“IT SHOULDN’T BE THIS BIG EVENT”:

A CULTURAL HISTORICAL ACTIVITY THEORETICAL STUDY

OF TECHNOLOGY USE DURING ELEMENTARY LITERACY INSTRUCTION

by

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(Under the Direction of Jennifer M. Graff)

ABSTRACT

The purpose of this qualitative multi case study was to understand the relationships elementary teachers have with the technology they use as part of their literacy instruction as well as explore the combination of social and historical factors that may have contributed to a teachers' integration of technology in their literacy instruction. Using a Cultural Historical Activity Theory (CHAT) lens, data was collected in a 1:1 device district from two third grade teachers and from those who supported these teachers in using technology: the principal, media specialist, and instructional technology specialist (ITS). Findings indicated that there are contradictions hindering teachers from integrating technology within their literacy instruction. These findings have implications for elementary teachers, administrators, pre-service teacher educators, and for literacy researchers.

INDEX WORDS: Elementary Teachers, Literacy Instruction, Cultural Historical Activity Theory, Technology, Case Study

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DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2017

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May 2017

DEDICATION

To Matt, who cheered me on and made many sacrifices along this journey.

ACKNOWLEDGEMENTS

There are so many individuals I would like to thank for helping me to achieve my dream of earning a PhD. First, I would like to thank my dissertation committee members. Honestly, I consider the three of them to be the *Dream Team*. While I admit this journey was difficult, it would not have been as rich and as gratifying of an experience if it were not for them.

To Jennifer Graff: Thank you for spending numerous hours reading my work and for always challenging me and pushing me to do my best work. You are incredibly intuitive and I feel fortunate to have been under your guidance.

To Donna Alvermann: I appreciate your down to earth attitude. Thank you for always helping me to understand the counterargument and making me feel like my work is important.

To Silvia Noguerón-Liu: I have fond memories of first meeting you at Jittery Joes at Five Points. We were meeting to plan a class we had just learned we would be teaching together in a two days. I was terrified. I had just left the third grade classroom and wondered how I was even qualified to teach college students. You made me feel at ease and I have continued to be drawn to your energy and organization.

To Mom and Dad: Thank you for believing in me, cheering me on, and supporting me financially. You've made every dream of mine possible. I love you.

To Whitney: Thank you for encouraging me to "just get it done!"

To Henry and Hazel: Becoming an Auntie during this process is something I will never forget. I admit, I overshared your pictures. You both help remind me about what is most important in life. I look forward to seeing you both reach your goals and dreams.

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CHAPTER 1

INTRODUCTION

"The world we prepare our students for is not a fixed point; it is an ever-evolving, elusive target that only those capable of recreating themselves will be ready to endure. Kids will only learn this trait by seeing it modeled" (Alex Stubenbort, 2016, para. 5).

There are lots of bells and whistles with technology and as teachers we have been told that the EdTech tools of today need to be used to help students prepare for their tomorrows. For some teachers the call to use technology can be terrifying. From my own personal experience as an educator in an elementary and at the university level, I have witnessed competing paradigms of thought amongst teachers with proven low to non-tech practices that see technological advances as more of a nuisance than a benefit. For example, the idea of giving students an assessment via Google Forms could be seen as a benefit to some because the results go directly into a shareable spreadsheet, however, it could be seen as a nuisance for those who would rather use paper and pencil because of the fear of possibly losing the data or the thought of the time it may take to figure out how to create the assessment and then aggregate the data. Meanwhile, these same technological tools, such as Google Tools, are treated as incredible cure-alls by welcoming newbies casting eye-rolling stares towards their non-techie counterparts. Stubenbort (2017) affirms this unproductive binary and indicated that "both approaches are flawed in the misrepresentation of the purpose and scope of education technology" (para. 3). He believed that pedagogy should be at the heart of every lesson rather than the technology taking center stage; "EdTech is NOT a teaching panacea; it elevates instruction if and only if it's rooted in proven

pedagogy" (para. 7). Understanding technology for literacy instruction has been listed as one of the top five hot topics at the community and country levels (International Literacy Association, 2017), making this research ripe for the literacy community. Research is needed to help inform professional development in schools, learning for literacy teachers, and to guide conversations in teacher education programs about the relationship between technology and literacy. The first step is learning about the relationships the teachers in this study currently have with technology within their literacy instruction.

