to fragment oral language or teach it as isolated skills.

The importance of oral language is highlighted as researchers turned their attention to beginning reading behaviors. Findings from the work of Dr. Marie Clay (1972a) allow us to have a clearer picture of beginning reading behaviors as evidenced by children between the ages of five and seven.

Beginning reading is a communication system in a formative stage. At first the child is producing a message from his oral language experience and a context of past associations. He verifies it as probable or improbable in terms of these past experiences and changes the response if the check produces uncertainty.
At some time during the first year at school visual perception begins to provide cues but for a long period these are piecemeal, unreliable and unstable . . . slowly the first sources of cues from experience and from spoken language are supplemented by learning along new dimensions, such as letter knowledge, word knowledge, letter sound associations and pronounceable clusters of letters.

Adequate learning must proceed in the directions of more and more receptiveness to visual cues which must eventually dominate the process. They do not do so in the first year of reading when the average 6 year old can only discriminate half the letter symbols in his reading, and yet in the third year they are a dominant source of information. (pp. 161-162)

In summary, Marie Clay (2003) offered observations on the process as young learners strive for meaning by “relying on their sense of the probable. The young learners engage in a continual assessment of the probable by predicting, testing and realigning their world. They accomplish this monumental task not armed with a toolkit of skills accessed through outside instruction but rather by a reliance and growing confidence in their own resources. Knowing that they must find significance . . . from their own experience of the world” and their ever expanding acquaintance with the intricacies of language (cited in Holdaway, 1979, p. 91).

Before the conceptual beginnings of the psycholinguistic movement, educators had viewed models of the reading process from an adult vantage point employing matured logic. Specifically, if “wholes are composed of parts, learn the parts and you’ve learned the whole” (Goodman, K., 1986, p. 9). Goodman (1967) turned this reasoning on its head as he handed young learners reading material and then monitored through taped recordings and observation their actual reading. These observations and recordings were to serve as the basis for a new model of the reading process, a psycholinguistic model. Through this research Goodman came to realize that what others were viewing as reading errors on the part of the young learner were in reality reading “miscues,” or a difference
in response between expectation and observation. Far from random the miscues were
grounded in three systems of language: graphophonemic or letter sound correlation;
syntax, or the structure of language; and finally, semantics, or the meaning of the words
being read.

The understanding of the cooperative role each of the three language systems
contributed to the young learner’s construction of meaning was a beginning tenet in the
whole language concept of reading. The importance on the centrality of meaning to the
whole language approach stood in stark difference to the phonics model of reading which
placed emphasis on letter sound relationships and the skill model of reading which
suggested a bottom up approach concentrating on subskills of reading to be mastered in a
progressive fashion (Harste & Burke, 1977).

Short, Harste, and Burke (1996) suggested that “Michael Halliday did for
language what Ken Goodman had done for reading (p. 9) in that he asserted that it was
learned in authentic and functional settings. Language is social in nature. In this sense,
language is tied to meaning both in constructing meaning from receptive language and
conveying meaning through communicative language. Short et al. noted that Halliday
appreciated the context of language user noting that “language users produce texts that
reflect the context in which they find themselves” (p. 10).

As proficient, literate adults, it is often difficult for us to reconnect with the
enormity of this task of attaching meaning to text for beginning readers. Fortunately,
many have engaged in workshops that offer a glimpse into this awesome task. From Paul
McKee’s Primer for Parents explained in Holdaway (1979) the reader is placed in a
somewhat comparable position by depriving the accomplished reader of necessary cues
to meaning. Given 15 of 39 letters with little syntactic clues the reader struggles with the following excerpt:

Xe	Xe		Xe	Xe		Xe	oooXx oxxoxw xox

while the reader is quicker to decode the same excerpt with only 12 letters but with greater syntactic clues:
Lxtx... xxt xxxl xlx xkxxxn xxxdx! (p. 91)

This simple exercise is telling in that literate adults begin to understand the convergence of literacy strategies that emergent or early readers bring to bear on text including language cues (both syntactic and semantic) directional, lexical (configuration of the unit) and grapho-phonic. It becomes readily apparent that simply using grapho-phonic clues would severely alter the ability to make meaning of text during these early stages.

Certainly, the reader’s meaning making may prove effective although the reader may not be reading without error. As Goodman (1967) reminded, that reading is not error free. To employ the use of all cues would render reading slow, inefficient, and beyond comprehension.

Technology and the New Literacies

*Changes to literacy are limited not by technology but rather by our ability to adapt and acquire the new literacies that emerge.*” (Leu, Kinzer, Coiro, & Cammack, 2004).

*Overview*

In a recent article five authors (Cunningham, Many, Carver, Gunderson, & Mosenthal, 2000) offered their perspectives on how literacy will be defined in the new millennium. Presented as separate definitions the viewpoints on literacy range from the broad concept by Many of “making meaning of the world” (p. 65) to a more traditional point by Carver of “knowing how to read and write . . . with rate of reading and accuracy
of spelling being part of the standard” (p. 67). Certainly, there appears to be elements of disagreement within the literacy community. What is perhaps best exemplified in this spectrum of definitions, however, is the “deictic” nature of literacy (Leu, 1997a, 2000a; Leu & Kinzer, 2000) specifically, the rapidly changing meaning attached to a word that is altered by the temporal context of its use. Thus, the one constant becomes change.

Over time, changes in the forms and functions of literacy have occurred and were altered by evolving technologies and the social forces of the day. Archeological discoveries detailed man’s search for communication and written records; with the early human communication using simple symbol systems. Historically this quest gave rise to technological advancements to literacy such as the cuneiform tablets and historical scrolled parchments (Boyarin, 1993). The impact of social forces was also witnessed during the Reformation as it was aided in the popular dissemination of the Bible through the advent of printing press. The evolving nature of literacy fermented through technology and social change was implicit in the development of the American classroom as detailed in the historical framework of this review (Leu et al., 2004).

Bruce (1997) outlined these transformations in literacy beginning with primitive symbol systems which were first organized into complex oral language which in turn gave way to early writing and manuscript writing organized through an understanding of print literacy. The evolution continued according to Bruce through video literacy, digital multimedia and hypertext literacy and concludes for the moment at virtual reality. At each of the above stages the technology and literacy engaged transactionally. In other words, the technology altered the literacy while at the same time the literacy altered the technology.
Throughout the early history of education in the United States technological change happened slowly, thus allowing changes in literacy to also extend over a number of years. Cuban (1986) reviewed many of the technologies that paraded through the classroom over the years and suggested that each had prophesized a unique potential, but regretfully these taunted technologies are not central to today’s classrooms. For example, Cuban (1986) noted Thomas Edison imagined the importance of film, noting that “books will soon be obsolete in the schools . . . scholars will be instructed by the eye . . . it is possible to touch every branch of human knowledge with the motion picture” (p. 11). Film, however, has failed Edison’s vision and today it is not a pivotal technology in classrooms.

Even as the Woods Hole scholars in 1959 contemplated the changing face of education in the post-Sputnik world, they noted the growth of technology but only in the form of a teaching machine (Bruner, 1960). The value of these “automatizing devices” was to lighten the teacher’s load by providing programmed immediate correction and feedback to the learner. Bruner concluded by noting that it was premature to estimate the efficacy of these machines and he felt that early claims had been greatly exaggerated. The importance of the teacher remained central to the classroom as Bruner explained:

Clearly, the machine is not going to replace the teacher—indeed it may create a demand for more and better teachers . . . nor does it seem likely that machines will have the effect of dehumanizing learning any more than books dehumanize learning. (p. 84)

Today the focus has shifted from these original “automatizing devices “to the use of digital computer technology. The technological changes offered with digital computer technology happen so rapidly that literacy changes not as much in response to the technology but rather our ability to utilize the new literacies that surface (Leu et al.,
2004). Still, there are times that the classroom is reluctant to engage in the landscape of opportunities that technology presents to the students and instead, has opted to simply digitize former print educational practice. Marlowe and Page (2005) viewing this practice questioned, “if you use technology to do the same things you were doing in a traditional format, we would have to ask: why bother?” (p. 104).

Other concerns were offered by Strommen and Lincoln (1992) as they suggested that “our children have been raised in a world of instant access to knowledge, a world where vivid images embody and supplement information formerly presented solely through text” (p. 466). They bemoan the fact that although “the schools are embedded in our culture and reflect its values, the technological changes that have swept through society at large have left the educational system largely unchanged” (p. 467). In this same vein, Cuban (2001) concluded that the computers have been “oversold and underused” noting that the availability of computers has not resulted in the anticipated increased teacher use of technologies to alter the traditional model of classroom learning.

Moving to a Post Typographic World

Lanham (1999) realized that even at the turn of the millennium, in 2000, events suggested that correspondence and research were increasingly accomplished through the use of digital technologies. The transition to a post typographic world threatened many as the anchor of the literate world was lifted and they felt themselves afloat on a very unfamiliar sea. They clung to their vision of book-based transmission as the sole means for reading and writing while failing to recognize that books define more than their technology of production but also are cultural icons. Lanham (1993) cautioned that:
before we fix on the book as the center of humanistic culture, shouldn’t we have a better idea of what books do to us and for us? Having decided what we what to protect, how do we make sure it survives the movement from book to screen? (p. 99)

_Transformative, Deictic, Transactional_

In this atmosphere of transition, literacy researchers began to examine the nature of digital literacies. Reinking (1998) proffered that literacy was in a transition to a “post typographic world in which the technologies of print would no longer be the dominant form of written communication” (p. xx). Indeed, in this post typographic world, as literate activities were pursued, literacy and especially writing witnessed profound changes as text in digital form have been displayed and altered on the digital screen. Following this line of thought, Reinking originally viewed this relationship between the form and functions of literacy as transformational.

Leu et al. (2004) concurred with Reinking’s (1998) idea concerning the transformative nature of the new literacies but conceptualized them also as deictic. Therefore, it was proposed that the forms and functions of literacy are changing so rapidly that they transform with the temporal context of the happening. What is more, individuals who used new technologies often imagined new ways of using them and, in this transaction alter the nature of literacy” (Leu, Karchmer, & Leu, 1999). Thus, new literacies were also transactional. Reinking (1998) asserted that literacy was transformed by technology while in turn technology was changed by the potential of the new literacies.

If the technologies themselves were transactional, transformative, and deictic, the ways of using them in the classroom could also be seen through the same lenses. As Bruce (2003) realized “what happens with new technologies depends in large part on how
we interpret and respond to them” (p. 16). The deictic nature of technology in the literacy curriculum was documented in the changes from simply digitizing print to the use of technology for its unique capacities (Leu et al., 2004). While technology engaged further with literacy, new forms that may be considered new forms of literacies as well as new ways of using technologies emerged in this transaction (Coiro, 2007; Coiro, Knobel, Lankshear & Leu, 2008; Kist, 2004; Knobel & Lankshear, 2004; Yelland, 2007). Finally, there was some evidence that technology was transforming at the very least the relationships involved with meaning making in the literate world if not the very nature of the bond of literacy and technology beyond our current understanding of this connection (Knobel & Lankshear, 2007).

These new studies highlight the fact that the early new literacies theorists, Reinking (1998), Leu (1997a, 2000a, 2000b, 2002), and Labbo (1996, 1998) understood even by “only seeing the tail of the elephant” the transformative, deictic, and transactional encounter they were detailing. Reinking and Labbo (1999) reminisced that “we . . . have perhaps too often been content to have our work considered singularly in terms of its technological aspects as opposed to how new digital technologies lead us to think in new ways about our interests in emergent literacy (p. 479). In considering these new ways Labbo and Reinking constructed a framework for integrating technology with literacy instruction. This framework encompassed the use of new digital technologies being employed and available for literacy instruction while enhancing simply the established goals of conventional literacy. On the other hand, the framework also considered the transformative effects of the new literacy including their ability to prepare students for the “literacy of the future” and “to empower students” (p. 481). Certainly,
these multiple realities presented by new interactions with literacy needed to find a focus and then be refocused to fully understand “what new literacies are, how they come to be, and how they evolve and develop (Coiro et al., 2008).

In a discussion of new literacies, however, it was important to note that the very concept of “literacy” really appeared during the 1970s. At that time while experts were concerned with state of literacy in the country, it was a “widely used concept in education . . . the dramatic discovery—many called it an invention—of widespread illiteracy” (Lankshear & Knoebel, 2004, p. 6). Whereas reading and writing rested upon psychological foundations, the new formation of literacy was much more connected to sociological concepts. Literacies reflected social, cultural, and institutional practices that Gee (1996) would maintain could “only be understood when they were situated within their social, cultural, and historical contexts” (p. xii). Therefore, bits of literacy outside of the social practices were nonexistent or carry no meaning.

Socio-Cultural Perspective

Gee (2004) suggested that simply decoding print, putting sound to symbol has no inherent meaning. The purpose of decoding is to arrive at more meaning laden tasks such as interacting with text. Of course, there is an entire phonetic movement that encourages drill on meaningless sound symbol combinations to arrive at the facility to gain meaning from text. However, Gee maintained that:

many children learn to decode print as part of larger activities which do have deep meaning and value to the children . . . a child or an adult is engaging in a ‘game’ whenever they are taking on a specific sort of identity defined by certain moves; that is certain sorts of actions and interactions that define them as playing a certain sort of role. (p. 46)
Children become adept at being a camper, sister, brother, and student to name a few of the games for which they adapt specific moves and roles. In this sense as Gee upholds learners who engage in the “game” learn moves particular to that game and thus establish their identity as a player of that particular game. Further clarification may be found in the “games” people may play in relation to the meaning of the word “run,” for example. If the individual is involved in the game of a marathon runner the word is different from another individual playing the “game” of a little league baseball player.

Gee (2004) posed an important question: How then does the learner gain meaning from a situation, through definition or perception? In other words can a person come to know a situation by reading a definition or by “thinking that is connected to and changes across, actual situations” (p. 49). Among researchers, who accepted a socio-cultural view of language and meaning making, there continues a shared perspective that “language is tied to people’s experiences of situated action in the material and social world . . . [and that] these experiences are stored in the mind/brain . . . in something like dynamic images tied to perception both of the world and of our own bodies, internal states, and feelings” (Gee, 2004, p. 49). Moreover, these simulations have two distinct qualities, being both made in the moment and portraying a particular viewpoint. “Meaning is not about definition, it is about simulations of experience” (p. 51). Children imagine simulations and play games in preparation for their future: in the same manner, even adults play the simulations and mental games to arrange for the moment that the simulation becomes reality.

Relating to these understandings, Lankshear and Knobel (2004) suggested that the “New Literacy Studies comprise a new paradigm for looking at literacy as opposed to the
paradigm that already existed that was based on psychology.” Rather than a psychological viewpoint these authors now refer to “specific sociocultural approach to understanding and researching literacy” (p. 16). Taking an even broader view, Kist (2005) acknowledged the importance of the New Literacy Studies as a portion of the new literacies which also encompasses “the plethora of communication media” (p. 12) or multiliteracies. The “pedagogy of multiliteracies” formulated by the New London Group (1996) of which Gee was a founding theorist focused on “modes of representation much broader than language alone” as well as one in which modes of meaning are dynamic representational resources, constantly being remade by their users as they work to achieve their various cultural purposes” (p. 64). Due to the amorphous and deictic nature of the new literacies, Kist(2005) agreed with the Alverman (2002) definition for a more expansive view of literacy which she views as including “the performative, visual, aural, and semiotic understandings necessary for constructing and reconstructing print and nonprint-based texts”(p. viii).

Construction of Meaning With Technology

Writing before the turn to our current century, Jonassen, Peck, and Wilson (1999) suggested that students do not learn from teachers or technologies but rather through active engagement and thinking. Moreover, the belief that teaching in itself is a process of “helping learners to construct their own meaning from the experiences they have and . . . the meaning making process [engaged by these experiences]” (p. 3) is also applicable to meaning construction with technology. Since technology in the best of cases calls upon the user to apply their knowledge to real-world problems, it can be seen as a viable
tool to support knowledge construction. Moreover, technology supports meaning through social collaboration, allows for simulation of real-world problems and contexts, and permits the learners to articulate and represent their meaningful constructions.

Ashburn et al. (2006) used the analysis of meaningful learning using technology (MLT) as projected by Project TIME through a grant from the U.S. Department of Education. Included in this analysis was a framework for learning which promoted MLT and incorporated six characteristics including: 1) intentionality with clear learning goals, 2) content centrality, 3) authentic work, 4) active inquiry, 5) construction of mental models, and 6) collaborative work (p. 9).

Meaning making as approached by The New London Group is based upon multimodal texts which they contend are essential to becoming literate in contemporary times. The “pedagogy of multiliteracies is centered on four key principles . . . [that speak to issues] . . . about the design of meaning . . . [which include] . . . a mix of situated practice, overt instruction, critical framing and transformed practice” (p. 38). An extension of the original pedagogy of multiliteracies that also illustrates “knowing in action called “Learning by Design “posits four fundamental ways of knowing: specifically, by experiencing, by conceptualizing, by analyzing, and by applying” (Yelland, 2007, p. 41).

Although reformulated by differing philosophies centered on early childhood learning, play continues to emerge as a central concept in meaning formation. Play may be seen in the larger context of active learning, inquiry, and problem solving which foster meaning through exploration and experimentation (Piaget & Inhelder, 1969; Vygotsky, 1978).
Yelland (2007) conducted research to investigate students’ home use of technology. The investigators during the home “techno-tours” were the children’s classroom teachers as they researched the range of skills students had with ICTs prior to coming to their classrooms. Yelland to “extend these into an analysis of [a] broader impact and a critique of their application for learning and meaning making devised a framework for learning . . . C/ICT” (p. 68). This framework consisted of four quadrants: 1) functional user, 2) meaning maker, 3) critical analyzer, and 4) transforming understandings. Since each quadrant evidenced specific activities connected to learning and meaning making, the teachers gained a better understanding of the students’ prior knowledge.