Statement of the Problem

According to the literature, there seems to be a discrepancy between what is meant by adequate "technology use" (Hutchison & Reinking, 2011; Russell et al, 2007) as alluded to above. Results from a national survey (Hutchison and Reinking 2011) of 1,441 literacy teachers from 31 different states, most elementary, middle, and high school teachers are using digital tools in literacy classrooms as "technology integration" rather than "curricular integration," meaning that digital tools are not fully integrated into the curriculum; technology is more of an add-on or a special event rather than a means to enhance content. In this national survey, these scholars found that the highest percentage of respondents reported using presentation tools (e.g., multimedia presentations, creating websites) for the majority of their "technology integration." Another example of "technology integration" opposed to "curricular integration," cited by Kist (2007) is that in some cases, districts only want the computers to be used for running several software programs designed for use with students who need remedial reading. With uses such as this, the technology is the focus and the teacher is not even required in the learning process. Stubenbort (2017) warns that "if we lose sight of the person in front of the device due to our

infatuation with the device itself, we will fail them emotionally, socially, and academically" (para. 8).

Using technology in a surface level way is not enough. The problem with this type of integration is that it's not doing much to enhance student learning of the curriculum (Staples, Pugach, & Humes, 2005) it lacks "learning experiences grounded in content-based technology examples" (Hughes, Kerr, & Ooms, 2005, p. 277). Further, as Harris, Mishra, and Koehler (2009) have indicated, technology should be used to support inquiry, collaboration, and reformed practice, rather than focusing on using presentation software or learner-friendly websites.

There is a call for more research in the literacy field on integrating digital tools into the classroom. Burnett (2009) specified that little research has been conducted investigating technology use in elementary classrooms. Agreeing, Hutchinson & Reinking (2011) indicated that "data has not been collected on a large scale to determine--from the standpoint of literacy teachers--the extent to which integration has occurred, what obstacles inhibit integration, how teachers conceptualize ICTs [information and communication technology] and so forth" (p. 313). From my current review of the literature there is still a need for this research.

Purpose of the Study

The purpose of this study was to understand the relationships elementary teachers have with the technology they use as part of their literacy instruction as well as explore the combination of social and historical factors that may have contributed to a teachers' integration of technology in their literacy instruction. For this qualitative case study, the overarching research questions were:

What are the relationships that exist between the two activity systems of (1) elementary teachers and (2) the school, in which these teachers teach in, who share the same objective of integrating technology in literacy instruction?

1. *What factors might be contributing to instructional contradictions of technology-infused literacy learning in the elementary classroom?*
2. *How are teachers' socio-historical experiences with technology informing their pedagogical applications of technology?*

Background of Study

To investigate these questions in this qualitative case study, I chose to conduct research at Live Oak Elementary (LOE), an elementary school known for its technology use within the community that I heard about from colleagues and through social media. I focused on three separate cases (or activity systems) which included: third grade teacher Erin's classroom, third grade teacher Hazel's classroom, and the school, which included the principal (Eve), the media specialist (Adam), and the Instructional Technology Specialist (ITS) (Abby). I observed both of these teachers in their classroom while also serving as a participant-observer within the study as I worked with small groups of students during each classroom's reading block. My interaction with Adam was through volunteering in the media center along with semi-structured interviews that I also conducted with Eve and Abby.

Overview of the Methods

The context in which teachers teach is an incredibly complex arena, filled with a myriad of details that make the context different for each teacher. Consequently, it could be possible that what was a contradiction for one teacher could motivate the other. When I read through the literature concerning elementary teachers and their use of technology, the context offered in each

of these studies was often only a paragraph's worth before the data collection methods were described. Mentioning the demographics of a school or the academic achievement level of the students in the class does not provide readers with enough information to truly understand the motivations for teachers' actions. I argue that without fully acknowledging the complex context of schools, we paint an incomplete picture of the stimuli for instructional decisions because context may be exacerbating that which we already know is difficult for elementary teachers.

In order to more accurately analyze the context and the actions resulting from the context, I used Cultural Historical Activity Theory (CHAT). CHAT is a framework that can allow a researcher to view teachers as components of a larger activity system, including the rules, tools, community, and division of labor. In this way, no teacher is seen as an isolate entity, but rather an actor in a very intricately interconnected activity system. Additionally, CHAT allows the researcher to examine contradictions, or ongoing tensions that may be present within and between components of the activity system. These contradictions may motivate teachers to promote the status quo despite the increasing tension, or to challenge the status quo to break the tension. To assist in the understanding of CHAT and its integration in my study, in the following section I will define key terms that will be discussed throughout the remaining chapters.