_Early Uses of Technology in the Literacy Curriculum_

It is understandable that the earliest uses of technology in the early childhood classroom would tend to transpose activities formerly undertaken solely through print technologies to a digital context in cooperation with computer technologies. These early attempts focused support on singular book literacy with the underlying assumption that technology “functions to support the acquisition of the traditional and unidimensional literacy required by book technologies” (Karchmer et al., 2003, p. 176). Often these early works focused on software that supported phonemic awareness (Barker & Torgeson, 1995; Foster, Erickson, Foster, Brinkman, & Torgeson, 1994) and word recognition skills (McKenna & Watkins, 1994; Wise, 1992). These early studies found that using phonological awareness software programs positively impacted young learners’ reading skills (Foster et al., 1994). Likewise the use of digitized speech was found to support struggling readers in word recognition (Reitsma, 1988; Wise, 1992).
These results were not without exemptions and often best informed research dealing with the struggling reader. Overall, the use of technology in these studies was defined by a singular book literacy skill.

Certainly, the research suggested that technology might support the skills needed in singular book technologies but also exhibited other potentials just beginning to be probed in an attempt to uncover the novel in the new literacies. Reinking (1998) sensed that innovations in educational technologies often had to start “denovo” since there was little in the form of recognized instructions in this area.

Labbo (1996) began these investigations as she studied the semiotic symbol making of kindergarten students in a computer center. Labbo purposed her study to examine the forms of computer symbols generated by kindergarten students in an urban elementary school. Attention was focused on what the symbols meant and how the young learners assigned meanings to them within the socio-cultural context. While investigating the nature of symbol making and the semiotic mediation process, Labbo described students “playing, creating art, and writing in screenland.” The research concluded by noting that “young children learned to make and use meaningful graphic symbols on the computer to represent their ideas and to communicate with others in their environment” (p. 380). This research also underscored young children’s inclination toward negotiations of multiple sign systems. Conclusions also “seemed to offer unique support and mediation for children’s construction of meaning about the process of symbol making” by drawing on their knowledge of language (p. 381).

Labbo and Kuhn (1998) continued investigation into technology and literacy by connecting it to the body of literature dealing with emergent literacy. The researchers
summarized children’s knowledge of symbol making by seeing the computer as a symbol making tool and by gaining an understanding of the processes and forms involved in this process of symbol making. They understood that students engaged with the tools available and questioned:

When they [the students] see paints and paintbrushes they expect to use those tools to create a painting. When they see scissors, paste, and construction paper . . . they expect to create a collage. When they see paper and pencils . . . . they expect to write. It is important to understand what children expect to do when they sit down before a computer? (p. 83)

Labbo, Reinking, and McKenna (1995) also proposed that young students view teachers using computers for class business and come to understand this as one use of technology. Labbo (1996) explored the writing in screenland, their description of digitized writing, and later Labbo and Kuhn (1998) acknowledged students’ understanding of the malleability of print. The ability to easily change the impermanent computer writing surface of the computer screen was also recognized (Cochran-Smith, 1991). The public, collaborative nature of the computer screen, the denser nature of writing generated on the computer, and the metacognitive talk when engaging with the computer were all part of the forms, processes, and products of electronic symbol-making (Labbo & Kuhn, 1998, p. 84).

Carroll (2004), working with suburban grade 2-3 students who resided in the San Francisco Bay area, also investigated computer use in the early childhood literacy curriculum. She concluded with the understandings that technology should be integrated to support literacy instruction. The classroom she observed exhibited a sharing relationship on the part of the teacher honoring the belief that “knowledge may be constructed through multiple perspectives” to offer the “richest and deepest
understandings (p. 14). This perspective underscored the collaborative, risk-taking, and playful nature of the literacy environment when engaging with technology.

Turnbill and Murray (2006) investigated early literacy and new technologies in Australian schools. They began their study based on the belief that most early childhood teachers were not skilled in technology and viewed it as an add-on “play” activity time after classroom assignments had been completed. Indeed, Luke (1999) suggested that children’s play experiences are increasingly integrated with technology. Moreover, a series of research studies by Downes (2002) as referenced in Turnbill and Murray (2006), uncovered that “that children who have regular opportunities to use computers at home . . . are more likely to be predisposed to exploratory learning and learning by doing in school” (cited in Turnbill & Murray, 2006, p. 96). Unfortunately, the review also noted that students felt that their use of computers at school was limited. Turnbill and Murray (2006) initiated an action research project which incorporated the teacher as an integral part of the project. The project utilizing a “Digital Learning Experience Approach (DLEA) began with a known and trusted starting point for the teacher, the LEA, and allowed them to learn new ICT skills within this context” (p. 104). Through this vehicle the teachers gained valuable information concerning their future students as well as confidence with their personal use of digital technologies.

Van Leuwen and Gabriel (2007) posed the possibility that perhaps due to the easy connection with technology through word processing, the emergence of digital technologies has fostered ongoing investigations to connect effective learning strategies with the needs of today’s students especially through writing. While investigating the potential of word processing, these researchers presented findings connected to digital
technologies which included interactions within the classroom that adjust for increased student talk and student peer assistance. Additionally students were observed making use of the story web technique less while composing digitally which the author suggests may be due to malleability of computer processed writing. In all, the study found “no participant ever said that he or she would rather not use the computer” (p. 426).

Historically there have been limited publications that explored early childhood literacy and technology (Gordon & Still, 2007; Lankshear & Knoebel, 2003). Even within this undersized group, a shift from detailing support from print-based literacy to an evolving vision of new literacies can be noted. Papert (1996) engaged in musing “what if” while imagining a virtual mathland created by educators for student roaming and discovery. Labbo and Kuhn (1998) proposed that “researchers at the . . . dawn of the 21st century are in the enviable position to be able to explore issues related to Papert’s initial question because necessary technologies, child-friendly computer software interfaces, and relevant learning theories . . . have been developed” (p. 89). Perhaps the “what if” literacy vision for the 21st century may rest on the conceptions of Lankshear and Knobel (2007) in their discussions of relationships and the “new ethos stuff” (p. 20). They envisioned a new literacies, with Web 2.0 values of “collaboration and participation, leveraging collective intelligence via practices like eliciting user annotations, distributing and willfully sharing expertise, decentering authorship . . . [which is] profoundly different from that which constitutes the paradigm literacies of bookspace” (p. 20).

Whatever evolutionary change the new literacies may affect, in order for them to effectively become part of the curriculum, teachers, acting as gatekeepers, need to first open the classroom door. Indeed, history has shown that it is the teacher who is the most
influential factor to promote classroom change (Bruner, 1960; Cuban, 1986; Leu et al., 2004; Reinking & Labbo, 1999; Turnbill & Murray, 2006; Yelland, 2007). Teachers are the bridge between learning theories researched for over a century and the glimpses of their students’ future; expressly, a bridge forged through a skilled and thoughtful understanding of their students’ transactions with the new literacies.

Summary

The review of the literature informing the discussion of meaning making in a first grade technologically rich environment addressed each of the elements inherent in this topic. Beginning with the theoretical constructivist framework employed in the study, a detailed description of the foundational elements of constructivist thought was presented. Next, the sociopsycholinguistic framework was offered as the discussion of meaning making was expanded. A review of the historical framework of literacy, in general, preceded an investigation of practices and beliefs in early literacy development. Finally, the chapter concluded with an in depth discussion of technology and the New Literacies.
CHAPTER III
METHODS

Introduction

The purpose of this study was to gain insights into the nature of first grade meaning making in a technologically rich environment. Specifically, the research sought to investigate what kinds of interaction happen when a teacher purposely constructs an environment using technology in a first grade classroom and how do the students in this classroom use these interactions to make meaning. This chapter addresses the design and implementation of the current study. Elements specific to the design such as population and setting are detailed, methods for collecting, managing, and analyzing data are discussed, and finally, issues of subjectivity, reliability and validity are reviewed.

Purpose and Epistemology

Purpose and epistemology are inextricably linked much as the lungs and the heart are interlocking systems giving life to the body. One is the filter (the lungs) through which all thought is screened and the other the pump (the heart) generating the ideas throughout and returning them once again for screening against long standing beliefs (Potter, 1996.)
Epistemological Lens: The Filter

According to Glesne (1999), each of us views the world through an epistemological lens. Through this we understand the nature of knowledge. Some portray knowledge as fixed and external, positivist; while others believe that meaning is based on a socially constructed reality, interpretivist. These lenses represent two theoretical paradigms through which research is viewed and to which research methodology is connected. Although some early qualitative work was positivist in nature, some would suggest that positivist researchers are drawn to quantitative studies, since they believe that there is a “fixed, measurable reality” (p. 5). On the other hand, the purpose and subsequent research questions generated by interpretivist researchers are more often explored through qualitative research. This study employed the interpretivist tradition in that it rested on the researcher’s ability to interpret the social world under investigation.

Purpose: The Pump . . . Generator

People are meaning makers, assimilating and accommodating to their environment in construction of meaning (Piaget, 1977). Our combined scheme of epistemology and purpose act in concert to filter incoming thoughts and once filtered pump them out once again to interact with our environment. In this way humans are, as Piaget described, always under construction (Piaget, 1970).

This process is equally valid for the researcher who filters the research through her epistemological lens. Through purpose she generates a sound methodological orientation that is driven by the research questions which, in turn, results in a sound research design. Thus, the purpose of this research was driven by the challenge to
integrate the new literacies with the early learning experiences, and in so doing better prepare young learners to live purposefully in their future world.

Qualitative Design Decision

The purpose of this research was consistent with a qualitative design that seeks to “understand and interpret how . . . participants in a social setting construct the world around them” (Glesne, 1999, p. 5). Merriam (1998) reinforced the connection between the purpose of a study and qualitative design by reflecting upon the fact that “the researchers are interested in understanding the meaning people have constructed, . . . how they make sense of their world and the experiences they have in the world” (p. 6).

This study incorporated a duality of perspectives in that it utilized both the emic and etic perspectives. In concert with elements of qualitative design, this study exhibited some components derived from an emic perspective, at times situating the angle of the study from the participants’ viewpoint rather than the point of view of the researcher. This study sought to investigate first graders’ perceptions of their literacy behaviors in a technology rich environment, and thus included a strong emic perspective. At the same time the study incorporated elements from the etic perspective. The researcher’s perspective was evident at the most basic level as the researcher constructed the boundaries of the study and engaged in observations subsequently organized in field notes. The etic perspective also influenced the study through the researcher’s review of the literature and prior observations in the classroom. Taken together, these created the interplay between the influence of the emic and etic perspective in the study.

Another distinctive characteristic of qualitative design is the role of the researcher who often acts as the data collection instrument. This research was conducted within a
first grade classroom. Therefore, the researcher was able to respond immediately to the context, adapting strategies as circumstances warranted and the study evolved (Guba & Lincoln, 1981). Against this stance of flexibility, these characteristics were subject to the personal bias of the researcher, which might have been reflected in issues of subjectivity which are discussed in a later section.

In this study, qualitative research was used in different ways and for different purposes. At times this study was both inductive and descriptive in nature. It was inductive in nature aiming to engage in concept development rather than to test established theory. In particular, this study addressed the situation presented when technology is infused into the curriculum. There is very little established theory to detail what occurs when students engage in meaning making in a technology rich environment, especially in the early grades. Therefore, in this study, there was a need for research to more thoroughly describe the phenomenon under investigation. Consequently, the study was also richly descriptive acknowledging that qualitative research can encourage understandings through rich descriptions of observations. Therefore, although this qualitative research began without hypotheses to “guide the investigation” (Merriam, 1998, p. 7) it did begin with suppositions grounded in observations and an a priori review of the literature prompted by these observations. In this way, the study employed a qualitative stance in which “qualitative researchers build toward theory from observations and intuitive understandings gained in the field” (Merriam, 1998, p. 7). It was understood, however, that this study was not in itself designed to build toward theory directly, but only in the most indirect sense that all research builds toward theory from study to study.
Research Design

The proposed study was conducted within the context of a particular first grade classroom. A single case study design was selected as case studies are well designed for monitoring and describing a particular phenomenon (Merriam, 1998). This study monitored the interactions in the technologically enriched environment during the early weeks of the students’ first grade year capturing a description of the particular phenomenon through audio and video recordings, field notes, and digital photography.

Moreover, researchers concur that a case study is differentiated from other qualitative designs in that it exhibits a “bounded context” (Miles & Huberman, 1994; Smith, 1978; Merriam, 1998). This particular study lived within the boundaries of the technology rich environment which was purposely constructed by the classroom teacher. This study was also bounded temporally to investigate the beginning weeks of the first grade year as young students are engaged in the transition from emergent to conventional literacy.

Yin (2003) suggests that there are three elements connected to determining research strategies: 1) the nature of the research questions, 2) the power the researcher is able to exert over the behavioral events, and 3) the extent to which the study focuses on current events. Yin maintains that forms of “what” and “how” research questions are particularly well suited for case study methodology (2003). In particular, the descriptive nature of this study which was employed to explore the interactions in this particular technologically rich environment demonstrate that some forms of “what” questions can be used in exploratory case studies. Some forms of “how” questions are equally well suited for case study methodology to explain how students used the interactions within
this technologically rich environment to help them construct meaning. The current study aimed to provide description and explanations of how first grade students in a technologically rich environment used the interactions to make meaning. Since research design is often reflective of the research questions explored in the study, the use of “what” and “how” research questions in this study supported the use of case study methodology (Merriam, 1998; Yin, 2003).

The second element proposed by Yin (2003), the power the researcher is able to exert over the behavioral events was also considered in determining the research strategy. The researcher’s stance in the current study was that of a participant observer. The current study was designed to be descriptive and exploratory and as such the researcher did not enjoy control over the events as might be possible in an experimental design. In this case study the researcher had no control over behavioral events and therefore needed to rely on multiple sources of data to gain understandings.

The final element supported by Yin (2003), the distinctiveness of the area of research was also important to the design decision. This study spotlighted first grade students’ interaction in a technologically rich environment. This current topic has enjoyed research focused on the teacher’s role in a technologically rich environment but very few studies are focused on the students. Moreover, Abramson (1992) suggested that case study designs are particularly well suited to elucidate a distinct experience whose very distinctiveness might have been lost in a large empirical study.

Taken together, these three elements proffered by Yin (2003), specifically, the nature of the research question, the power the researcher is able to exert over the behavioral events, and the distinctiveness of the area of research, serve as the rationale
which linked the study to qualitative case study methodology and the following research questions.

1. What kinds of interaction happen when a teacher purposely constructs an environment using technology in a first grade classroom?
2. How do students use these interactions to make meaning?

Participants, Setting, and Access

This study employed a single subject case study, utilizing a first grade classroom in an urban school in a medium size Great Lakes Region city. In the following discussion the setting, participants and access involved in this study are detailed.

Setting

The first grade classroom was housed in a 100 year old building which is scheduled for demolition after the close of the present school year. The new school will be constructed on the same site over the next few years. The school during the 2006-2007 school year encompassed grades K-5 and had a total number of 402 students. There were 34 full time teachers and a student to teacher ratio of 11.7:1. There were 62 students enrolled in first grade and the per pupil expenditure was $4,847.

The city in which the school is located has a higher percentage of Black and Asian households and a lower percentage of White households than does the state in general. Indicators also suggest that the city is below the state average on measures of household wealth.
Participants

*Students.* Participating in the study were 18 students and the teacher in this particular technology enriched first grade classroom. Eight of the students were male. One male student transferred to another school during the study; while, soon after an additional male student joined the class. There were 10 female students in the case class. The majority of the class appeared to the researcher to be African American and only one male student appeared to be Caucasian. The school employs a dress code and requires uniforms. The students complied with the rules concerning their school uniforms and were well groomed. By their very nature the uniforms limited students to a uniform appearance. The researcher did observe individuality among many female students who wore elaborately beaded hairstyles. Male students, however, were more uniform with very short haircuts.

After a short time observing the classroom, the researcher noticed that the students were similar in many ways to other first grade students. The researcher saw the female students playing games and chanting hand claps with one another. In general, the researcher heard laughter while students interacted and shared with each other. While the students were engaged in studies, the researcher noticed their concern for friends who were out of the classroom for sections of the lesson. They offered to collect papers for absent friends or to make notes to share with these students upon their return to the classroom. The students were also respectful of their classmates and the researcher noted that students did not ridicule each other.

*Teacher.* The teacher, a white male, has taught for 26 years and has been on faculty at various buildings within the same school district during this time. The teacher
has an earned Master’s degree in administration but does not intend on leaving the classroom. He has taught in kindergarten, first and fourth grades.

Research suggests that the teacher’s beliefs and dispositions towards technology can affect the use of technology in the classroom (Johnson, 2006). The understanding concerning the teacher’s legitimacy as an expert in utilizing technology in the elementary classroom was important to this study. Thus, it was essential to this study that the technology rich environment was considered purposely and be expertly constructed. The proposition that this teacher was an expert teacher for integrating technology into classroom practice and curriculum is supported by many sources. Foremost, he was noted as such by his colleagues and through interviews with the school administration (Still, 2006). He has also been selected as the recipient of a grant from a local university which invited his classroom to be participants in a study conducted in their ubiquitous technological environment. This selection was based on both classroom observations and teacher interviews conducted by research analysts at the local university.

After a brief time observing the classroom the researcher noted an air of respect that permeated the classroom. In particular, the teacher consistently referred to his students as ladies and gentleman as well as referred to a classroom poster prompting respect (“Respectful, responsible, and ready to learn). From interviews, it was clear that philosophically, the teacher believed in the multidimensionality of human beings. He understood that his students learned in different ways, especially by moving as they were learning. The teacher appreciated the complicated nature of human beings and was challenged to create not only an environment but a delivery system that allowed each person to maximize who they were as an individual.
Access and ethics. Prior to the 2004-2005 school term, the researcher was unaware of the distinctive nature of this classroom and discovered it solely through the fortunate placement of her university classroom. The researcher was an observer in this particular classroom during the 2004-2005 school year and viewed the technological environment of this classroom while she supervised university students enrolled in a particular section of a field placement course. In the fall of 2006, the researcher contacted the teacher with the hope that he might agree to allow access into his classroom for study, which he did. Prior to entering the classroom, the researcher applied for and received approval for the study from the internal review boards of both the university and the school district (Appendix A & B).