Definition of Terms

The following terms are organized in alphabetical order:

Activity System- An activity system is a bounded system related to the social environment in which object-oriented activities and goal-oriented activities are anchored with other related activities with similar objects (Gallimore & Tharp, 1990).

Community- "the mutual systemic relations between individuals and their social environments (Lecusay, Rossen, & Cole, 2007, p. 94).

Contradiction- "Contradictions are historically accumulating systemic tensions that cannot be observed directly. Only their manifestations, such as disturbances and conflicts, are observable in the daily flow of actions. That is why the examination of contradictions requires historical analysis. Hypotheses generated by historical analysis can then be tested and enriched with data on disturbances and conflicts experienced and articulated by practitioners" (Engeström, p. vii, 2016). Contradictions are seen as sources of development; activities are virtually always in the process of working through contradictions (Engeström (1987, 2001). "Contradictions of activity remain an extremely touchy issue" (Engeström, 2001, p.135).

Division of Labor- the ways in which a community is organized with respect to the transformation of object into outcome (Lecusay, Rossen, & Cole, 2007, p. 94) or in other words the specific responsibilities the community has to meet the object.

Mediating artifacts- Can include a tool or sign. A tool mediates an object oriented activity and a sign mediates social intercourse (e.g. linguistic signs) (Leiman, 1999). In this study, I will focus on tools, which are further defined as a material object that has been modified by human beings as a mean of regulating their interactions with the world and each other (Cole, 1999).

Object- is more than just a goal or product. "Objects are durable concerns and carriers of motives; they are generators and foci of attention, volition, effort, and meaning. Through their activities people constantly change and create new objects" (Engeström, p. xvi, 2016). An object is "what connects the individual actions to the collective activity" (Engeström, p. 31, 1999).

Outcome- The outcome of the system refers to the results of the activity (Ryder & Yamagata-Lynch, 2014).

Rules- norms and conventions, both implicit and explicit, that constrain interpersonal interactions within the activity system (Lecusay, Rossen, & Cole, 2007).

Subject- A member or members of the local activity through whose eyes and interpretations the activity is constructed (Engeström and Miettinen, 1999).

Technology Integration: the use of computing devices such as desktop computers, laptops, handheld computers, software, or Internet in K-12 schools for instructional purposes (Hew & Brush, 2007).

Tension- A tension is a pressure that subjects encounter while participating in an activity. These pressures can stimulate or interfere with the subjects' abilities to attain the object (Yamagata-Lynch, 2010).

Organization of the Dissertation

In the next chapter, I will present a literature review outlining Cultural Historical Activity Theory (CHAT), the research that has been conducted on elementary teachers' use of technology within classrooms, and how socio-historical experiences effect pedagogical applications to technology. Chapter 3 describes the theoretical framework that provides structure for this research, as well as the data collection and analysis methods undertaken. The findings for the first research question will be presented in Chapter 4 and in Chapter 5 findings for the second sub-question will be explored. The conclusions and implications for these findings are in Chapter 6, as are the directions for future research.

CHAPTER 2

REVIEW OF THE LITERATURE

The overarching purpose of this study was to better understand the relationships between elementary teachers and those within the school community who were responsible for supporting these teachers in integrating technology within literacy instruction. In addition, I wanted to examine the factors that may have been contributing to instructional contradictions to integrating technology, as well as, how the teachers' socio-historical experiences with technology may have been information their integration of technology within literacy instruction. I hoped to gain insight into how the teachers, who have been identified as one of the most significant factors associated with effective technology integration (Mandell, Sorge, & Russell, 2002) were integrating these tools in literacy with their elementary students. In this chapter, I will review the literature on how elementary teachers are using technology within their classrooms followed by the research examining how teachers are hindered from using technology in their classroom. In addition, the literature on how socio-historical experiences of teachers affect the application of technology within classrooms will be discussed. I will end with the lens which I chose to view this research, Cultural Historical Activity Theory (CHAT).

Elementary Teachers' Use of Technology in Classrooms

According to Tyack & Cuban (2000), there hasn't been any other educational revolution like the computer; it has been supported, criticized, and researched more than any other educational investment. However, just because there has been such a huge investment doesn't mean that all educational parties are in agreement of its use or even if it should be used at all.