Having secured approval, the researcher was welcomed to the school by the principal and into the classroom by the teacher. The teacher sent home the parental consent form for the parents to read, sign, and return (Appendix C). The consent form permitted classroom observations, the collection of documents and artifacts, personal interviews with both students and teacher, and the use of digital photography, audio taping, and videotaping to capture classroom activities, student and teacher behaviors and the classroom environment. The parents were given separate options to give consent for their students to be interviewed and photographed both digitally and through videotaping. Ten parents gave consent for their students to be interviewed, and photographed both digitally and through videotaping. One parent refused to give consent and seven did not return the consent forms. To respect the consent process, the researcher interviewed only those students with specific signed consent authorizing photographing and interviewing. Students whose parents did not return the forms were included only as part of the
inclusive category “the class” as was provided in the provisions from the internal review board’s consent. Students already having been given parental consent also granted their own assent to engage in their individual interview having been read a student assent form prior to their interviews (Appendix D). The teacher also gave formal consent for his participation in the research (Appendix E).

Pseudonyms and abbreviations are used throughout the narrative to support the confidentiality of the participants. Also all identification and reference to the exempted student was removed from field notes, photographs, and other data compiled from the classroom. The raw data as well as transcriptions and reviewed notes were coded with pseudonyms and stored in a locked cabinet only to be shared with individuals specified in the consent forms. Additionally, data stored in computer files were password protected. Specific issues dealing with research using children were addressed both in the assent form and the field notes. Prior to beginning an interview the child/adult relationship and right answer syndrome were addressed in an oral assent form during which the student was solicited as a special helper and instructed that there was not a right answer. In addition, the effect of cognitive stage development was noted in the field notes as a filter to student responses (Hatch, 1988).

Data Management

Data management was divided into three phases which included preparation, identification, and manipulation of data (Reid, 1992). The very beginnings of data management were embedded in the continuing log trail document which maintained an account of the research journey. Data preparation included processing the other sources of data such as “typing notes, transcribing interviews, and otherwise entering the data
from which the researcher will be working” (Reid, 1992, p. 126). Although many feel that qualitative research may be a messy process, this should not be an attribute that applies to data management. Miles and Huberman (1984) caution that procedures need to be described clearly enough “so that others can reconstruct them” (p. 244). In this study there was a need to plan ahead, creating a structure with accurate bookkeeping to house the mountains of data that would inform the research questions.

Data Preparation

Before commencing data collection the researcher established a design for storing incoming data (Richards, 2005). At the start of the study, each piece of data was catalogued by date, participant, and data collection method. After labeling it, the data were also described briefly and then sorted to the appropriate computer data file. The audiotapes required additional preparation by first transcribing and then cataloguing the transcription. The researcher made the recordings on a digital recorder and then uploaded the audio files onto a computer from which the data were able to be replayed and transcribed. While audiotapes may be transcribed into text documents, videotapes present an additional problem. In this case, the videotapes were digitized and stored on the computer. The researcher then reviewed the videotape and compiled field notes on the images. All field notes, whether from video tapes, interviews, observations, artifacts, or documents were dated and categorized according to source.

Data Identification

Reid (1992) explains that “data identification divides data into analytically meaningful and easily locatable segments” (p. 126). This process was started through
establishing computer files indexed according to date, type, and content. Word processing also aided this task by line numbering and allowing information to be retrieved via word searches. The data were also imported into computer-aided data analysis files that maintained the identification of date, type, and content while adding additional information associated with the coding process including notations of dates of coding changes.

The decision to employ computer software for data management was taken with a concern for the negative as well as the positive aspects involved in the process. The relationship between the researcher and their data is an intimate one enhanced by the writing and reading of field notes. Some qualitative researchers express unease when computers are introduced into this relationship (Lyman, 1984). Often computer programs require early category construction and theory building in order to build a filing system (Freidheim, 1984); however, the researcher noted that there was always the opportunity to manipulate these filing systems. Finally, there was concern for the back up routine for data and procedures for storing the data outside of the computer hard drive. Issues of confidentiality also entered into the storage of data. These same issues are present with paper and pencil technology and similar concerns for participant confidentiality needed to be in place. In this study, these included coded access to computer files through the use of personal passwords as well as the storage of back up computer files in a locked cabinet.

Data Manipulation

Part of data management also involved the process of preparing the data for analysis through data manipulation. Labeling passages according to content was at the
core of coding and permitted the retrieval and manipulation of data (Richards & Richards, 1994). Subsequently, creating code lists, anchored with rationales and operational definitions, allowed the researcher to move from data identification to data manipulation. This study employed the use of QSR* NVivo 7 computer software to manipulate the data. During manipulation, data were first imported, labeled, and stored in free nodes. The researcher used nodes in QSR* NVivo 7 as digital bins for dumping like chunks of data. Specifically, free nodes have no structure and operate as individual bins while the more sophisticated tree nodes represent a hierarchical structure with super and subordinate nodes.

For the purposes of this study the unit of analysis was based on a meaning making event which was defined as talk and activity that occurred while students were engaged within the technology enhanced environment purposely created by the teacher. The boundary of the “event” was determined either by the continuity of the action or dialogue. The meaning making event was considered finished either when the student had finished the activity or dialogue, changed activity, or the teacher or student had completely changed the purpose of the activity of dialogue.

During the beginning of this data analysis process the researcher was able to reduce the data and link it together forging a meaningful story to inform the research questions. Beginning with an a priori code structure drawn from the literature review, the researcher was able to chunk sections of the simple descriptive narrative generated by reading the observation and interview transcripts. These chunks of data collected to inform the research questions were stored as free nodes. After all the data had been
entered into free nodes, the researcher searched for emerging themes and organized these themes into tree nodes.

These preliminary selections became the beginning of the codes which were organized in the free nodes even while in the management phase; for indeed, they had begun to be roughly categorized as themes emerged. In this study, this preliminary list included evidence of interactions and meaning construction in a technologically enriched environment since this study was concerned with interactions useful to the meaning making process in this enriched environment.

Data Collection

This single case study of first grade students in a technologically enriched environment incorporated a variety of data collection procedures including participant observations, interviews, and the collection of student artifacts and classroom documents. The researcher was a participant observer in this particular first grade technologically enriched classroom over a period of six weeks during which time she conducted 11 observations. In addition, data collection also included three interviews with the classroom teacher and two sets of interviews with all students whose parents gave informed consent. Throughout the data collection the researcher digitally captured images of student behavior and their work products; in addition, the teacher also shared documentation of student work with the researcher.

Even at the beginning of data collection, the researcher was cognizant of specific criteria that needed to be addressed. Richards (2005) suggested that there should be attention to accuracy by checking all records against recall and notes. Particular care should also be devoted to the context in which the data are collected. Moreover, the data
should include details that speak to its usefulness, noting in thick description all pertinent information about the data collection setting and procedures along with the researcher’s impressions.

In this study, the researcher exercised care that the criteria suggested by Richards were in place. During observations and note taking the researcher began each observation a few minutes early and noted the context of the particular observation. The researcher also recorded the classroom activity on digital recordings and transcribed these recording to augment the observation notes. Additionally, the researcher employed thick description during note taking in order to include a clear picture for the reader along with sufficient detail about the environment, behaviors, participants, and actions. Digital and video photos were also taken during the observations in an attempt to augment these thick descriptions offered through field notes.

Throughout the study the researcher was attentive to the nature of case study methodology which employs the researcher as intimately involved in the data collection. It was understood that the data might exhibit reflexivity which required the researcher to acknowledge the collaborative nature between the research and the researcher. Case study methodology suggests that the researcher should be interactive with the environment of the study and the data should detail this interaction. In the broadest sense, the case can be made that all research, irrespective of methodology, is filtered through the researcher. Even in quantitative research, the mark of the researcher is subtly apparent in selections of certain formulations in design and questions. In contrast, however, qualitative research acknowledges at the onset that the researcher is indeed the data collection instrument and as such needs to acknowledge this interaction.
Merriam (1998) suggested that “data are nothing more than ordinary bits and pieces of information found in the environment” (p. 69). The connection between the data and the research questions was displayed in the research plan and included the following: classroom observations, documents such as student assignments, audiotapes, videotapes, digital photos, physical artifacts, teacher interviews, and student interviews. The resulting data collection forms and purposes are detailed in Table 1.

Table 1

Data Forms and Procedures

<table>
<thead>
<tr>
<th>Data Collection Tool</th>
<th>How Employed</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Trail Document</td>
<td>Audit trail</td>
<td>To specifically document daily happenings i.e. how many hours spent in the field on a particular day</td>
</tr>
<tr>
<td></td>
<td>Change log</td>
<td>To log changes in the study and the reasons for the change</td>
</tr>
<tr>
<td></td>
<td>Field notes</td>
<td>To record observations and interviews with field notes which are translated into descriptive, analytic, and personal notes</td>
</tr>
<tr>
<td></td>
<td>Interview transcripts</td>
<td>To record details of semi structured interviews</td>
</tr>
<tr>
<td>Log Trail Document Codes</td>
<td></td>
<td>To create a list of codes and note code changes</td>
</tr>
<tr>
<td>Observations</td>
<td>Participants’ Observation</td>
<td>To record classroom interactions through unstructured classroom observations</td>
</tr>
<tr>
<td>Interviews</td>
<td>Teacher interviews</td>
<td>To investigate the construction of the technologically enriched environment and the student interactions within the environment.</td>
</tr>
<tr>
<td></td>
<td>Student interview</td>
<td>To investigate their meaning making interactions within the technologically enriched environment and their perceptions of these interactions.</td>
</tr>
<tr>
<td>Documents/ Artifacts/ Taping</td>
<td>Digital photos</td>
<td>To inform the investigation of the interaction within the technologically enriched environment.</td>
</tr>
<tr>
<td></td>
<td>Artifacts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Audio and Video taping</td>
<td></td>
</tr>
</tbody>
</table>
Classroom Observations

Classroom observations provided a window into relevant behaviors and environmental conditions in concert with case study methodology (Yin, 2003). Within this case study, classroom observations were relevant in understanding the interactions which presented themselves in a technologically rich classroom environment. Moreover, the classroom observations also served as one source of data to aid in the exploration of the meaning making connected to these interactions. These classroom observation notes were transcribed as field notes (FN). The field notes in turn were divided into descriptive (DN), analytic (AN), and personal notes (PN). Each transcription began with the observation notes which were the cursory notes taken during the observation. These notes combined with brief notations often a personal aside or the hint of beginning analysis were labeled as field notes (FN). Generally within 24 hours, these notes were then transcribed and divided into descriptive notes (DN) of the original observations and personal notes (PN) which observed the researcher’s personal reactions and feelings.

The week before data collection began the researcher met with the teacher during which she sketched details of the physical classroom environment. Participant observations of student interactions within this environment were conducted during the following six weeks. Generally, the researcher observed the classroom on a biweekly schedule with the exception of one visit due to the absence of the teacher, resulting in 11 participant observations. Initially, the notes from these observations were used to define the unit of analysis by suggesting when a literacy or meaning making activity began and ended within the technologically enriched environment. As the study progressed, the observations also bridged the data collection and analysis phases as patterns and
redundancies began to emerge. In this sense, classroom observations became a research tool serving specific, planned research purposes.

During the initial meeting with the teacher, the researcher also discussed her role as a participant observer. The teacher and researcher agreed that the researcher would be introduced to the students as an observer who was interested in the happenings of the classroom and would be taking notes during the next few weeks. The teacher suggested that the students had interacted with many auxiliary educators during their school day schedule and therefore would not find it unusual to have another adult interacting with them. In this role as participant observer, the students appreciated the researcher’s role as someone who was documenting what occurred in their classroom. They saw that the researcher took notes and often recorded what was happening in the classroom with a digital recorder. Although the researcher’s role evolved slightly throughout the study, the students did not perceive her as a teacher. At times they would come and check what the researcher was typing, even offering information in certain instances. During the times that they were engaged in reading trade books alone or with friends, students would often come and read the researcher a book.

The class also saw her as a ready audience for performances of poems or choral readings. She also served as an adult assistant on the field trip along with two of the students’ parents. Initially, the students sometimes posed when the researcher used the digital camera, but digital photography soon became redundant and ordinary as well. At certain times, the teacher used the researcher’s role as observer asking her to report to the class what she had observed, for example, during their initial use of the computers and also when they “performed” their monthly poems. Soon, the researcher became part of
the classroom landscape as she maintained a routine during the frequent observations and maintained her role as participant observer as defined at the beginning of the study by the researcher and the classroom teacher. Thus, although the researcher became very connected to the students, they simply greeted her each morning with a smile, wave, or “Hello, Mrs. Gordon” and continued with their work.

Interviews

Data collection also included the use of interviews, both of the teacher and the students. Yin (2003) suggested that interviews might be “one of the most important sources of case study information” (p. 89). In this study the researcher used interviews to understand the meanings that participants held especially in response to the second research question concerning student meaning making. At its best a good interview is similar to a conversation during which the researcher can gain insights from the participants’ viewpoints on issues related to the purposes of the research (Dexter, 1970).

Prior to beginning field research, the interview protocol which reflected the research questions and detailed the interview questions, was reviewed by the IRB. In this study, the researcher employed semi-structured interviews which allowed the researcher to be responsive to the participants’ point of view. This semi-structured format permitted the interview to be “guided by a list of questions or issues to be explored . . . [while allowing] the researcher to respond to the situation at hand” (Merriam, 1998, p. 74). In addition, the interview questions in this study were reflective of the literature and devoted special attention to the construction of questions that were developmentally appropriate for the first grade students.
There were three teacher interviews, conducted before, during, and following the classroom observations. The initial teacher interview was held one week before the beginning of data collection and lasted about two hours. The interview took place in the classroom at the close of the teacher’s school day after the students had departed. During that time the researcher shared preliminary details of the research design and the teacher shared information on the students and his classroom. An observation schedule as well as the physical space for note taking during the observations was confirmed. The second interview was conducted at a local coffee house and occurred during the data collection period. This was also scheduled after school and lasted for approximately two hours. The location was selected by the interviewee and allowed the researcher and the teacher to have a private space for discussion away from the possible interruptions of the school setting. During this interview, the researcher utilized the semi-structured research questions to understand the philosophical stance of the teacher, specifically, to clarify the teacher’s feelings and thoughts on first grade learners in general as well as student meaning making with technology. The final teacher interview was conducted at the same coffee house at a time after the data collection and during the analysis of the data. At the beginning of the interview the teacher completed a free list and pile sort on the topic of student meaning making in the classroom (Appendix A). The free list and pile sort were employed to gain a more thorough understanding of how the teacher viewed ways of meaning making in the technologically enriched environment of his classroom. The researcher then structured the interview using the second interview protocol specifically the assessment of the teacher on the lasting effects of the technological learning environment which he purposely created on students’ future learning.
Interviews were conducted with the students at two points during the data collection. At the midpoint of the data collection, the researcher individually interviewed students whose parents who had given parental consent to the interviews. The 10 interviews were conducted in the school hallway outside the classroom during the morning classes. Each interview lasted approximately 10 minutes and began with the researcher reading a note to the student describing the task and asking for their verbal assent. This protocol had been established in conjunction with the IRB. Student answers to the interview questions were not elaborate but seemed thoughtful as each student took time to contemplate their responses and when probed about a particular response maintained certainty in their reply. The interviews were also valuable in that the students expressed beliefs and thoughts about their actions that did or did not coincide with their actual behavior in the classroom. For example, there was not a single student who said that they could read the print on the Smartboard during their interview. However, during the class observations students were observed doing this on a regular basis.

Concerned about a possible disconnect with the classroom facilities, the researcher decided to conduct the second interview inside the classroom. Each student was asked to select the place in the classroom that helped them learn best. The researcher then videotaped the student in their selected spot as they narrated their reason for selecting a particular spot with a brief explanation. As in the initial interviews, the use of videotaping helped elaborate through classroom background, student gestures, and body language why they had made their selection. In this sense, it added a richness to the data that would not have emerged through audio tapes alone.
**Documents and Artifacts**

Documents and artifacts served as corroborating sources to augment other evidence in the study and informed the research questions. Merriam (1998) suggested that “documentary data are particularly good sources for qualitative case studies because they can ground an investigation in the context of the problem being investigated” (p. 126). In this study documents and artifacts included digital photographs of student work and classroom activities as well as print copies of student work. Audio recordings and video photography were also used to record student activities and interactions and were helpful during the interview process.

**Impact of Technology on the Data Collection Process**

Due to the context of the study in a technologically enriched environment it was understood that technology might impact the data collection process. Although Merriam acknowledges “the growing importance of online interaction makes it a natural arena for qualitative research” three critical areas that the qualitative researcher must consider are also noted. Specifically, these include “the effects of the context on the data, the effects of software functionalities on data gathering process, and the effects the medium tends to have on ethical practice” (p. 132).

In this study the effect of technology on the context of the data collection is best exemplified by the effect of the temporal context and the context of the classroom activity. The temporal context at the beginning of the school year was often noted in the field notes during data collection as the students’ first encounters with a particular interaction with technology. For example, having returned from their field trip, the students transcribed their hand written notes using a word processor for the first time. In
the same vein, students’ employed software testing phonemic awareness at the same time that they were introduced to the use of the computer. In addition to the temporal context, the researcher also recognized the added richness to the data collection by capturing gestures and body language realized by the inclusion of technology. This benefit was prominent both in the interview process as well as classroom dramatizations.

There was also the need to document times when software functionalities or even malfunctions impacted the data collection. At times, the malfunctions simply required the teacher to take a few extra moments to work through the problems. During these times the teacher would model patience by thinking aloud to the students that he was frustrated but it would not help to bang on the technology. The students attended to his thoughtful monologue and during the participant observations behaviors of frustration addressed by the teacher were not observed. At other times, the technology was not to be salvaged and the teacher easily employed an alternative format.

Finally, the ethical handling of the data was complicated through the use of technology while at the same time enhancing the data collection procedures by capturing data more thoroughly and accurately. Specifically, the use of audiotape in conjunction with field notes increased the comprehensiveness; but at the same time, it created data management issues involving transcription which were cumbersome and time consuming. The introduction of videotape technology greatly enhanced observation notes but also opened issues of data management and participant confidentiality. Data management issues required viewing the video tapes and taking field notes, similar to observation notes, during the viewing. The video photography required the same safety storage concerns to guard participant confidentiality as were taken with the written documents.
including locked storage. In addition, special considerations were also included in the parental consent form specifically authorizing the use of their student’s image through video photography.