Many scholars have argued that technology integration has been minimal, superficial and disheartening to say the least (Groff & Mouza, 2008; Hutchinson & Reinking, 2011). The differing opinions on using technology in schools, the tech mandates found within the Common Core State Standards (CCSS), followed by the specific ways teachers are integrating technology are discussed below.

Differing Opinions

An opponent of technology integration is a professor of Education at Stanford University, Larry Cuban (2000). Through his own observations and interviews with kindergarten, high School, and university teachers, he feels that computers are a mismatch for the requirements and conditions of teaching. Cuban's concern is rooted in the belief that teachers must be expert users of technology before they are asked to implement the technology in the classroom (Sinclair, 2009). He believes that if teachers are not able to use technology because they lack the knowledge then the students are hardly going to use the computers during classroom practice and then they are not work their investment (Sinclair, 2009). In agreement with Cuban, Monke (2006) argued that technology might actually be distracting to children from what is most important to learn. He asserted that children need to first learn self-discipline, moral judgement, and empathy for others. The new technologies, Monke said, should be removed from elementary classrooms and instead placed in the secondary curricula. Similarly, Philip and Garcia (2013) assert that it's not the technology that teaches, and technology is not a cure-all for the variety of challenges in today's schools. Nonetheless, Philip and Garcia (2013) agree that technology can be used effectively when placed in the hands of skilled teachers. It's skilled teachers and good teaching, not technology that remains at the heart of all classroom learning.

On the flipside, enthusiasts of technology integration assert that it is essential to use in order to (a) address challenges in teaching and learning, (b) foster changes in the content and quality of teaching and learning, and (c) prepare students for an increasingly technological world (Johnson, Adams, Cummins, 2012; McMillan-Culp, Honey, & Mandinach, 2005). Proponents further argue that technology increases student engagement (Shamir-Inbal & Blau, 2016, O'Brien, Beach, & Scharber, 2007; Scherer, 2011), advances their reading fluency (Stover, Kissel, Wood, & Putman, 2015; Vasinda & McLeod, 2011), enriches their writing (Boas, 2011, Yancey, 2012), and transforms teaching practices so that learning activities are more student-centered (Warschauer, 2007) and collaborative (Lei & Zhao, 2008). Some contend that technology is the best way to close disparities in the academic achievement between high and low performing students (Wendt, 2013). Finally, technology use is also known to make teaching tasks that were once mundane, now more efficient.

Technology Mandates Within Common Core State Standards

Beyond a teacher's personal beliefs about technology integration, teachers are dictated to use digital tools as specified in the CCSS (National Governors Association, 2012). More than 40 states have adopted these standards which integrate technology into both the reading and writing standards. With the CCSS, the students who meet the standards should also be "college and career ready in reading, writing, speaking and listening" (CCR) (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). One component of being CCR is being able to use "technology and digital media strategically and capably" (p.7), which means students should use technology to enhance their reading, writing, speaking, listening, and language use. Below are the anchor standards for K-5 which highlight technology use:

- Writing: “Use technology, including the internet, to produce and publish writing and to interact and collaborate with others” (p. 18).
- Reading: “Gather relevant information from multiple print and digital sources, access the credibility and accuracy of each source, and integrate the information while avoiding plagiarism” (p. 18).
- Speaking and Listening: “Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations” (p. 22).

How to Integrate?

Harris, Mishra, and Koehler (2009) found that there seems to be a mismatch between what teachers and researchers emphasize with digital tool integration. On one hand, researchers see digital tools as support for collaboration and inquiry and on the other hand teachers seem to be focusing on using presentation software, learner-friendly sites, and management tools to enhance existing practice (Spires, Oliver, & Corn, 2012), which is understandable when reading the aforementioned standards. The following subsections include the way teachers are using apps, digital texts, and how teachers are preparing students to have digital wisdom.

With apps. One example of digital tool integration by teachers that may be deemed ‘haphazard use’ is the temptation to use one of the numerous education apps. The novelty of these drill and skill apps has been found to quickly wear off for young children ages three to five according to O’Mara and Laidlaw (2011). They explained that the young children using these apps are more sophisticated than we think and are good at evaluating these educational apps. Through their research these scholars found that apps that are more open-ended or “blank –slate” writing, art and image-capturing design apps sustain children’s interest longer than more closed activities (p. 156). These types of apps allow students of all ages to experience and make

meaning through using apps that allow them to explore, engage, create, and share (Bruce & Levin, 2003). Examples of more blank slate apps includes Storykit or Story Creator where children can take their own pictures and record their own voices to create their own content. When using certain apps for literacy use, students can type or write on top of printed text or other backgrounds, record audio for a response, add pictures, and the like. Also, the built in cameras on iPads provide opportunities for the user to easily capture a photo or video for inclusion in a response within an app. Some apps also facilitate collaboration by enabling users to simultaneously share screens and manipulate drawings, written responses, among other activities (Hutchinson, Beschorner, Schmidt-Crawford, 2012).

Digital texts. Digital texts as compared with printed texts offer different affordances that create new modes of reading and writing (Lankshear & Knobel, 2003; Leu, Kinzer, Coiro; & Cammack, 2004) such as the inclusion of multimedia or hybrid texts, and a variety of other modes that cause the reader to experience a text nonlinearly (Barone & Wright, 2008, p. 292). Although these digital texts while not as sophisticated as today's versions have been around since at least the 1930's (Brown, 2014), it wasn't until the invention of e-readers such as the iPad in 2010 that made it convenient for anytime, anywhere learning in schools where the student does not have to be sitting in front of a computer in a laboratory setting (Brand & Kinash, 2010). O'Mara and Laidlaw (2011) reported that children are entering school with a far stronger sense of their own capacities as "directors" of information making them ready to read and create their own digital texts. For example, when using digital e-readers students have convenient access to resources for words they may be unfamiliar with. By simply tapping on the screen, students have access to definitions, pronunciations along with tools to add notes and highlights without any additional materials needed from the teacher (Hutchinson et al., 2012).

While digital texts cannot claim at this stage to be more beneficial than paper books (Merga & Roni 2017) they do offer a range of comparable advantages making them attractive to both young and older readers. An added advantage digital books have over printed texts is the opportunity for the student to physically interact with and manipulate texts and to transform texts to meet their needs and interests (Eagleton & Dobler, 2007). This makes the experiences more individualized, interactive, and engaging (Larson, 2010). For example, there is a range of sizing options available for the text as well as text-to-speech capabilities that act as an assistive technology for children with learning disabilities (Gentry, Chinn, & Moulton, 2004). Previously, teachers before had to provide students with sticky notes, highlighters, and dictionaries, but with e-readers, these tools are now embedded within the text. Digital texts offer the possibility of a portable library, which greatly increases the practical volume of books that an individual can travel with and have instant access (Merga & Roni, 2017). They also offer privacy, as it is relatively easy to conceal the nature of the reading material when read on an eReader (MacFadyen, 2011).

Digital Wisdom. Many of these digital tools provide opportunities for the teacher to teach students skills that they were unable to do before or were not as easy to do prior. For example, when students were taught the skill of skimming and scanning using a traditional text, the purpose of this activity may have been to quickly find an answer for a multiple choice question or to quickly find the main idea. When using digital print, the ability to skim and scan becomes even more essential due to the wealth of information that is available on the web. During teacher modeling, students can see this skill in action (Alderton, 2010).

Many students fear making mistakes (Jones, 2007, p.5), however with the use of digital tools, students “are learning through many ‘trial and error’ attempts about how language matters

in searching for information or locating favorite videos" (p. O'Mara & Laidlaw, 2011, p. 155). Again, through this example, teachers are able to offer their students learning experiences that are not only authentic, but are also the type of learning that is difficult to replicate without the aid of digital tools.

In addition, teachers are able to provide their students with an array of ways to read and interact with texts through the use of digital tools, Bomer, Zoch, David and Ok (2010) have found that digital tools have made writers increasingly aware of visual resources. Teachers are able to now go beyond just the written word with writing because as they interact with digital texts, they are being exposed to a variety of multimodal resources that are enhancing the writing such as links, videos, and memes. Therefore, reluctant writers might be inspired to write by using some type of visual resource rather than just starting from a blank page.

Teachers working with struggling readers now have a new method to engage these students. Leu and Reinking (1996, 1992, 1998, and 2001) found that digital texts can support individual readers' text comprehension and potentially engage struggling readers. Also, those students who have a very low motivation to read may be more motivated to read texts that are more multimodal (Glasgow, 1996). With the variety of digital tools that are available to teachers it's hard to say that they all have the same benefit so it's important for teachers to evaluate them before using them. Additionally, besides the research on digital tools that has shown the benefits of using technology in the classroom, scholars have also found that teachers who become too caught up in using digital tools hinder their teaching effectiveness because the technology tool becomes the focus of the lesson over the content.