Even in the face of these limitations Roskos & Nolan (1997) reminded us that:

video belongs to one of the earliest and most basic forms of research observation. Video extends the boundaries of the observable to include the finely shaded details of events and settings and permits the researcher to revisit scenes repeatedly. It enlarges our human capacity to see more and process the incredible detail of human interaction which leads to the discovery of new meanings. (p. 519)

The researcher acknowledged that there were limitations inherent in the use of videotaping. Educational video often was an extension of the researcher’s point of view. The camera did not capture the scene fully but reflected the researcher’s choice of filming. Video also presented major issues in participant confidentiality in that it was not feasible to block the image of the participant. In addition, the video equipment itself was more visible and the likelihood of it being intrusive in the setting was increased.

Realizing these limitations the researcher took precautions to minimize the negative potential. These included altering placement and use of the video camera and securing specific permissions to use videotaping in the classroom from both the school district and the students’ parents.

The researcher believed that even in the face of these limitations, the richness that videotaping added to the study made it worthy to pursue as a data collection procedure. Videotape allowed the researcher to capture more authentic observations than ever possible through field notes. The video recordings were also invaluable during student interviews after the researcher realized that many of the students’ responses were gestured and not captured through the audio recordings. Throughout the data collection
process, the use of technology added a richness of detail and an authenticity filtered only by the placement of the technology that enhanced the data collection in general.

Data Analysis

Yin (2003) suggested that there are three general strategies for analyzing data in a case study: relying on theoretical propositions; crafting rival propositions; and finally, developing a case description. The current study utilized a theoretical framework that guided the initial data analysis. In this study, the theoretical framework rested upon three interlocking theoretical frameworks: constructivism, sociopsycholinguistics, and the new literacies. Consistent throughout these frameworks is the view of active learners constructing meaning through their sociocultural setting, in particular, and their environment in a more general sense. Meaning making is thus shaped by the learners’ perception of their personal experiences. In addition, the importance of collaborative learning through dialogue and scaffolded meaning making is also apparent in these frameworks. Finally, the growth of multiliteracies providing multiple paths to meaning making, a trademark of the new literacies, threads throughout these theoretical frameworks. These interlocking frameworks supported by concepts from the literature review were used to craft an *a priori* code structure, to guide this study.

Throughout the data analysis process, the data were continually revisited and reshaped. This reiterative analysis process as it informed the research questions was originally organized according to an *a priori* code list based on a review of the literature and the theoretical frameworks. The researcher began the analysis journey while in the final days of data collection which had spanned a period of seven weeks. Following the completion of the data collection, the researcher began in earnest to code the data.
initially employing the *a priori* code list. Each time the data were coded new codes emerged and were included in an updated code list. As this occurred, terms in the emerging code list were operationalized; the code list was dated; and a rationale for changes was noted. Nineteen codes emerged from this exercise and became the new emergent code list.

The researcher had completed this first thorough coding swipe of all the data two months after completion of data collection. Also, at this time she met with her research advisor and methodologist to review the analytic process to date. Even before the meeting the researcher felt that the developing code structure did not totally allow her to tell the story of the research and further coding was needed. Specifically, the original framework for the study which detailed interactions between individuals was not able to tell the story of the data in this particular study. Originally, literature had presented these interactions as independent but during classroom observations they were found to be interwoven, and, subsequently impossible to dissect into individual “bits of data.” Therefore, at this time, exploration of the data continued.

Following this initial meeting the researcher utilized ideas from expert advisors to review the data and coding in order to identify other themes that connected and represented the data and allowed the researcher to more accurately tell the story of the data and the research. This additional analysis identified six avenues of interaction leading to meaning making in the technologically enriched classroom.

As the researcher continued to code and analyze the data, she continually attempted to determine how well the coding informed the research questions. This led to reductions and at times alterations in the coding structure. At times the reorganization
was prompted by a rival proposition or questions posed during expert debriefing sessions. By means of these challenges throughout the data analysis rival propositions were crafted, assessed, and incorporated or rejected as integral to the analysis.

Having applied and reworked the codes, the researcher reviewed the data in the most current coded form to view broader themes supported by the coding structure. The overarching theme of the environment had emerged early in the data analysis. Later, a theme evolving around the types of interactions was uncovered during recoding of classroom observation data. The researcher continued to struggle to understand meaning making in this environment and through these interactions. The researcher returned to the literature once again to investigate meaning making from the psychosociolinguistic framework and found new conceptual tools which combined with her intimate knowledge of the data and codes allowed the formation of bigger, broader categories, or themes that did speak to meaning making.

Eventually, the researcher arrived at a structure that identified three main themes, environment, interactions within this environment, and meaning making generated within these interactions. All three were identified as happening when a teacher purposely constructs an environment using technology in a first grade classroom to make meaning. The environment was organized through a purposely constructed classroom architecture and mission. The theme of interactions included three varieties. Specifically detailed were interactions with print including graphics, letters in isolation and words in print; interaction with real world and authentic experiences; and interaction with technology. Students used these interactions in three main ways to make meaning. They were found to utilize the social nature of learning to engage in meaning making, they also employed
creativity and references to their experiences and prior knowledge in meaning construction, and finally students used multimodal approaches to make meaning.

Criteria for Judging the Quality of Research Design

There is an implicit understanding that research is undertaken to produce valid and reliable knowledge in an ethical manner (Merriam, 1998). To this end, in any research there is the need to have confidence in both the conduct of the research and the resulting implications. The research must develop a solid defense for the proposal in two major areas: first, by demonstrating the usefulness of the study while detailing the thread connecting the problem to purpose to the resulting research questions; and secondly, by offering criteria for judging the soundness of the research. Chapter I served to address the first of these, while this section will address the second and focus on establishing criteria for the soundness of the research.

Issues of validity and reliability underscore this confidence. As Guba and Lincoln (1981) maintain qualitative research should be no less accountable to these standards than the domain of quantitative research. The researcher adopted the stance of Joseph Maxwell (1992) for assessing the soundness of qualitative research by means of four types of validity relative to this study: descriptive validity, interpretive validity, theoretical validity, and generalizability.

At the core of qualitative research is the concern for a basic factual accuracy of the account. Descriptive validity rests on an accurate recording during note taking and interview transcriptions. Beyond the most elemental need to accurately record there is an additional concern for accurately depicting things that were observed. Descriptive validity relies upon accurate and thorough reporting of activities and situations. During
this study the researcher attended to accurately recording the data by transcriptions of observational notes within 24 hours of the observations. The researcher documented the study through an explicit audit trail and narratives told the story of the data through thick, rich description. The researcher also employed diagrams based on precise records which she confirmed through member checking and triangulation with audiotapes and digital photography.

Interpretive validity rests on the researcher’s ability to assure the reader that the interpretation of the story which is presented is accurate. To promote interpretive validity in this study the researcher began the interpretation of the data with connections to the research literature. Interpretation also was enhanced through triangulation of the data from multiple data sources, the use of participants’ voices to tell the story, as well as thick rich description. Alternate views to the interpretation were offered during expert peer debriefing to challenge the interpretation and increase its accuracy. Additionally, member checking at multiple junctures during the investigation also served to substantiate interpretive validity.

Theoretical validity connects the use of theory to understanding the research phenomenon. In this study, theoretical validity began with the construction and application of a strong, conceptual and theoretical framework based on social constructivist thought. The constructivist framework grounded the formation of the research questions. Theoretical validity was demonstrated through an understanding of well accepted theory upon which the researcher drew for support of the study.

Maxwell (1992) suggested that “generalizability refers to the extent to which one can extend the account of a particular situation or population to other persons, times, or
settings than in those directly studied” (p. 293). Often this is due to the purposeful nature of the sample or a purpose dedicated to investigating an extreme or unique case.

This study concentrated on a single case with the intent to understand the interactions within this particular case in detail; and moreover, the single case was determined to be unique. Thus to increase generalizability, the researcher viewed her research from the reader’s perspective questioning “what is there in this study that I can apply to my own situation and what clearly does not apply” (Walker, 1980, p. 34). To encourage the reader to extend the account of the study’s particular situation and increase the believability of the story being told, the researcher employed thick, rich description in the research account. In addition, an explicit audit trail was detailed in this chapter. Steps taken in the research were operationalized. Specific notation and documentation of the research process were meticulously detailed to ensure that readers could apply the study to their own situations.

Bias

It is well known that an alternate meaning for bias is the diagonal cut in woven fabric. Or as Richards (2005) explained that “the cloth has a bias you can control by cutting straight, by careful design” (p. 25). Certainly the qualitative researcher cannot be expected to approach a study with an absence of thought on the subject. On the contrary it may be passion about a particular subject that often ignites the research. Most certainly, the researcher acknowledges both a passion for and prior thought on the subject of technology in the early childhood classroom.

Therefore, the researcher attempted to guard against bias by opening analysis up to alternate explanations and calculating the degree to which she was open to contrary
findings (Yin, 2003). The researcher shared preliminary findings with members of the dissertation committee who offered alternative explanations. Accordingly, “if contrary findings can produce documentable rebuttals, the likelihood of bias will have been reduced” (Yin, 2003, p. 62). In this study the researcher considered the alternative explanations and at times incorporated them into the coding structure, or created new coding structures. At other times, the alternative explanation was rejected after further review of the data and discussion with the dissertation committee.

In addition the researcher maintained a stance of constant vigilance for potential bias through accurately recording of observations and interviews. The researcher was also careful to register in observation notes instances of possible bias.

Subjectivity

The special role of the researcher as the primary data collection instrument in qualitative research must be acknowledged. Qualitative researchers tend to be intimately connected to their data and the analysis in a manner that would not be possible if a data collection instrument had been utilized. Although it was well established that the researcher was the primary data collection instrument in qualitative research, the case could be made that all research is filtered through the lens of the researcher. Even in quantitative research the mark of the researcher would be subtly apparent in selections of certain formulations in design and questions. In contrast, qualitative research acknowledges at the onset the researcher’s lens and the need to recognize and monitor subjectivity.
Historically, subjectivity has been recognized as an attribute to be avoided, minimized, and at the very least, controlled. In contrast, qualitative researchers have come to dispute the negative image of subjectivity (Denzin & Lincoln, 1994; Peshkin, 1988b). Continuing this tradition, Glesne (1999) suggested that subjectivity is intimately interwoven into research from “deciding on the research topic to selecting frames of interpretation” and she began to understand that subjectivity “once recognized can be monitored for more trustworthy research and how subjectivity…can contribute to research” (p. 105).

To monitor subjectivity researchers must investigate their emotions to determine their impact on the topic of research. It is important to keep note when emotions creep into the research, noting how they impact elements that are questioned and are reflected in the narrative that is developed. Each researcher brings a unique set of subjectivities to their research. At times they may act to obscure but just as often they may, carefully monitored, serve to illuminate. To this end, Glesne and Peshkin (1992) explained how “mapping” points of your subjectivities connected to an area of research monitors the subjectivity of your research.

In this study the researcher took steps to monitor subjectivity. A reflective stance was assumed while transcribing observation notes to detail areas that might be influenced by her personal lens. During the selection of her research agenda and site she has engaged in dialogue with experts to gauge the impact of the researcher’s subjectivities. There has been continual reference to the research literature to strengthen steps taken during the research and insights drawn from the study.
The researcher also came to believe that the solitary nature of research, especially dissertation research, enabled unexpressed assumptions. To avoid this possibility the researcher sought out times for dialogue; since the researcher believes that in the act of putting voice to thought, subjectivity is often brought to light. Therefore, discussions with members of the dissertation committee, fellow doctoral candidates, practicing professionals, and knowledgeable friends were sought and hopefully enlightened this research. Finally, the researcher has adapted Cambourne’s concept of “talking your way to meaning” by simply talking out loud to herself. In so doing, the researcher found that she forced herself to re-examine her subjectivities that only seemed to emerge from the obscurity of silent thought to illumination through spoken thought.

As a final step to monitor subjectivity, the researcher attempted to monitor points of subjectivity in relation to the current study. The researcher recognized three lenses which included her personal lens, her professional lens as an educator, and a philosophical lens connected to mankind in general. The researcher acknowledged that her personal lens is shaped as a constructivist and collaborative learner. As an educator, the researcher maintained that all children, especially first graders, come to school wanting to learn. She also assumed that all children are able to learn, but that all children do not learn in the same manner. As a member in the family of mankind, the researcher maintained that all people are worthy of respect, but also must assume responsibility for their actions. As a citizen in the 21st century the researcher acknowledged the growing impact of technology in our lives and the lives of young learners. Elements of these lenses were recognized in the shaping of the research questions and questioned as resulting themes began to emerge.
Summary

This chapter highlighted the use of the single case study as an appropriate research methodology for this investigation. A detailed description begins with a review of the decision to investigate the research question through the use of qualitative research methodology. The epistemological view which is reflected in qualitative research supported by the theoretical framework was explored. The nature of the case study reflecting its bounded context, descriptive nature, and the particular nature of the population were specified.

The research questions aligned with the purpose of a case study including forms of “what” and “how” questions (Yin, 2003). This rationale linked the following research questions to the case study decision.

1. What kinds of interaction happen when a teacher purposely constructs an environment using technology in a first grade classroom?

2. How do students use these interactions to make meaning?

The research design was based on a conceptual framework which allowed the researcher to construct “bins” which involved the participants and setting. The researcher conducted observations in a technologically enriched first grade classroom in an urban elementary school at the beginning of the school year. The researcher began observations on the third week of classes through the ninth week. Data forms included 1) log trail which encompassed the audit trail, the change logs, field notes, and codes; 2) interviews with both the students and the teacher; and, 3) documents and artifacts including audio and video recordings. Field notes taken during the observation were transcribed and
reconfigured to create descriptive notes, personal notes, and analytic notes. A rationale with theoretical support was offered for each of the data collection measures.

The researcher managed the data in both print and electronic files, specifically through the use of QSR*NVivo software, and engaged in analysis during the entire data collection and analysis process. Ultimately, the researcher structured tree nodes that identified three types of interaction that happen when a teacher purposely constructs an environment using technology in a first grade classroom to make meaning. These interactions included interactions with print including graphics, letters in isolation and words in print; interaction with real world and authentic experiences; and interaction with technology. Students used these interactions in three main ways to make meaning. They were found to utilize the social nature of learning to engage in meaning making, they also employed creativity and references to their experiences and prior knowledge in meaning construction, and finally students used multimodal approaches to make meaning.

The researcher addressed criteria for judging the quality of the research by detailing approaches to deal with validity, specifically descriptive validity, interpretive validity, and theoretical validity. Additionally, the concept of generalizability was dealt with as it applies to qualitative research. Issues of bias and subjectivity were also discussed to conclude the chapter.
CHAPTER IV

RESULTS

Even though technology is becoming a more potent force in the lives of students, there are few research findings that speak to the young learner at the nexus of literacy development between emergent and conventional literacy. The purpose of this study was to describe literacy behaviors of students in a first grade technology-rich classroom environment by documenting student behaviors while engaging and interacting with literacy activities in this environment. Ultimately, the study sought to investigate how students used these interactions to make meaning. The results of this study are based upon data gathered in investigation of the following research questions that guided the study:

1. What kinds of interaction happen when a teacher purposely constructs an environment using technology in a first grade classroom?

2. How do students use these interactions to make meaning?

Data collection procedures employed during this study included the use of: classroom observations; interviews, and collection of student artifacts and classroom documents. The researcher reduced the data and linked it together to tell the story of the research and give it meaning. In so doing, the researcher attempted to “construct categories or themes that capture …recurring pattern(s) that cut across . . . [and] are indicated by the data but not the data itself” (Taylor & Bogdan, 1984, p. 139).
An important consideration of the study was to investigate these young learners at the beginning of their first grade year, a time that developmental experts theorize may capture the beginning of a child’s transition from emergent to conventional literacies (Teale, 2003). Even though this was the intent of the timed interaction of this study, the researcher recognized that young children experience unique individual differences as they pass through the predictable stages of literate development identified by a large body of research (Teale & Sulzby, 1986). Moreover, children learn through active engagement with the authentic literacy acts that reflect their stage of development and hold meaning in their society (Goodman, 1984; Smith, 1984; Teale, 1984). Harste, Burke, and Woodward (1984) observed no evidence that “children’s psycholinguistic and sociolinguistic strategies are qualitatively different from the kinds of decisions which more experienced language users make” (p. 69). Quite the contrary they identified common principles between adults and children. Teale (2003) suggested that perhaps the time of transitioning from emergent reading and writing to conventional forms is one “phase of early literacy learning . . . we know less about . . .” (p. 26). Consequently, results of this study provide additional insights into this significant developmental phase.

With this rationale, the study was designed to enter the first grade classroom early in the school year. Data collection commenced the third week of the school calendar year and continued for six weeks in order to capture the onset of this developmental phase. The following analysis from the data collected during that time period is presented in three sections. The first section provides a detailed description of the teacher-created environment. This description forms the backdrop to answer the first research question by analyzing the three main types of interactions that occurred in this environment. The
discussion of the second research question presents an analysis of the data describing how these interactions were employed in meaning making. Finally, a summary will lead to the following chapter in which conclusions which emerged from the analysis of the data are presented.

Research Question 1

What kinds of interactions happen when a teacher purposely constructs an environment using technology in a first grade classroom?

The purpose of this question was to offer a rich description of the teacher-created environment. Subsequently, given this environment the kinds of interactions are described.

Teacher-Created Environment

The teacher purposely created the classroom environment through a specific classroom architecture, organization of space, incorporation of technology, and attention to orderliness in the classroom. The teacher believed that: “some of the activities we do in our classroom directly relate to being able to work as a cooperative team . . . to accomplish your goal. . . . You need a computer in front of the team instead of computers being at the back of the room” (TI1). This philosophy was reflected in the classroom environment.

Classroom Architecture

The classroom was found in an older school building, originally constructed 100 years ago. In fact, the school building was scheduled for demolition the next year, to be followed by the construction of a new building on the same site. The classroom itself had
high ceilings with spacious surroundings for the 20 students and teacher who referred to it affectionately as the “Dream Factory.” The walls were a soft, institutional green with bulletin boards on three of the four walls. The fourth or front wall had a white board and an electronic Smartboard. The floors were polished tan tiles with a large beige rug marked off in rectangles to specify student seats although no specific seats were assigned. The beige rug was centered in the room in front of the Smartboard. (see Figure 2).

Upon entering the room to the left, one saw a classroom sink alcoved in the wall. Wall A jutted out to allow for a bulletin board dedicated to science information, including a large poster of a seven step science cartoon designed specifically for this classroom. There were also two of the six student tables that protruded from the wall and housed one computer at the end of each of the tables. There were four student size chairs at each table with storage bins at the wall by the tables.