How Teachers Are Hindered from Using Technology in Their Classrooms

There are a variety of reasons why teachers are hindered from using technology in the classroom. Hew and Brush (2007) identified 123 barriers to technology integration from empirical studies from 1995 to 2006 and classified them into six main categories: (a) resources, (b) knowledge and skills, (c) institution (d) attitudes and beliefs, (e) assessment, and (f) subject culture. As I was reviewing the more recent research on barriers to technology integration, I found similarities within these categories, therefore, I will use their frame as I present more recent studies (2007 and newer) to support their research on barriers.

Resources

Hew and Brush (2007) equated lack of resources to include one or more of the following: (a) technology, (b) access to available technology, (c) time, and (d) technical support. Through the more recent research articles, I found a lack of resources to be a common thread. In Hutchinson and Reinking's (2011), well-cited survey data from K-12 teachers in 31 states, many literacy teachers do not have access to useful digital equipment that would facilitate integrating digital tools into instruction. Similarly, Bomer, Zoch, David, and Ok (2008, 2010) found that elementary schools in low-income areas of the US just cannot afford to embrace frequent changes in hardware and software, or even maintain the equipment they do have; "privilege really counts" (p.10). Another resource barrier—time—was documented by novice urban elementary teachers in Grisham and Smetana's (2009) study. They reported teachers needing an adjustment period to become accustomed to a new tool before implementing it in their classrooms. As far as sufficient technical support, Hutchison and Reinking (2011) cite a lack of technical support being the most problematic. Similar findings were present in Hsu's (2016) study with K-6 teachers in the urban, suburban, and rural Midwest. Over 60% of the teachers in

his study were frustrated because the student laptops were not trustworthy, often had weak battery life, the wireless internet signal was weak, and they felt an overall lack of technical support in dealing with these issues as they were also trying to implement instruction. Hence, resource barriers for implementation still exist in schools today.

Technology Knowledge and Skills

The lack of knowledge of specific technology and skills, technology-supported pedagogical knowledge and skills, and technology-related classroom management knowledge and skills were identified by Hew and Brush (2007) as a major barrier to technology integration. Groff (2008) found that the assorted hardware and software available at schools lacked the support teachers needed in order to put them into use, therefore their lack of use persists. In Young's (2016) study he found that an overwhelming amount of primary teachers point to knowledge and skill of using iPads or Tablet computers being the main reason for not using them with their students. In addition, preschool teachers reported that many technological tools are developmentally inappropriate (Public Broadcasting Service and Grunwald Associates, 2009). In Shamir-Inbal and Blaus's (2016) study on teachers using tablets and laptops in their elementary classrooms, they found that one of the barriers was frustration with the numerous extra work hours they had to put in to searching for solutions to compatibility problems with the programs running on laptops versus tablets. This barrier also relates to time and support as a barrier. These scholars reported that the teachers had issues with adjusting the tablets versus the laptops properties when creating things such as a table on a worksheet, so additional knowledge of skill with compatibility was needed.

Scholars have found that, without the proper training, teachers are using digital tools haphazardly. Several studies report that K-12 teachers' instructional applications of educational

technologies show many to be pedagogically unsophisticated; they are limited in breadth, variety, and depth, and are not well integrated into curriculum-based teaching and learning (Groff & Mouza, 2008; Levin & Wadmany, 2008; Russell, O'Dwyer, Bebell & Tao, 2007; Zhao, Pugh, Sheldon & Byers, 2002). Callister and Dunne (1992) stated that, "If a teacher does not know what to make of the [digital] tool, or fears it, or misconstrues its uses, it will be used badly or not at all" (p. 29). For example, creating a new appearance for worksheets by having students access them electronically does not take full advantage of the nature that technology affords by allowing students the opportunity for interaction and collaboration.

Institutional Barriers

According to Hew and Brush (2007) institutional barriers to technology infused literacy instruction included leadership, school time-tabling structure, and school planning. In Hutchison and Reinking's (2011) study, they found that the most prominent obstacle by teachers was their perceived lack of time to integrate technology as provided by the school. Similarly, Stover, Kissel, Wood, and Putnam (2015) studied teachers' perceptions of using VoiceThread in elementary, middle, and high school. These scholars found lack of time to learn a new tool as an issue and they wished that had more time to tinker with the tool before effective implementation took place. These teachers felt that they didn't take advantage of all of the features such as the commenting feature as well as they could have because they didn't know the full capabilities of the tool prior to using it with their students. Researchers indicated, "If digital tools such as VoiceThread were introduced earlier in the year, these teachers felt that they may have been able to gradually integrate these new technologies into instruction in all subject's areas while concurrently continuing to address standards" (p. 356). With school planning for the roll out of new innovations within the school, Groff (2008) found another institutional barrier to be teachers

not being provided with the opportunity to voice their input on the development of innovations for instructional use, it was more of a one-size fits all approach to professional learning.

Attitudes and Beliefs

Another major barrier with technology integration is teacher attitudes and beliefs. For instance, many teachers do not consider new genres of reading and writing such as online chats, blogs, wikis, and email to be important to include in literacy instruction (Hutchison & Reinking, 2011), which may be problematic if teachers ignore because online reading and writing require different skills and strategies. Fear is also a concern for teachers. Some teachers are afraid of the openness and unfamiliar territory of the new technology, so they restrict what can and can't be done, creating a closed approach and system (O'Mara & Laidlaw, 2011). Sometimes there are worried that technology will be broken, so restrictions are placed around usage (O'Mara & Laidlaw, 2011, p. 158).

Schrimshaw (2004) believed that if teachers are going to use technology in the classroom they must be involved in at least "two radical changes- they must learn to use technology and they must fundamentally change how they teach" (p. 235), which also means they must believe in the benefits of using technology for reading and writing purposes. Teachers who are willing to use technology heavily depends on the perceived usefulness of the technology (Scrimshaw, 2004). Veen (1993) stated that it is the teachers view of the innovation that is critical. If teachers start using computers for 'drill and practice' only, it is probably because that use fits their routines best. Further, Veen supposed that a teacher's learning process should not be disturbed by telling them that doing 'drill and practice' is only a poor application of technology. "Perhaps it will be only after two or three years that teachers can gradually enhance their routines and handle more complex applications of information technology" (p. 149).

The value of technology in addition to teachers' beliefs about the capabilities of their students based on their age/developmental perspective has also been reported. In Hsu's (2016) study of eight teachers who had varying technology resources spanning K-6 grade levels, the majority of them had positive beliefs about using technology. However, two of the teachers were not sure about the value of technology which limited their use in their classrooms. One of the teachers, a first grade teacher said, "I mean just being first grade. They cannot do much. I integrate technology to do demonstrations such as showing pictures" (p. 36). Similarly, Rub (2015) found that teachers of children in kindergarten and first grade used technology to facilitate teaching and learning, but felt that their students could not participate well individually with computer assignments.

Assessment

In my study, I noticed the effects assessment had on technology use. Hew and Brush (2007) indicate the pressure of high-stakes testing gives teachers little time to attempt new instructional methods involving technology. Hutchison and Reinking's (2011) study also noted the amount of time that teachers must devote to high-stakes testing preparation a prominent obstacle in integrating technology. Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012), studied award-winning teachers in grades k-12 and found standardized tests were still considered a barrier to technology integration by teachers. These scholars cited teachers having a fear that students wouldn't master the state standards if they used technology in their daily lessons because it would take away from time spent preparing students to perform on the end of the year assessment at the highest level. Bennett (2015) details the current evolution of educational assessments from paper-based to electronic and surmises that the Common Core State Assessments, such as PARCC and Smarter Balanced, will be distributed over two time

points and are likely to be given to students at a greater frequency. In this type of environment "every mouse click, keystroke, latency, and resulting event can be recorded, providing an enormous volume of data" (Bennett, p. 391). The benefit would be a "finely detailed record of achievement," however there are several challenges with this line of thinking, including the impact on teaching and learning. Bennett questions if the knowledge gained from these continuous assessments would alter "teaching and learning to cynical attempts on the part of instructors and students to game the system" (p. 394).