Also protruding from wall A was a six foot long, five foot wide wooden two story construction called the magic tree house. The upper platform was a loft accessed by a ladder and was furnished with a full size floor cushion as well as side pillows. Students were given special permission to enter the loft for reading. The bottom space had side walls that framed a science experiment table and a small blackboard inside. Students entered this space through an opening framed by a large sign that said “Wetlands” across the top and had flowered posters down the side. The architecture created an aura that students were entering a special laboratory.
Figure 2. Classroom plan.

On the front of this construction, on the outside wall facing the student tables was a large five tier book rack for displaying trade books used during student leisure reading. Near the book rack were also two large figures of children holding a sign that said “Welcome to the Magic Tree House.” On the opposite side of the structure, there was a storage hallway formed between the back of this structure and the classroom wall. This
private area was home to shelved storage of classroom material neatly arranged and stored in tubs.

There were two more desks protruding from the back wall, Wall B. There was a computer and keyboard on each of these desks duplicating the student desks on Wall A. This back wall of the classroom, Wall B, framed a blackboard which had a set of ABC posters running across the top as a heading, with words that started with particular letters listed under the letter as the beginning of a word wall. There was also a map of Ohio on this board. Turning to the next wall, Wall C, there was a bulletin board charting information such as the weather, day of the week, and behavior. Wall C also had two desks coming from the wall, each with a computer. Closer to the front of the room, along Wall C was a larger table that served as immediate storage for the day’s lessons and student papers.

The front wall, Wall D, had a white board used for display. The proclamation that “We are the Dream Factory” framed one corner of the board and a guitar hung at the other side. Multicolored clipboard-shaped frames with pictures of individual students were displayed neatly on the sides of the white board. In the middle of the white board was a large electronic Smartboard which was used as a classroom “blackboard.” The teacher had his computer, connected to the Smartboard, on a side table along the front wall. On the other side of the board, a u-shaped table in the front of the classroom on the other side of the board was used for reading groups or classroom presentations. At the door of the room was a coat rack with a bulletin board of vowel sounds and other messages above it. The American flag hung from an area between this bulletin board and the white board.
There was a strong emphasis on the mindful organization of a variety of learning spaces that were purposefully used throughout the classroom day. Specifically, there were three primary spaces, the carpet, student desks, and work tables; while other spaces were employed sporadically for singular learning experiences. The “carpet” was defined as student interactions occurring on the large center carpet. The teacher employed this space for community discussions and also for whole group activities built around the Smartboard. There were often student sharing of ideas to construct meaning in this location.

Student desks and work tables occupied the same location but were purposed differently. Architecturally this space referred to the six student worktables spaced two tables per wall on three walls of the classroom (see Figure 2). When used as desks, individual students were working to complete individual written work. When used as work tables, they supported the use of technology by providing communal access to the computer monitor, keyboard, and mouse at the end of each worktable. Occasionally other spaces in the classroom became the setting for interaction or singular learning experiences, but these three areas were used most frequently.

Technology in the Classroom

Within the classroom, students interacted with print and digital technology through a variety of forms. The teacher had created an environment that utilized individual student white erase boards, desktop computers, and word processors. The Smartboard which was front and center in the room served as the traditional “blackboard” of the classroom. In this sense it was used for display of information. Unlike the
traditional blackboard, however, the teacher was able to load information stored digitally from software programs and Internet sites. Consequently, he had the capability to change the font size, color, and placement of text. This capability could alter both the visual features and conceptual structure of the information being presented to students. The multimedia nature of digital presentations was accessed in the classroom through the inclusion of movement, sound, graphics, and videos in the Smartboard presentations.

Each student had his or her own whiteboard, marker, and eraser cloth. The carpeted center area of the classroom often found students jotting responses on their individual erase boards. The Alpha Smarts 3000, a portable word processor, were also used on the carpet as well as at the student tables. Information stored on the machines could be downloaded onto printed pages but it was not instantaneous and not done by the students.

Students were seated at tables with four students to a table. At the end of each table was an IMac desktop computer, keyboard, and mouse. The students used the computer as a team, taking turns operating the mouse and keyboard. The turns were designated through the ICAN positions at the table. Students also used individual Alpha Smarts at their tables.

In addition to the digital resources of the class there were print technologies used by the students. Each student had his or her own toolbox containing pencils, crayons, and other schools supplies. There was a large crate at the end of each table that held student notebooks, reading material, journals, and other supplies. There was also a large trade book display near the magic tree house area of the classroom.
**Orderliness in the Classroom**

The classroom environment had a deliberately-crafted sense of the importance of specific places for specific purposes. There were containers used to organize student papers. There was always a ready supply of sharpened pencils and tissues for student use. Bulletin boards were neatly arranged. They had an uncluttered look, with many boards showing large white spaces in anticipation of future student work.

Moreover, the teacher shaped the orderliness of the classroom even into the private storage spaces outside the view of students. Bookshelves for teacher-related material were neat and organized. Each of the student tool boxes, book crates, and journals were uniform, varying only in color. Finally, the teacher continually encouraged order throughout the day,

The challenge for me, in terms of my philosophy of education, is that I have to be very aware of the differences of students, as to how they learn, and then be able to create not only an environment but a delivery system that allows each person to maximize who they are as individuals. (Teacher interview 11_8)

It was evident that the teacher was creating the environment that valued a sense of positive purpose among all members of the classroom community.

Additionally, there were two messages which were prominently displayed and established a sense of purpose and code of personal behavior appropriate for this classroom community. The first message, “We are the Dream Factory,” was reinforced through classroom discussion. For example, in a lesson close to Columbus Day, the teacher showed pictures of Christopher Columbus and then made an explicit connection to the Dream Factory message: “Christopher Columbus is a ‘dream factory’ kind of guy because he learned to never give up! He wasn’t afraid to keep asking” (Descriptive
notes, 10_8). While integrating the mission into curriculum the teacher has subtly defined specific qualities for members of the dream factory.

The second message, “Respectful, Responsible, Ready to Learn,” was promoted through two commercial trade posters featuring a group of students laughing and engaging with a computer. The posters were located in front of the classroom and on the morning message wall. Equally subtle, the fact that this poster was repeated while there were so few posters in the classroom points to the importance of its message. The teacher often pointed to the poster to remind the students of their class “rules.” Students seemed to have internalized the message and referred to it during student interviews as a guide for their work in first grade.

Interviewer: How do you learn in the classroom?

Student: Respect and responsible for what we learn.

This student’s assertion was characteristic of a generic shared belief that the students viewed their classroom environment as safe place for learning and student-directed inquiry. As the students were respectful and supportive of one another they were able to stretch and to learn never fearing classmates’ ridicule for their attempts (Descriptive notes 10_29).

Certainly, the purposeful organization and simplicity of the classroom environment studied during this analysis is representative of the environment suggested by Calkins (1983).

It is significant to realize that the most creative environments in our society are not the ever-changing ones. The artist’s studio, the researcher’s laboratory, the scholar’s library are all deliberately kept simple so as to support the complexities of the work-in progress. They are deliberately kept predictable so the unpredictable can happen. (p. 32)
Kinds of Interactions

This section provides results from data analysis focused on the following question: What kinds of interactions happen when a teacher purposely constructs an environment using technology in a first grade classroom? Data analysis revealed three main types of student interaction: (1) interactions with print; (2) interactions with authentic, real world happenings; and (3) interactions with technology. It is important to note that during this analysis these categories were not always distinct, but details of an interaction were included in the type of interactions that it best informed.

Interactions With Print

For purposes of analysis, interactions with print were defined as interactions with conventional printed text, whether through skill-based decoding of word parts or other reading and comprehension activities. It also included the interaction of printed text with graphics, where the meaning making was derived either primarily from the printed text or in conjunction with graphics; or as digitized print, where the emphasis was placed on the print and not the qualities of the technology.

Learning space. Print-based interactions occurred in two major spaces: students’ desks and the carpeted area. At their desks students engaged in bell work activity, often phonics workbook page exercises. Students were also at their desks while they interacted with the print involved baseline measure through standardized assessment. The teacher utilized the student desks as he integrated print and technology to present the morning activities, including morning message. The journal and weekly planner, for example, were projected onto the Smartboard through the document reader. One student was asked to construct a sentence to include in the planner for today’s sentence. Her sentence was
“Today is a sunny day.” The teacher questioned the class concerning the beginning letter of the sentence. After a student volunteered the information that it was a “T,” he wrote it in the journal. In the same fashion the class spelled sun (s-u-n) in unison and the teacher then recorded it in the planner projecting it onto the Smartboard. Working together, the sentence was displayed as students aided in its construction. (Descriptive notes 9_17; illustration from student’s weekly planner and descriptive notes 9_17).

The carpeted area was also host to many print interactions. Foremost among these were typical primary-level instructional strategies, including teacher read-aloud, echo, and choral reading (Opitz & Rasinski, 2008). This was also the location for buddy reading with their fifth grade mentors.

Spelling words were also presented on the Smartboard. Students sounded words out as a class, viewed the word on the Smartboard, and then copied them into their individual journals. After the spelling words had been presented for inclusion in the planners, additional practice occurred in the carpeted area with the use of individual student white boards. Students wrote their spelling words on white boards prompted by the teacher’s selection of a particular word. Many students orally sounded them out. During the exercise, students viewed each other’s boards and some conferred about the words or listened to their neighbors on the carpet sound out the words. For example, a student read another student’s board and said that the word was “bug” not “bag” (Descriptive notes 9_17).

Writing activities also occurred on the carpeted venue. They included sentence completion and creative writing activities. One morning, students were asked to respond to the morning message projected onto the Smartboard, “When I feel happy, I ______.”
Students began to fill in the word, sometimes discussing their responses with each other. Students uttered responses aloud to themselves and then used invented spelling to record them on white boards. For example, one student wrote that he “woch TV” and the teacher moved among the students reading their invented spellings and reacting to their messages (Descriptive notes _9_17).

Audience. Due to the collaborative environment which permitted student talk, students were able to find an audience for their print interactions with other students, the teacher, and the class as a whole. For example, students regularly read a book or discussed their writings with me. In addition, visitors to the class were invited to be an audience to impromptu performances based on print text; while at other times, visits to the school secretary, principal, or nurse provided a ready audience. One day as the reading specialist entered the room the class decided to treat her with a choral presentation of their poem of the month..

Interaction With Real World or Authentic Activities

Interactions with real world and authentic activities included a continuum of interactions that ranged from field trip interactions with authentic environments to interactions with digitized authentic environments through such technologies as Google Earth. At times these interactions were situated in real world authentic situations, such as the class field trip to the local wetlands, while at other times were part of the classroom experience such as dramatization during the storyteller’s visit.

Learning space. The continuum of real world interactions was either situated in the authentic space or in the carpeted area of the classroom. In the simplest form
interactions occurred when a local storyteller/librarian visited the class, read student stories, and organized the students to interact through dramatization of these stories. In much the same manner, the teacher called upon students to dramatize math story problems or poetry.

Moving along the continuum, interactions with real world artifacts within the classroom also provided a valuable interaction in this classroom. For example, the teacher brought a preserved beaver into the classroom on loan from a local museum. The students seated on the carpet encircled the beaver and were able to pose questions based upon physical input. “The animal was once alive and they have preserved it,” explained the teacher. The teacher then formally asked for questions from the students about the beaver. One student asked about the bottom of the feet (Descriptive notes 1_8).

Interactions with the real world also occurred in spaces outside the classroom, most specifically on the class field trip to a local wetland. Students were able to view a beaver lodge and the local wetlands representing the beaver’s habitat. Students were able to journal their reactions to this real world setting while overlooking the beaver’s lodge. Students were viewed interacting and conferring with one another in small groups during journaling (Descriptive notes 10_10).

**Audience.** Students found a small, personal audience during interactions with authentic and real-world interactions. At times these interactions happened between the environment and the student or class as a whole, but more often they were interactions between more intimate groups of students. For example, a small triad of students gathered on the bridge overlooking the beaver’s lodge to share their journaled thoughts.
Interactions With Technology

Interactions with technology included student interactions with digital technologies such as computer monitors, hard drives, keyboards, mouse, Alpha Smart 3000 word processors, digital and video cameras, document reader, projector, Smartboard, printers, and software utilized through these formats. Technology included both digital technologies employed in the classroom and global technologies through the Internet, websites, wikis, and podcasts.

Learning space. Interactions with technology were located in two areas, the carpet and student worktables. On the carpet the students looked at the Smartboard for activities ranging from those related to print text such as a review vocabulary and reading words to Internet investigations to authenticate the Golden Gate Bridge by experiencing the famous bridge through Google Earth.

Interaction with the technology of the Alpha Smart 3000 took place at both the students’ desks and also on the carpet. The Alpha Smart 3000 is a laptop digital device dedicated to word processing. Students in this classroom also worked cooperatively with desktop IMac computers and were introduced to the IMac computers working at their tables in groups of four students. The students took turns according to the ICAN plate taped to the middle of the table. In much the same manner as the introduction to the Alphasmarts, the students were able to view the computer screen on the Smartboard and listen to verbal cues from the teacher. The students followed the commands and were soon engaged in software programs (Descriptive notes 10_10).

Audience. Students accessed an expanded audience as they interacted with technology in the classroom. At times, the audience was simply a neighbor seated on the
carpet near them with whom they could share their writings on the Alpha Smart 3000.

The audience expanded to their worktable group as students interacted with software on their IMac desktop computers and to the entire class as they discussed images presented on the Smartboard. Finally, their work enjoyed a global audience as it was uploaded to the class website and students could view guests to the site and interact with their global audience (Table 2).

Table 2

Relationship Between Type of Interaction, Learning Space, and Instructional Grouping

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Activity</th>
<th>Learning Space</th>
<th>Instructional Grouping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print</td>
<td>Bell work</td>
<td>Desk</td>
<td>Individual</td>
</tr>
<tr>
<td></td>
<td>Journal</td>
<td>Desk</td>
<td>Group</td>
</tr>
<tr>
<td></td>
<td>Reading</td>
<td>Carpet</td>
<td>Group</td>
</tr>
<tr>
<td></td>
<td>Spelling</td>
<td>Carpet</td>
<td>Group</td>
</tr>
<tr>
<td></td>
<td>Writing</td>
<td>Carpet</td>
<td>Group</td>
</tr>
<tr>
<td></td>
<td>Picture walk</td>
<td>Carpet</td>
<td>Group</td>
</tr>
<tr>
<td></td>
<td>Favorite character selection</td>
<td>Carpet</td>
<td>Individual in group setting</td>
</tr>
<tr>
<td>Real World</td>
<td>Storytelling dramatization</td>
<td>Carpet</td>
<td>Group</td>
</tr>
<tr>
<td>Technology</td>
<td>Beaver presentation</td>
<td>Carpet</td>
<td>Group</td>
</tr>
<tr>
<td></td>
<td>Spelling</td>
<td>Carpet</td>
<td>Group</td>
</tr>
<tr>
<td></td>
<td>Math problem solving</td>
<td>Carpet</td>
<td>Group</td>
</tr>
<tr>
<td></td>
<td>Alphasmart</td>
<td>Carpet</td>
<td>Individual in group setting</td>
</tr>
<tr>
<td></td>
<td>Computer</td>
<td>Worktable</td>
<td>Group</td>
</tr>
<tr>
<td></td>
<td>Google Earth</td>
<td>Carpet</td>
<td>Group</td>
</tr>
</tbody>
</table>
Research Question 2

How do students use these interactions to make meaning?

The purpose of this section is to gain a view of how students constructed meaning through the interactions with print, the real world activities, and technology. Three ways of meaning making emerging from the data analysis: specifically, through social collaboration; through experience based inquiry and interpretation; and through multiliteracies. As in the case of the interactions, these ways of meaning making were often recognized working in tandem during the same interaction to provide multiple paths to meaning making. For purposes of presentation the researcher constructed categories based on the data which reflected a path to meaning making while realizing that other paths may have been operating at the same time and in the same place.

Social Nature of Meaning Making

In this study, the sense of social community in the classroom was defined by the understanding that students engaged almost exclusively as a social group during the early weeks of the school year. The only daily exception to working in a social community was the brief time at the beginning of the school day when the students were engaged individually doing bell work activities. Moreover, the social nature of the classroom was purposefully designed by the teacher.

... some of the activities we do in our classroom directly relate to being able to work as a cooperative team to gather information, to do whatever the skill set is that you’re working on as a team to accomplish the goal. (teacher interview date)

In speaking of the development of the social nature in the classroom the teacher mirrored the reflections of Miller (2002) as she reminisced that the real classroom community is forged long after the rooms are designed for community or the contracts to build
community are signed and sealed. They are rather the product of a vision “of community that expands to create a culture and climate for thinking. . . . when rigor, inquiry, and intimacy become components of our definition” (p. 17). They are forged by authentic relationships bonded by mutual trust; thus, “real classroom communities bring together the voices, hearts, and souls of the people who inhabit them” (p. 17).

The social nature of the classroom provided an environment that permitted students to scaffold classmates in constructing new meanings. Students seated together on the carpet wrote their spelling words on white boards, orally sounding them out as they wrote. Students viewed each other’s boards and some conferred about the words. One student leaned over and read another’s board and then shared that the word was “bug” not “bag” pointing to the middle vowel to further clarify. The other student sounded out the words that she had written and then agreed with the new meaning erased her spelling to change to “bug” (Descriptive notes 9_17). This simple example exhibited a student confirming the meaning of symbols, in this case letters, holding specific sounds which were then reflected in the word meaning.

Written activities occurring on the carpeted area were also ripe with meanings made through the social nature of learning. They included sentence completion and creative writing activities. One morning, students were asked to respond to the morning message which had been projected onto the Smartboard. The students were to complete the sentence “When I feel happy, I _ [blank]____” Students began to fill in the word, often discussing their responses with each other. Students were heard saying responses aloud to themselves and then using invented spelling to record them on their individual white boards. One student wrote that he “woch TV” and then shared it with a friend.
carefully sounding it out for them. The friend accepted the meaning and wrote it on his board as well. Even though the teacher circulated throughout the room and read all the students boards, students continued to look at their classmates’ boards to see if their spellings held more meaning than their own construction. Students were found to alter their boards if they felt a different spelling was more meaningful (Descriptive notes 9_17).

During the classroom observation period the researcher was able to help supervise a class trip to the local wetlands. Students were excited to have viewed nature in this authentic setting. They shared thoughts based on their own personal experiences and listened to classmates’ comments. During the nature hike some students identified logs floating in the river as alligators. Having pointed the “alligator” out to friends many concurred and indeed the log did resemble an alligator. Other students questioned if it was warm enough for an alligator and did alligators live in our area. The social dialogue continued and resulted in the students finally deciding that it was a log and not an alligator. Most students had decided that alligators’ habitats would not be found in our area. Working in a constructivist frame for meaning making students relied upon prior understandings to construct knowledge only to be scaffolded by other students to a new and deeper meaning or understanding.

Students were able to view authentic animals in the wetlands including a blue heron balancing on one leg. Quietly students watched the heron, mimicking the balanced stance as they proceeded on their hike. Throughout the hike students investigated signs of the beaver finally spotting the beaver’s lodge. A time for journaling details of the hike was found as the students rested on a platform overlooking the beaver’s lodge. Taking
out their journals, students grouped to discuss findings with classmates and conferred on their journal entries. Some students began to draw while others inspected their classmates’ drawings. One student was so intent that she had her tongue running across her lip as she wrote and drew. Other students near her peeked at her work smiled and then returned to their writing (Descriptive notes 10_10, Digital photos 1_003 & 1_004).

One day the teacher extended a reading selection dealing with bridges by incorporating technology, specifically *Google Earth*. The reading selection ended with four pictures of bridges, one of which was the Golden Gate Bridge. The teacher asked students to put their finger on their favorite bridge and the majority selected the well known California landmark. The teacher then invited the students to put their books away and return to the carpet as he planned to show them what the bridge actually looked like. The students returned to the carpet to witness their teacher typing Golden Gate Bridge into *Google Earth*. Soon a dot appeared on the digital map spreading across the Smartboard screen. The students traveled by digital imaging across the United States learning to decipher aerial maps; finally they arrived at the California shore overlooking the Golden Gate Bridge. The following minutes were spent responding to students’ requests to fly over and under the bridge, near the bridge and across the communities surrounding the bridge. Students were quick to note the dense communities surrounding the bridge and the huge body of water around the bridge. Students exploded with “ohs” and “ahs” as they came to understand how many people lived around the bridge and the immensity of the small view of the Pacific Ocean. One student commented on how high the bridge appeared; indeed, it appeared as tall as the surrounding hills. Another student remarked “look where the bridge has to start to get high enough.” The teacher then
lowered the class onto the bridge explaining that this view was as if they were riding in a
car with their Mom and Dad on the bridge. Students exclaimed, “Oh, I like this school”
and “Oh my G-d”; while as the travels drew to a close and Google Earth returned them
home the students applauded the wonderfully, meaningful experience (Descriptive notes
10_3). This powerful example of meaning making, although grounded in the social
nature of learning, also drew upon the two additional paths to meaning making. Students
were offered an experiential activity as they directed the digital path of their explorations.
Additionally, the nature of digital journey encouraged the explorer to access the
experience through multiple sensory paths.

At the beginning of October the students were introduced to the Alpha Smarts. The
word processors were placed in the individual student squares on the carpet area. The
students were called to the carpet and asked to turn on the Alpha Smarts. Led by a
projected picture on the Smartboard the class began to use the Alpha Smarts and were
soon composing on them. The students helped each other find the correct keys (video_9,
10, 11). One student asked another where was the period and the other put the period in
his writing after showing him where to locate the key (Descriptive not 10_1). Even
during later use of the Alpha Smarts at the students’ desks, classmates continued to offer
help to each other.

Students engaged with the IMac computers in teams of four students. The mouse
and keyboard rotated among the students and were shared according to their seating in
the I-C-A-N position of the table. While one student operated the mouse, all students
viewed the monitor and group discussions were evident. During one design program the
students took turns selecting features for a pumpkin face. One student assured another,
“oh you get to pick the mouth” and then turned and asked about the feature he was selecting, “do you like this?” The students at the computer tables viewed themselves as a group and at times shared answers in an effort to be supportive (Descriptive notes 9_19).

The strength of the social nature of meaning making was also confirmed during a student interview. When one student was asked how he decided which answer to select while working with the team on the computer he volunteered that he “sometimes … ask[s] my friends.” When asked if he ever answered on his own he replied that, “no he checks it out with his friends” (student interview, p. 45).

*Experience Based Inquiry and Interpretation*

The concept that meaning can be made from our experiences or through experimentation and creative activities formed the second avenue to meaning making recognized in the data. Worthy of note in focusing upon this second path to meaning making is the understanding that most often each of the three paths to meaning making was joined and not discrete avenues.

The teacher was finishing his reading of the day’s chapter in an exciting mystery about pirates and buried treasures when he recalled that today, September 19th, was “National Talk Like a Pirate Day.” Soon the students were engaged in perfecting their pirates’ greeting, “Aey, Matey.” Once perfected, the students retrieved their reading books and practiced their latest selection, *Sam and the Bag*.

It had been decided that they would read the selection chorally for their singular audience, the school secretary, concluding with their pirates’ greetings. As the class practiced for their choral reading performance the text gained greater meaning. Serious faces abounded as the class offered their personal rendition of *Sam and the Bag*. The
secretary’s applause was followed by a theatrically rough, pirate worthy chorus of “Aey Matey.” Students returned to their classroom smiling with the excitement of their interpretive reading and the informed teacher was smiling also in the realization that meaning is forged not solely from the text but in a transaction between the reader and the text (Descriptive note 9_19).

Interactions with real world and authentic activities whether through participation in field trips or in class interaction with authentic materials strengthened meaning making. A stellar example of authentic examples being employed to construct meaning occurred when the teacher brought a preserved beaver from the local natural history museum into the classroom. The teacher explained that the beaver was once alive and now it had been preserved. The teacher also noted that the beaver’s skeleton had been replaced by wires to maintain the form of the animal. The students were gathered encircling the beaver and observing the animal in detail. The discussion was led by the students’ questions.

The questions began with concrete observations of the feet and teeth wondering how they outfitted the beaver for his habitat. The students first questioned the feet wondering about the webbing on the feet. Other students questioned if the feet were webbed could the beaver swim like a duck? Another student commented on the teeth noting that the teeth must be stronger than humans since they chew wood and the teeth did not appear to be chipped.

Later, because the concept of a preserved animal was a challenge to the developmental level of the students, questions focused on this situation. One student wondered if they touched the beaver would it come back to life. Furthering this avenue
of meaning making, another student questioned the reason for putting wires in the beaver. A fellow classmate drawing upon prior knowledge suggested “I think that the wires are to electrocute him” (Descriptive notes 10_8).

Technology was employed to construct meanings in math literacy. Math “balls”: were displayed on the Smartboard. A student created a model of a problem on the Smartboard by moving the balls while physically touching the Smartboard and dragging and dropping the math ball in the appropriate spot. In this manner, the student dropped the electronic math ball on the Smartboard screen to create the picture of a problem. The teacher wrote the problem in numerals on a large white board placed nearby on an easel. The class then voted if the teacher’s understanding of the problem was correct (Descriptive notes 10_29; digital photos 709-711).

The social community organized in the classroom was incorporated into meaningful activities with technology as students created podcasts and experimented with digital photographs to post on the class website. Each week a student was selected as the digital photographer and he or she was responsible to portray the week’s activities through digital imagery. The student presented the photographs to the class and the class discussed which photographs best explained what they had accomplished during the week. Subsequently, the teacher uploaded the student generated photographs onto the website. The local community gained entrance to the class through their website which was a known feature at the local community library. As the teacher explained during an interview, “our local libraries know about our websites and know about what we’re doing. All they [the students] have to do is get there and they’ll help them set it up” (teacher interview p. 5).
The classroom was also viewed by the global community through this website which supported the student photographs as well as podcasts recorded by students for the website. The teacher was showing the map of the world while noting the dots signifying visitors to their site. The students were impressed with their audience and remained quite serious. The quiet demeanor continued as one student read a narration that was being recorded on the Smartboard to be uploaded onto their website. Students comprehended the communicative nature of language as they viewed the global nature of their website and heard their classmate reading the narrative soon to be heard in this global village (Descriptive notes 10_1).

Although technology was part of the students’ lives, the applications of technology presented in the classroom were often new to the students. In spite of this, students were quick to explore and to experiment with these new interactions leading to meaning making. The teacher understood this sense of experimentation. “You will notice that we have laptops on the carpet . . . we have never used them in our classroom . . . today is a date to experiment with them” (Descriptive notes 10_1).

The students were generally the operators of the technology and the teacher took great pains to instruct but not to physically operate the students’ mouse. The teacher led the students’ first encounter with the computer by demonstrating with a projected simulation on the Smartboard and oral directions. Although it appeared that the students were simply following directions, the fact that the students proclaimed that “I did it” and requested the teacher look at their computer implied that they had successfully engaged in meaning making through experimentation (Descriptive notes 10_3).
Students readily felt a comfort level with experimentation involving technology and were quick to share their expertise with others. One day another teacher was in the room briefly while the classroom teacher went to her room to repair the technology. This teacher was proficient in technology but students in the classroom ‘took it upon themselves to explain to her how the technology in their room worked” (Descriptive notes 9_19). These actions suggested that the students had stretched and explored the technology; meanwhile, they had used it for meaning making and were willing to share this with others.

*Meaning Making Through Multiliteracies*

The concept of multiliteracies augments traditional pedagogical thought by speaking to dual aspects related to textual multiplicity. Traditional literacy is often according to Cope and Kalantzis (2000) “a mere literacy . . . centered on language only, and usually on a singular national form of language . . . being conceived as a stable system based on rules…that we can actually discern and describe correct usage” (p. 5). By contrast, multiliteracies concerns itself with “modes of representation much broader than language alone” (p. 3) Cope and Kalantzis (2000) identified five symbol systems through which literacy learners were able to construct meaning; specifically, they are meaning derived from linguistics, audio, gestural, visual, and spatial elements. Alcock and Cullen (2008) concluded “words are tools for playing and meaning arises in the use of words” (p. 7). Word play that is fundamental to literacy growth may be expressed musically through musical rhythms, poetry, drama and movement. Indeed, “word-play can empower children as active members of a community [to be] able to transform and re-create words, sounds, meanings, and feelings anew” (Alcock & Cullen, 2008, p. 8).
Students employed graphics in print text to provide meaning to the text. At times it was initiated by the teacher. One day the teacher invited the students on a picture walk of a book. “Just look at the pictures . . . don’t read the words.” Viewing the pictures alone, the students were able to explain that the main character could read and sing by constructing meaning from the pictures in the book (descriptive notes 10_8). The teacher also encouraged them to use the graphics to make meaning from the print text. The students were reading a selection and the teacher inquired how they knew that the log was heavy. One student used his prior knowledge and explained that he had tried to pick up a log and it was heavy. Another student reads the text that noted that the log was big and the rabbit was little. The teacher suggested that the artist also let us know and dramatized the pictures associated with the page by pretending to lift a heavy log with his tongue hanging out (Descriptive notes 10_3).

During presentations with the local librarian as a guest speaker, the carpet area was reconfigured into a large student circle to support multiliterate activities. The local librarian/storyteller had collected short stories from students at the school during the previous year. The storyteller now used these student stories as read-aloud texts and invited students to dramatize them. Each student was offered a role as she went around the circle after which they practiced their dramatization.

The storyteller also told a tale describing how she had found her walking stick on a trip through the forest. In one part of the story she shared how she came upon a field of flowers and the students who were cast as the flowers portrayed this by lying on their back and putting their legs in the air. When asked what they were doing they explained
that they were flowers in the ground with their legs serving as the stems and their feet were the flowers (Descriptive notes 10_17).

Authenticity supported through multiliteracies was an important component of the classroom as students generated meaning from interactions with print and real world activities. Certainly the multiple paths to meaning while hiking in the wetlands framed a richer meaning of the beaver’s lodge for the students. Honoring the possibilities of multiliteracies, students’ art, mimicking, and discussions suggested a deeper understanding than they were able to convey through written composition. During the inverse situation, wherein print was expanded through dramatization, the students also seemed to gain a greater meaning through the incorporation of multiliteracies. For example, one day after finishing a story about a fox family the teacher began to dramatize subtraction problems based on the reading. Students were selected to fill the roles of the mother fox and her children, leaving the room as they were subtracted from the story. Finally, the teacher distributed worksheets based on the subtraction problems which now held greater meaning for the students and were quickly and correctly completed (Descriptive notes 9_17).

Working at their tables in groups of four, students were introduced to the IMac computers. The students took turns according to the ICAN plate taped to the middle of the table. In much the same manner as the introduction to the Alphasmarts, the students were able to view the computer screen on the Smartboard and listen to verbal cues from the teacher. The students followed the commands and were soon engaged in a software program that allowed matching of middle vowel sounds with graphics. When the correct word was dragged and dropped into place using the mouse, a complimentary tune was
played and the correct word was “read” by the computer. The students took turns and were seen working as teams to make the correct selection (Descriptive notes 10_10).

During their work with the software program students were involved in sounding out the words which corresponded to the pictures. Even through there was some confusion, groups were helping each other. For example, one student shared with another to “look at the picture and find the letter at the beginning of the pictures.” Students were reading the words for their turn out loud for everyone in the group to hear and one student said to another to sound them [the words] out. The students were very excited at their successes and one student was clapping while others were laughing and singing and one student even seemed to be clucking like a chicken (ipod transcription 9_19). Students were constructing meaning through scaffolding and modeling from peers. The program through multiliteracies allowed the students to move the correct answer into place and then gave a confirming sound before reciting the correct answer.

Finally, the example of the popcorn poem exemplified the development of meanings continually enhanced by all three avenues to meaning making. Students committed poems to memory each month and October’s selection was a poem about popcorn. Having memorized the poem, students were able to offer interpretations which were enhanced by a musical selection. The students selected the musical track that they felt best exemplified the popcorn poem. During practice they were encouraged to stand and use movement to also give meaning. In totality, the recitation with music and movement were to be captured digitally (Descriptive note of video). The students employed creativity as they experimented with multiliteracies to enhance the printed version of the poem. Meaning was added to the text first by the tones and cadence of
their oral presentation, and subsequently by the addition of carefully selected music. As students moved to the music during their recitation the movements were socially selected as students decided to mimic the movement which offered the greatest meaning to them. Taken together, the three avenues to meaning making, social collaboration, experience based inquiry and interpretation, and the use of multiliteracies strengthened and expanded the students’ understanding and the meanings which they transacted with the poem.

Summary

In this chapter, the results of a single case study of one technologically enriched classroom were presented. The purpose of this study was to investigate the kinds of interactions that happened when a teacher purposely constructed an environment using technology in a first-grade classroom at the beginning of the school year. In addition this study sought to investigate the ways that students use these interactions to make meaning.

Data collection procedures for this study included classroom observations, interviews with the teacher and students, and a collection of artifacts generated by occurrences in the daily life of the classroom. Data from the classroom observations organized in the form of descriptive notes along with details from the transcribed interviews were incorporated into the major discussions of the findings. The artifacts were also detailed in descriptive notes and served to substantiate the findings.

Research question 1, what kinds of interactions happen when a teacher purposely constructs an environment using technology in a first grade classroom, was informed by an analysis of the data. First, a thick, rich description was drawn detailing the classroom architecture, the organization of classroom space to support learning, technology in the classroom, and orderliness in the classroom. Within this teacher created environment
three kinds of interactions emerged from the analysis of the data. Each of these interactions, including interactions with print, with real world and authentic activities, and with technology was defined for purposes of the discussion. The learning space in which the interaction occurred was also noted leading to the realization that the majority of learning activities within this teacher created environment took place on the carpet or in other social settings such as the computer worktables. Examples which detailed each type of interaction were offered to further describe the interaction.

Research question 2, how do students use these interactions to make meaning, was also detailed in the analysis of the data that focused upon three major ways through which the students made meaning within these interactions. The three major ways, through a social community, through experience based inquiry and interpretation, and through multiliteracies were defined according to their purposes in this study. They were also described through examples within each of the interactions. The analysis of the data enabled the researcher to tell the story of the classroom as students interacted with print, with real world activities, and with technology through social community, through student interpretation of experience based inquiry, and through multiliteracies.
CHAPTER V
CONCLUSIONS AND IMPLICATIONS

Introduction: Summary of Study

This investigation into first grade meaning making in a technologically rich classroom environment explored the ramifications of technology on the literacy learning of first grade students in an urban setting. Currently few in-depth research studies have examined meaning making in a technologically rich classroom setting, especially with early literacy learners.

Bruner (1960) noted that “each generation gives new form to the aspiration that shapes education in its time . . . [deliberating] “what shall we teach and to what end ” (p. 1). He considered that those aspirations are shaped by culture and the quest for meaning within culture (Bruner, 1990). Gee (1999) believed the material world in which we live assumes certain meanings based on what he termed “Discourse.” According to Gee, it is through Discourse that humans

integrate language with non language stuff, such as different ways of thinking, acting, valuing . . . and using symbols, tools and objectives in the right places and at the right times . . . to make . . . meaningful connections in our experience, and privilege certain symbols systems and ways of knowing over others. (p. 13)

Over the past 50 years, the literacy community has investigated issues central to the meaning making process, including whether meaning resides solely in the text or in a transactional relationship between the text, reader, and the context (Rosenblatt, 2005).
All literate experiences “call us to generate and communicate meanings and to invite others to make meaning from our texts in turn” (Knobel & Lankshear, 2007, p. 4). While the text carries potential meaning, that meaning is only “actualized through interaction with the text by its recipients” (Knobel & Lankshear, 2007, p. 4). Today, this relationship between text, reader, and context has been further impacted by new technologies, resulting in the evolution of what are being called the “new literacies” (Coiro et al., 2008).

Even though technology is becoming a more potent force in the lives of students, there are few research findings that speak to the young learner at the nexus of literacy development between emergent and conventional literacy. The purpose of this study was to describe literacy behaviors of students in a first grade technologically rich classroom environment, by documenting student behaviors as they engaged and interacted with a range of literacy activities. Ultimately, the study sought to investigate how students used these opportunities to make meaning. The results of this study are based upon data gathered in investigation of the following research questions that guided the study:

1. What kinds of interaction happen when a teacher purposely constructs an environment using technology in a first grade classroom?

2. How do students use these interactions to make meaning?

This study focused on providing a rich description of the kinds of interactions that happen in a technologically rich environment by investigating how these interactions are used to make meaning. The research questions were analyzed through a qualitative single case study methodology (Yin, 2003). Data collection included classroom observations, interviews, student artifacts, and pertinent classroom documents. The
analysis of the data began with an *a priori* code structure derived from a review of the research literature. It evolved through a reiterative reading of the data from which themes emerged and told the story of the research and ultimately gave it meaning.

**Conclusions**

Within this classroom environment, three types of interactions were found. These included interactions with 1) the print environment, 2) the “real-world” environment, and 3) the technology environment. Through these opportunities students were found to make meaning in three ways; specifically through 1) social construction, 2) experience-based inquiry and interpretation, and 3) encounters with multiliteracies. Throughout the study, these three types of interactions and ways of meaning making were rarely seen as distinct, or individuated from one another; on the contrary they were often witnessed working in confluence. Furthermore, analysis of the data revealed that all three types of interactions included two pervasive features: 1) opportunities for social collaboration and 2) the incorporation of multiliteracies

*Social Collaboration*

Embedded in each of the three types of interactions were opportunities for social collaboration. More often than not, students gained meaning in a social group rather than in isolation. For example, students demonstrated social collaboration leading to meaning when they presented the “scary” poem for the month for October. The class seemed to inhale and exhale as one as their recitation asked the audience to imagine going deep into a dark, dark woods, then into a dark, dark home, then deeper to a room, deeper yet into a closet, and ultimately to open a box which was culminated by a communal “BOO!” and
quickly followed by group laughter at their cleverness (Descriptive notes 10_17). Together the members of the class had socially constructed the meaning of fright in the poem by ending their recitation with an explosive communal BOO.

This finding was consistent with abundant and longstanding research about the pivotal role of social collaboration in meaning making (Bruner, 1990; Holdaway, 1979; Labbo, 1996; Smith, 2004; Vygotsky, 1978). Goodman (1984) noted that literacy is learning “how to mean, but Gee (2004) points out that this process is altered by our social group. Moreover often meanings are deepened in a social setting (Vygotsky, 1978).

Opportunities for social collaboration abounded in the Dream Factory classroom and were enhanced by the classroom architecture. Students entered the room as individuals to hang up their coats, but the cubby was the only individually designated student space in the room. Students were grouped at tables, not isolated in individual desks. On each table there was a shared area for student supplies, while a bin on the floor hosted the books and notebooks for the table. The placement of workspaces and computers was a unique aspect of this classroom, one which promoted social collaboration. There was an IMac desktop computer, keyboard, and mouse at the end of each worktable placed against the wall. The students used these cooperatively as the teacher explained:

some of the activities we do in our classroom directly relate to being able to work as a cooperative team. To accomplish your goal . . . you need a computer in front of the team instead of computers being at the back of the room. (TI1)

The teacher also purposefully structured additional spaces for social collaboration. In fact, the majority of classroom interactions took place in the large communal carpeted
space; the desks framed the walls. The teacher explained the significance of this variation in classroom architecture, noting that “instead of computers being at the back of the room, and everybody in rows, my room is basically open in the middle which has a big carpet on it” (TI1). The carpet was divided into individual student seating areas consisting of large squares outlined in permanent marker and was an ideal environment for facilitating social collaboration among students.

Although early criticism of including technology in the classroom cautioned that it would be isolating (Griffith, 1997), a decade of research across student age ranges has found social collaboration to be a defining characteristic of incorporating technology in the classroom (Carroll, 2004; Kist, 2005; Knoble & Lankshear, 2007; Labbo 1996). Results of this study provide further evidence of the presence of social collaboration as integral to technology use.

Moreover, previous research noted that social collaboration fosters classroom talk, and there was considerable purposeful classroom talk in this setting (McIntyre, E., Kyle, D. & Moore, G., 2006; Owocki, G., & Goodman, Y., 2002; Short et al., 1996; Sipe, L., 2000). Students conferred with other students, using them as scaffolding peers. Students also engaged in discussions with the entire class or small groups as they worked as a computer team. Sometimes students would even talk to themselves, sounding out the correct spelling or working through math problems. Since only one student at a time was allowed to operate the computer mouse, other students often shared ideas about a possible answer or activity to pursue. As Oswald (1999) suggested, “classroom talk should not only be allowed, it should be promoted” (p. 163). Results of this study corroborate this view, as the classroom talk was an important venue for meaning making.
Indeed a growing body of research has studied the classroom as an environment “for face-to-face pupil interaction in a computer based activity” (Cochran-Smith, 1991; Merchant, 2008). A significant body of research has also explored talk as an avenue for thinking in collaborative computer based activities (Labbo, 1996; Labbo & Kuhn, 1998; Mercer, Fernandez, Dawes, Wegerif, & Sams, 2004; Vaas, 2002).

Furthermore, social collaboration and talk are integrally connected to the concept of audience. As noted by Moffett (1968), audience is important to discourse of all kinds because feedback and response impact the way human beings learn to do things with their mind and body. Therefore, lack of response can be one cause of failure, and feedback points out what learners cannot see for themselves. Students in this classroom had a variety of audiences. As they worked together, students proved to be good listeners for fellow classmates. The class as a whole often traveled the halls to perform for secretaries, the nurse or the principal. Other classes were ready audiences. The fifth grade “buddy readers,” for example, would often be enlisted. Additionally, the local library was familiar with the class website and helped parents and community members to access it and become a community audience for the students in the Dream Factory. Finally, the class website was viewed by Internet users from around the world. Some members of this virtual audience responded to the class’s invitation to share thoughts on the website. During all these experiences, students appeared to enjoy performing for their audiences. They took rehearsals seriously and delighted in their accomplishment as performers, at times laughing (Descriptive notes 10_17).

Other features of the classroom environment also created an atmosphere for social collaboration. Students in the Dream Factory, for example, did not have individual
desks. Likewise, there was not a teacher’s desk in the classroom. Papers were stored on a large table under the window, while instruction occurred in many spaces throughout the room. At times, the teacher was at the computer at the front of the room or standing near the Smartboard with a wireless keyboard. This keyboard permitted him to move to all sides of the carpet while presenting a lesson, a feature he used on a daily basis. In this way, the front row of the class was continually changing and the teacher was able to interact closely with all the students in the room.

*Multiliteracies*

Multiliteracies (New London Group, 1996) or multimodal social semiotics (Stein, 2008) supported meaning making throughout the classroom day. In this study, the concept of multiliteracies reflects the summation of Kist (2005) who asserted that “students should be able to both read [in the broadest sense of the word] critically and write functionally, no matter what the medium” (p.11).

Spelling words were transformed with sound and movement, math problems were augmented with graphics and kinesthetic activities, phonemic awareness instruction was enhanced by a computer with sound, graphics, and movement. Stories (whether math story problems or fictional writings) were dramatized. The teacher understood that he had students who learned in different ways in the classroom . . . noting that many of them learned by moving.

I see in my classroom, that education is very different for every one of the students that’s taking in or experiencing maybe the same type of lesson that’s being done. My students learn best by moving as they’re learning. Other students learn best by just closing their eyes and listening. Others need to have something very visual popping in front of them for it to hook into their minds. (T11)
According to Cope and Kalantzis (2000), traditional literacy is typically “centered on language only and usually on a singular national form of language . . . being conceived as a stable system based on rules . . . that we can actually discern and describe correct usage” (p. 5). By contrast, multiliteracies are concerned with concepts “much broader than language alone” (p. 3). Written language is only one part of the visual, audio, and spatial communication of meaning (Gunther & Kress, 2003; Kist, 2005; Lankshear & Knobel, 2004; Richards & McKenna, 2003). Kist (2005) reminded us that multiliteracies present us with a “plethora of communication media” (p.12). Meanwhile, Gee (2004) emphasized that “meaning is not about definition; it is about simulation of experience” (p.51).

Students in the Dream Factory engaged in encounters with multiliteracies which often were generated through multimodal activities. Engagement with the “popcorn poem” is one example of how multiple literacies were embedded into class experiences. The poem was found at the end of a story in the basal reading book. Students began by reading the poem. Subsequently, the poem was memorized and became one of their “poems of the month.” Students selected music to accompany their recitation of the poem and finally created their own choreography for the poem.

Lemke (1998) asserted the importance of understanding “how various literacies and various cultural traditions combine these different semiotic modalities to make meanings that are more than the sum of what each could mean separately” (p. 288). As demonstrated through the “popcorn poem” example, findings of this study underscore the relevance of Lemke’s theory. Although the data from this study did not provide evidence of cultural tradition in this activity, there is evidence of “different semiotic modalities”
(Stein, 2008) that demonstrate the concept of multiliteracies. For example, the young meaning makers began by using their visual literacy to read (decode) the written language of the poem. After memorization, they selected appropriate music by using their audio literacy. And finally, they employed their gestural and spatial literacies as they imitated the “popping” of the corn through dance.

Technology and the New Literacies

At times, the role of technology in the classroom may simply be functional or mechanical. These situations occur in classrooms when technology is just enlisted to digitize traditional texts. Marlowe and Page (2005) articulated the view of others who view this practice skeptically when they note, “If you use technology to do the same things you were doing in a traditional format . . . why bother?” (p. 104). Although technology is present, such learning activities do not support what are called the “new literacies.”

This perspective is best explained by Knobel and Lankshear’s (2007) dichotomous definition of the term “new literacies.” They conceptualize the new literacies as comprising both the new “technical stuff” (p. 7), and the new “ethos stuff” (p. 9). These terms will heretofore be designated as “technical” and “ethos” respectively. Although most often found working synergistically, Knobel and Lankshear postulated that the “technical” and the “ethos” may appear individually. At such times, they specified that the “technical” in isolation would not qualify as representative of the new literacies, while the “ethos” would qualify as such.

In this study, the application of technology as a tool for learning was woven throughout all types of interactions and occurred throughout the school day. Digitized
text displayed on the Smartboard was malleable as the teacher changed size and configurations for student viewing. Interestingly, one student had undiagnosed sight problems early in the year and often had the teacher enlarge the print for him. Text could also be shown in color as well as change color during the lessons. Instruction could be created outside of the classroom and uploaded from a memory storage key; inversely, student work could be downloaded and stored for further review, assessment, or sharing with the community. Technology served the “technical” in these examples when it was simply manipulation of text, image, or data. When it privileged participation, sharing and experimentation the new “ethos” emerged.

From a broader perspective, neither these applications of technology nor the “ethos” of the new literacies are new to education, but rather have long served as the foundation for sound pedagogy. Indeed, conclusions of this study spotlighting the pervasive presence of social collaboration and encounters with multiliteracies are earmarks of both effective pedagogy as well as the new literacies. Educators should take heart that these familiar and sound educational practices will anchor their investigations into the new literacies as they have anchored effective classrooms for many years.

Smartboard technology interfaced with the teacher’s laptop computer. Therefore, sound and movement could be connected to presentations and the Internet, including Google. Google Earth was used to visit the Golden Gate Bridge while Google was also accessed to test the weather before going out for recess. This practice connected to both the new “technical” and the new “ethos” supported the findings of Bruce and Bishop (2008) who suggested that “through interactive software, they [students] can engage in
simulated investigations that would be too expensive, dangerous, or lengthy to pursue in other ways” (p. 715).

The students were active users of the technology in the classroom. The Smartboard was interactive and permitted the students to “write” on the screen, move objects, and discover hidden objects which were common practices during morning message and math activities. Students used desktop computers while they “played” phonemic awareness games. They also composed using the word processor Alpha Smart 3000. Taken together, these results support research on the impact of technology in the classroom. Students used all their resources to make meaning, including color and meaning-bearing icons (Leu et al., 2004), dynamic social interaction while playing with signs and symbols in a digital environment (Labbo, 1996), collaborative authorship (Reinking, 1998), the combination of text, pictures, images and sound (Carroll, 2004), engaging technology-based thinking activities (Jonassen, Peck, & Wilson, 1999), and multiple sign systems (Karchmer et al., 2003).

Students enjoyed these capabilities of technology as a valuable tool in the classroom; undeniably technology was a pervasive and integral aspect of this classroom context. The teacher confirmed his concept of the technology as a tool in support of the literacy curriculum.

When I think of technology in my classroom, I think of it about the same way that I think of paper and pencil, a book, an audio tape. Using the technology is basically the same, just another tool in the classroom. I believe many of the students see it as just another tool in the classroom. Not that everybody in the building has Smart Boards, but for them, a Smart Board is just a tool in the classroom we use. They don’t go wow, except for maybe when you turn it on for the first time. (TI1)
Yetta Goodman underscored this view of technology as a tool. During an interview she commented, “we’ve got to bring in the IPods and the EPods and all the new things that are coming up every day . . . those are important, but they’re tools. They’re like a pencil” (YGI).

Technology was also used in a social context where students worked collaboratively. While engaged in a simple phonemic awareness software program, for example, a team of students sat around their table’s computer and worked on which vowel should be imported into a word to match the graphic. Word choice was followed by computer reading of the word and if the correct word was selected, the computer played a catchy tune. Instructionally, if this exercise was not conducted with a team of students or did not have the multiliteracies of graphics, movement, and sound, it would be nothing more than a digitized worksheet. The teacher had, however, used technology (“technical”) in combination with the collaboration (ethos”) in support of the new literacies (Knobel & Lankshear, 2007).

Moreover, the teacher generally used technology in a collaborative fashion. Students directed their exploration of the Golden Gate Bridge and deliberated which of the class photographer’s snapshots should be uploaded to their website. There were additional elements of the new “ethos” apparent in the classroom context. The class was a place for experimentation, creativity, and innovation. Although at times the new “ethos” was combined with technology, there were other instances when there was only evidence of the new “ethos.” This is exemplified as the students collaborated to create meaning through multiliteracies while they dramatized the librarian’s tale.
In fact, one important insight resulting from this study is the awareness that the role of technology and the presence of new literacies may not be, as often assumed, interdependent entities. In this classroom, they were sometimes distinct and even separate entities. Although not witnessed in this study, but noted in the research, the new “technical” can be used merely to digitize worksheets (Knobel & Lankshear, 2007). Conversely, this study did find evidence of the new “ethos” as exemplified by experimentation, collaboration, and creativity displayed even in the absence of technology. This result is in support of Knobel and Lankshear (2007) who suggested that the new literacies can be present with only the new “ethos” stuff, even though it is most often found supported by technology. On the other hand, the results were not totally consistent with the conception of the new literacies offered by Leu et al., (2004):

The new literacies of the Internet and the other ICTs include the skills, strategies, and dispositions necessary to successfully use and adapt to the rapidly changing information and communication technologies and contexts that continuously emerge in our world and influence all areas of our personal and professional lives. The new literacies allow us to use the Internet and other ICTs to identify important questions, locate information, critically evaluate the usefulness of that information, synthesize information to answer those questions, and then communicate the answers to others. (p. 11)

This discrepancy may be emblematic of the dissonance experienced throughout the field of the new literacies as it seeks a definition. This insight is central to analyzing the role of technology in this technologically rich classroom environment.

In establishing a “context for research in the new literacies,” Coiro et al. (2008) outline four characteristics which they view as comprising an “emerging new literacies perspective.” First, there is a need for new visions surrounding “new potentials” for literacy tasks that take place within technologies. Second, there is a realization that the new literacies should fulfill their democratic potential by attempting to bring instructional
equity to the classroom. Third, the new literacies must be cognizant of the deictic and transactional relationship they enjoy with ever evolving technologies. Fourth, there is the understanding that the new literacies are multiple, multimodal and multifaceted; consequently, research in the new literacies would profit by multiple points of view” (p. 14).

These evolving potentials of technology were used in the classroom for student learning. Technology was integrated throughout the instructional context and used by the entire class rather than an “add–on” activity with availability for only a select group of students. The teacher’s vision continually attempted to bridge the digital divide, however, apart from the grant funded Smartboard, the technology was old. During the second interview, the teacher addressed the third criteria of the definition, i.e., the deictic nature of technology and the new literacies. He noted that he spent one hour each evening trolling for new approaches to literacy through technology. Finally, referencing the fourth and final aspect of the new literacies, the class engaged in literacies that were “multiple, multimodal, and multifaceted. By providing incipient evidence of the four aspects of this emerging definition of the new literacies, results of this study may contribute to new literacies research by illustrating the ways of meaning making employed in a first grade new literacies environment.

Meaning Making in the New Literacies

The foundation of this study is grounded in the constructivist approach to meaning making. Piaget (1985) understood that learners address discrepant events by seeking equilibrium through assimilation of the information into their existing knowledge repertoire or accommodating to include the new information. Subsequently, Vygotsky
(1997) realized the importance of the social setting in this quest for equilibrium; specifically, the importance of the scaffolding offered to the learner’s spontaneous concepts through the scientific concepts of others. Both of these early constructivists’ visions provided a conceptual foundation for the sociopsycholinguistic framework of this study which reinforces the position of the learners as active meaning makers. Indeed, Holdaway (1979) summarized this state as “short on teaching and long on learning . . . self regulated rather than adult regulated” (p.14).

In this study, examples of meaning making while employing the “ethos” of the new literacies were seen in the classroom as students engaged collaboratively in multiliterate activities. Students collaborated to dramatize poems and mathematic story problems. Meaning making was evident through the expressive presentations of these monthly poems or through computations based on the dramatized math problems.

Additionally, this study, considering the work of Leu et al. (2004), understood the unique potential of digital technology as the first amalgamated classroom tool using the digital computer with auxiliaries such as the Smartboard display tool. Incorporating that which can only be done by technology, specifically the compression of time and space, the findings from this study support the construction of meaning through social collaboration and multiliteracies in the new literacies. Space and time were compressed through Google Earth as the students digitally traveled across the country to view the Golden Gate Bridge. Students used both spatial and visual literacies as they collaborated to lead their explorations and discuss their individual understandings, thus making meaning in the social context of experiencing the San Francisco Bay. These meanings were enhanced as students discovered notes left on the bridge by individuals who had
shared their photographs of the bridge. Through the unique capabilities of technology, students had forged meanings that persisted and were accessed in future discussions of oceans, bridges, and uses for *Google Earth*.

Digital technology was employed to compress time and permit meaning making through multiliteracies and social collaboration. Students engaged collaboratively with phomemic awareness software to select the appropriate vowel matching a graphic. As the correct combination was dragged and dropped into place, the resulting word was read digitally and a catchy tune was played. Working together students collaborated to make the correct selection and were immediately rewarded by hearing the reading of the correct word, seeing the graphic and enjoying the rewarding tune. Meaning making was evident as students gave arm signs signifying success, offered cheers for their team, and exclaimed that they “did it!”

A real world example exposed the everyday use of technology. One day as the students prepared for recess, they questioned if they should wear their jackets. The teacher went to the computer and projected the weather map on the Smartboard. Students examined the weather forecasted during recess and collaboratively decided that jackets were in order. Meaning making was forged through the joint discussion and the ability to “read” the literacy of the weather map to come to a meaningful decision.

Students were also shown visitors to their class websites as they viewed a worldwide representation of their audience. The students were impressed and reacted with amazement. It was certain that the ramifications of their expanded audience held meaning for the students as they carefully selected photographs to post to their web pages. Indeed, technology altered two of the three transactional elements proposed by
Rosenblatt (2005). Text was expanded to include multiliteracies authored by writers from around the globe and the context for meaning making was enlarged to include the entire world.

Implications

The research questions that guided this study emerged from one researcher’s interest in understanding the potential of technology to enhance meaning making for the young learner. As a consequence of this effort, the researcher hoped to identify how technology might serve as an agent of positive change in primary classrooms. In the process of examining the role of technology, this study recognized the potential impact of a technologically-sensitive instructional environment on students’ meaning-making through multiple or “new” literacies.

To date, a fledgling body of research has investigated the new literacies and monitored its evolution, particularly its attempts to define itself. Results of this study of a “Dream Factory” classroom suggest that a curriculum that actively incorporates the new literacies may provide a powerful framework for classroom instruction. Hopefully, such a framework might encourage classroom teachers to incorporate the new literacies into their classrooms as a scaffold for the meaning-making efforts of young learners.

Implications for Classroom Practice

An important implication of this study is the need to recognize the importance of organizing classroom spaces in a way that promotes social collaboration, particularly around technology. Social areas such as those for reading and morning meeting might be expanded to include access to technologies that support the new literacies. Finally, the students’ desks should not be a central architectural feature. Rather a common area for
social collaboration should anchor the classroom much as the public square anchors
villages with the homes surrounding the social space.

Currently, many classrooms place the desks in the center of the room with a
reading or sharing circle in a designated area, usually near the board. The computers are
often found on desks lined against one wall, often at the back of the room. Computers
should be integrated into classrooms to aid teams of students in their inquiry. Tables may
be substituted for desks while student supplies can be minimized and stored on top of
tables with notebooks and books organized for each table. Large communal space such
as in the Dream Factory designated by a large carpet can be very effective in connection
with Smartboard technology. Additionally, the absence of a teacher’s desk,
architecturally suggested a more democratic classroom with the teacher in the role of a
facilitator. This practice is consistent with Taberski’s (2000) recollection:

Perhaps my classroom’s most telling feature is the absence of a teacher’s desk. I
had one years ago and found it took up too much space and conveyed an
unfortunate, though unintended, message about how I viewed the children’s and
my role. Young children in my classroom who naturally equate size with worth
(often thinking that taller people are older than shorter people and that larger
coins are more valuable than smaller ones) may have mistakenly thought that my
giant-sized desk, compared with their smaller workspace, reflected the relative
importance of their place in the classroom. And think of the valuable space it
actually took up. (p. 19)

Another implication of this study, supporting the findings both of social
collaboration and multiliteracies, was a pervasive atmosphere of respect for students
which permeated the classroom. Students were consistently referred to as “ladies and
gentleman.” Two classroom posters reinforced the mission encouraging students to be
“Respectful, responsible, and ready to learn,” and were often referenced by both teacher
and student alike. This classroom context is consistent with the concept of a community
of learners. In such collaboration, teacher and students alike are active and sharing learners (Short, 1990).

A final, major implication for classroom pedagogy was the power of inquiry and exploration through a new literacies framework, using technology. In this classroom, activities were constructed to allow for student choice as they grappled with meaning-making experiences. The teacher also engaged students in inquiry; often instruction was challenging without one right answer. Concerning the connection of student engagement and inquiry, Short, Harste, and Burke (1996) reminded us that:

[the ]stuff of real literacy. [As they] mediate the world . . . to create sign systems-mathematics, art, music, dance, language-that stand between the world as it is and the world as we perceive it. These sign systems act as lenses that permit us to better understand ourselves and our world. (p. 14)

Certainly, results of this study were a dramatic reminder that children are curious by nature. They are natural questioners and maneuver their environment to answer these questions. Children construct knowledge as they manipulate their environment while confronting discrepant events. They question, observe, discover, and hypothesize their way to new meanings through inquiry (Short et al., 1996). Classroom teachers need to be mindful that spaces for each of these activities should be available in the classroom context.

Listening to the classroom construct meaning about the beaver through student questioning was a powerful model of student-led inquiry. Research suggests that teachers may ask as many as 80 questions during one hour while students are responsible for only two questions per hour (Dillon, 1982, 1988). If we value a future generation engaged with inquiry, prepared to search out the answers to tomorrow’s questions, we must first fashion a generation prepared to question rather than only answer.
Implication for Teacher Education

Speaking of his classroom, the teacher in this study noted that classroom teachers are the gatekeepers opening the door for their students to engage in the new literacies, although the author of the study recognizes that teachers are not the only vehicle through which students are engaged in the new literacies. Teachers’ decisions, however, are crucial to the classroom environment. Karchmer (2008) detailed that, according to the National Council for Accreditation of Teacher Education (1997) and the White House Panel on Educational Technology (1997), “it will be mandatory that teachers integrate this new resource [technology] with daily instruction so students can learn how to [engage with] the new literacies” (p. 1249). Additionally, Cuban (2001) detailed that despite the professed importance of information technologies, computers are not currently an integral of the daily classroom instruction.

Teacher education should heed this need as it prepares tomorrow’s classroom teachers. Often preservice teachers view courses in educational technology as irrelevant to their preparation for teaching (Balli, Wright, & Foster, 1997). In fact, research suggests that preservice teachers are primarily influenced by their recollections of their childhood classrooms where technology was not central to the learning process (Calderhead & Robson, 1991). Indeed, university courses in educational technology often focus on the teacher’s use of technology for instruction, rather than the young student’s use of technology for meaning making (Becker, 1991). An important implication of this study, therefore, is the need to realign teacher education to support the daily integration of technology. University coursework should model the new literacies
through their instructional practices; additionally, preservice teachers should actively engage with the new “technical” and the new “ethos” during their course of study.

*Implications for Professional Development*

The teacher in this study noted how important it was for a teacher, as gatekeeper, to continually investigate the new literacies and stay current about the possibilities that technology could offer a classroom (TII2).

One implication of this study is the critical importance of effective professional development in the new literacies. According to Yelland (2007), this goal is perhaps more complicated knowing that the frame of reference for teachers is divergent than that of their students: “Today, our students are among an entire generations of digital natives, also known as The Millenials, who have never known a world without the computer” (p. 3). Unlike these digital natives and diverging from their Millenial framework, most classroom educators are immigrants to technology and therefore come to the study of the new literacies from a much different perspective.

Recent research investigated whether there is a likely profile of teachers who might be committed to the integration of technology for the acquisition of literacy skills (Still & Gordon, 2009). The findings suggest that those teachers most likely to integrate technology with literacy are more likely to be highly skilled in their uses of the technological tools available to them. One implication of this study is that professional development designed to promote proficiency in the new literacies must be devised for the appropriate teacher profile.

These same researchers questioned where classroom teachers might gain the professional development to alter their profile and increase their ability to integrate
technology with literacy in the early childhood classroom. They looked first to the research literature while investigating how the growing trend of integrating technology into the early childhood literacy curriculum (K-3) has been reflected in the classroom-based research literature during the time frame between January 2000 and March 2006. The review of the research literature demonstrated a lack of research that spoke to the integration of technology in the literacy curriculum within the early childhood classroom (Gordon & Still, 2008). Results of this study underscore the urgent need for effective sources of professional development.

According to Joyce and Showers (1988), fewer than 10% of teachers attending professional development on technology actually implement new ideas learned in traditional workshop settings. Noting this finding, Coiro (2005) pondered ways to “empower teachers as literacy leaders . . . [while] listening to teachers’ concerns . . . and [reminding]them that effective change with new technologies is a slow and thoughtful process requiring long-term commitment and support” (p. 210). Coiro envisioned professional development as site-based and developmental. She emphasized that the process needed to evolve from the individual educator’s starting point while acknowledging the educator’s inclination toward technology use.

Indeed, effective professional development in the new literacies would benefit from each of these attributes; moreover, the professional development might particularly focus on developmental level and connect educators at similar levels through virtual sites. The new technologies such as the growing use of blogs for sharing and communicating innovative approaches to the integration of literacy and technology may prove the most
fruitful professional development environment for encouraging attention to the new literacies.

**Implications Beyond the Classroom**

Implications of this study suggest that effective use of technology and the new literacies require that students’ interactions with technology extend beyond the classroom to include the broader school community. The classroom in this study had a strong connection with the local library where their class website was a known entity. In this urban setting, students, among other visitors to the library, were guided to the website by the librarians. Classroom families who did not have home computers were able to access classroom activities during library visits. This was a common practice as many students related that they read and “played” on the class website while at the library (SI1). As students viewed their work and interfaced with their community and global audiences, they realized that “websites can help people see their current ideas in a new light and encourage the creation and expression of new ones” (Bruce & Bishop, 2008, p. 715).

In addition, the librarian made classroom visits as a guest storyteller. The library had initiated a program through which they recorded student stories while they were in kindergarten. The stories were shared with the students while in first grade and used as text for dramatic interpretation. Research should continue to develop innovative approaches through which the local libraries can support the new literacies.

Implications resulting from this study highlighted the need for appropriate hardware and software to support a technologically rich environment in the classroom. Although this classroom teacher gained much of the classroom technology through grants or by learning of free software programs, many school systems are faced with the need to...
update hardware and software. As Merchant (2008) explained, there are many issues dealing with developmentally appropriate hardware and software. In the debate, some advocate for simplified and age appropriate hardware such as keyboards and word processors; while others suggest a “staged introduction to the tools that they [students] will be using later in life” (p. 767). Moreover, if school systems need to enter the debate beyond hardware and software, this study stands in strong support that the former concept of a staged introduction to technology in general should be reevaluated. Certainly, our young literacy learners are comfortable working with technology early in their lives. Officials who are gatekeepers must open the gates to the natural learning connection between our youngest learners and technology.

School districts have also been held accountable for students’ literacy development, most especially reading and writing scores. Across the board these accountability measures are designed for traditional literacy activities. Similarly, reading comprehension skills are viewed as identical to skills required for online reading comprehension, even though research has shown them to be distinctive (Coiro, 2007; Leu et al., 2005). Coiro et al. (2008) summarize the crisis regretting that:

Unfortunately, the pervasive power of an assessment that measures only traditional print literacies profoundly determines what is taught during reading instruction, especially within schools that are under the greatest pressure to raise test scores. This has resulted in denying online reading experiences to students in the most economically challenged school districts. (p. 8)

One potential implication of this study is that as the use of technology and the new literacies become commonplace in American classrooms, assessments must be designed to better reflect the role of new literacies in children’s meaning making activities. These children posed questions and investigated them through multiple
pathways that involved real experiences and simulated experiences facilitated by technology. They were taught traditional phonics lessons by using technology in a social context. Traditional assessments do not adequately capture meaning making from this perspective.

The final implication of this course of action is to exacerbate the digital divide. Specifically, poor urban and rural schools with the least funding often are pressured to achieve adequate yearly progress on the traditional literacy tasks specified in the No Child Left Behind legislation. In order to achieve better scores, they focus on skills that are tested, abandoning any thoughts of online learning or multiliteracies.

Inversely, more affluent schools are less challenged by the assessments and are free to include technology into the school day for students who also have greater access to digital learning in their home environments. Thereby resulting in “the cruelest irony of this public policy . . . [in that] students who need to be prepared the most at school for an online age of information, those who may not have Internet access at home, are precisely those who are being prepared the least” (Coiro et al., 2008, p. 9).

**Implications for Future Research**

The study explored the interactions in which first grade students engaged while making meaning in a technologically rich environment. This study was exploratory in nature. It offers insights into the integration of technology into the literacy curriculum in the early childhood classroom that need to be further investigated by subsequent research. Thoughtful research is needed that speaks to the 21st century classroom and the active learners for whom innovative teachers are constructing the technologically rich learning
environments. Furthermore, much information is still needed to understand the impact of the new literacies and the role of technology on today’s young learners.

Future research may find a starting point by testing the categories and conclusions of this study with different participants and settings. In particular, additional studies should examine how children make meaning in other primary grade classrooms in which the teacher has deliberately privileged technology in instructional activities, particularly for literacy development. Specifically, these factors should be studied not only in other urban settings but also in diverse sociocultural and socioeconomic settings. Moreover, in this study the teacher play a critical role in designing and implementing a technologically rich instructional context. Additional studies that focus primarily on teachers, male and female, in diverse settings are also needed.

Although not a finding of this study, there was the possibility of a gender difference as male and female students engaged in the technology rich environment. Classroom observations noted a propensity for male students to use technology and a level of comfort while employing it for meaning making. This is an inviting area for further research which has recently appeared in the literature.

From a broader perspective the purposing of classroom spaces in a technologically rich setting should be a dynamic area for future research. These new classroom spaces need to be places for investigating the growing impact of social collaboration and the multiliteracies. Specifically, the use of the technologically rich environment to encourage social collaboration and multiliteracies should be studied in other cultural and socioeconomic settings. Additional studies are needed to focus on
students’ meaning making in an environment that fosters social collaboration and honors multiliteracies.

Finally, attention should be devoted to investigating and defining the new literacies as they are operationalized in the early childhood classroom. Findings of the new “technical” and the new “ethos” which emerged in this study need to be further researched in other settings, both cultural and socioeconomic to gain an understanding of their place in the early childhood classroom. Additionally, dispositions of the new literacies that lead to meaning making such as collaboration, communication, synthesis of information, and problem solving, are areas for future research, specifically as they speak to integration of technology for the young literacy learner.

Findings in this study suggested that the concept of multimodal meaning-making, or multiliteracies offered viable communication modes. As this understanding evolves, research should attempt to deepen our understanding of how to assess children with this expanded vision to include multiliteracies. As Kress (2001) explained:

Given that there is trade across modes, and given that the shape of knowledge is transformed in the shift from one mode to another . . . assessment authority may have a specific shape of the knowledge in mind for that particular aspect of the curriculum. In its transduction from one mode to another, say from image to writing, that shape changes. That shift, and the principles of transformation guiding it, may not be overtly recognized by the assessor. (p. 176)

In other words, research should investigate the possibility that the learning may not be “content specific” as assumed, but rather “mode specific” (Kress, 2001). Further, research should also consider the disconnect between the evidence of multimodal learning and assessment. Cope, Kalantzis, and Harvey (2003) determined that “standardized tests are constructed on a one size fits all basis and cannot measure the new basics . . . broad knowledgeability, flexibility, problem-solving abilities, and open
sensibilities” (p. 25). Research should be directed toward investigating accurate assessment to encourage these new skills which are integral to engaging in the 21st century landscape and fostering the new literacies.

Furthermore, research in professional development and teacher education should address the critical role of the teacher as a designer of learning contexts. Future studies should evaluate teacher education programs that immerse preservice teachers in the evolving issues of the new literacies. In addition, studies should look at the construct of “technical” and new “ethos” as it is understood and operationalized by new and veteran teachers. For example, classes should employ new technologies such as Smartboard while requiring preservice teachers to construct their lessons employing these new technologies. Research might also investigate the differences in beliefs and attitudes of preservice teachers involved in university classes which model the new “ethos” encouraging collaboration, multiliteracies, and inquiry through instructional practices. In the same vein, professional development should be addressed to construct a collegial model that is relevant to the new literacies. Through site-based, whether actual or virtual, professional educators and preservice teachers should be immersed in an atmosphere that fosters social collaboration. Moreover, the multiliteracies embedded in technology should be explored as a viable mode of communicating meaning.

Based on the important role of the classroom teacher in this study, future research should examine the position of the classroom educator as an inquirer when incorporating technology as an integral part of classroom instruction. Such research might examine the effectiveness of professional development and action research initiatives between universities and local schools. Professional development should focus on the importance
of social interaction and building meaningful relationships through collegial collaboration around technology in order to grow communities of inquiry.

Throughout future research when “we speak about literacy we need to do so with the view of the world we hope to inhabit” (Bruce & Bishop, 2008, p. 735). We should value the teacher as the professional who orchestrates an environment within which the work of learning may happen. And finally, we should honor the young learner as an active meaning maker.

Summary

The findings of this study explored students’ meaning making in a technologically rich first grade environment. The environment which was purposely constructed by the teacher allowed space for social collaboration and multiliteracies to emerge as ways of meaning making across all types of interactions in the classroom. Students employed technology as a tool and engaged in the new literacies as a framework for their learning.

The new literacies emerged in this study as viable learning venues as students collaborated throughout interactions with print, real-world experiences, and technology. The unique classroom environment, architecturally anchored by a large communal space, offered opportunities for classroom talk and teamwork. Collaboration was also promoted through the unique placement of the computers at the end of each of the students’ worktables, allowing groups of four students to work at a computer cooperatively.

Multiliteracies were also privileged in the classroom as a way of making meaning. Students made sense through text, graphics, song, dance, art, and drama. They were active questioners and investigators. While constructing meaning they moved seamlessly
between interactions using print, authentic interactions, and technology throughout the
day.

This study details the interactions and meaning making of first grades students in
a technologically rich first grade environment. It acknowledges the power of the teacher
as a reflective practitioner to purposefully construct this environment. The teacher of the
Dream Factory suggested that teachers remain professionally current in creating
classroom contexts for learning. Once constructed the teacher should honor the student’s
natural sense of inquiry and ability to construct knowledge. The teacher is a gatekeeper
who needs to open the gate, facilitate student learning, and allow students to open their
wings and fly.
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