Subject Culture

According to Mangan (1995) subject culture refers to "the general set of institutionalized practices and expectations which have grown up around a particular school subject, and shapes the definition of that subject as a distinct area of study" (p. 614). A teacher who is reluctant to adopt a technology when it seems incompatible with the norms of the discipline (Hennessy, Ruthven, & Brindley, 2005) is a barrier. For example, an art teacher may be reluctant to use technology in painting because he/she feels that art needs to be done physically with one's own hands and that a "mouse makes one's mind and hand disjointed" (Hew & Brush, 2007, p. 231). Another example related to literacy instruction in D'Argostino, Rodgers, Harmey, and Brownfield's (2016) study of 14 recently trained Reading Recovery teachers in seven of the lowest performing elementary schools in urban settings, found when given a choice between using magnetic letters or an iPad app for letter identification, teachers chose to use the magnetic letters over the app because the app was perceived as a misfit between their theories of teaching and learning and the tool. The teachers felt that the iPad app did not have a kinesthetic or tactile component to it and ran counter to their view of what the students needed. This theory of the

need for movement in learning is part of their Reading Recovery teacher training curriculum or subject culture.

All of these barriers are interrelated. None of these barriers can be easily solved without additional time and/or monetary resources. Subject culture is important to keep in mind when thinking about socio-historical experiences and their effect on a teacher's integration of technology.

How Socio-historical Experiences Affect Pedagogical Application of technology

Lotta Larson (2010) believes that educators are already immersed in multimodal experiences. Therefore, these educators have a keen awareness of the possibility of combining modes and media to create a message, and with this experience they transfer this knowledge into teaching. However, Groff and Mouza (2008) pose the question, "Why is it that so many teachers use computers to increase their own efficiency and productivity, yet do not strive to find effective applications for their use as instructional tools? *What is it* that keeps teachers from making this quantum leap?" (p. 22). It is no secret that literacy teachers are specifically charged with developing all mainstream aspects of literacy, increasingly including those involving digital tools (Hutchinson & Reinking, 2011, p. 313). It could be that teachers are not seeing a natural connection between the curriculum they teach and the digital tools they are personally using. Hughes and her colleagues (2005) believe that the more teachers see the connection between digital tools and the subject content they teach, the more likely they are to develop a technology-supported pedagogy. The only way to guide teachers in seeing this connection is through training. However, with the expectation to use digital tools without training and without a clear understanding of the connections between the curriculum and the use of digital tools, teachers

run the risk of being labeled, *techno centric*, meaning omitting the relationship between content and technology (Papert, 1987).

Teacher Preparation and Professional Learning

McAdams (2001) argues that socio-historical context encountered early in life, and particularly in key developmental periods, continues to play a significant role in identity formation throughout life. He believes that people in modern societies have internalizing and evolving narratives of the self that are a configuration of the self-in-the-adult-word. Through this identity, teachers are out to "locate the self within an ongoing life story that, simultaneously, is strongly oriented towards future goals" (p. 107). Further, he contends that teachers negotiate new identities to survive within changing contexts or fail to negotiate new identities and leave. Teacher preparation programs are harnessed with the responsibility of preparing future educators to be effective in teaching environments that require the integration of technology and for teachers currently in the field, professional learning helps to improve their practices.

Groff and Mouza (2008) found that practical applications for technology integration for teachers is rarely well articulated (p.22). Kajder (2005) reported that two thirds of teachers feel underprepared to use technology. Several studies cite the lack of formal professional development is a prominent reason why teachers do not integrate technology into their curriculum (Bauer & Kenton, 2005; Stolle, 2008). However, April Di Benedetto (2005) claimed that even though trained teachers use technology more than teachers with no training, the frequency of technology use and of implementing student-centered learning does not improve significantly with training. With these findings, Benedetto suggested that rather than being 'trained,' teachers need to learn how to use technology in context, matching the needs and ability of learners to the curriculum goals.

Study best practices for preparing preservice teachers and inservice teachers for integrating technology has been well cited (e.g. Kay, 2007; Grisham, 2011; Mourlam & Montgomery, 2015). Grisham (2011) believed in using a similar approach to both teacher educators and those who lead professional learning. He believed that,

> When teachers work together, they share their knowledge; the conversations that take place during collaborative projects provide lead to articulation of content and process. Within the collaborative process teachers who are 'novice' technology users are able to hone their skills without feeling stupid or silly. Since technology based tasks involve many familiar tools (such as PowerPoint), teachers can progress at their rate as they become competent with repurposing old tools for new uses. Collaborative activities often bring together individuals who would not normally work together. When teachers learn more about each other, they build stronger professional bonds. Often, in the forging of those bonds, teachers will try out new ideas (and technologies) together (p. 16).

Teacher preparation programs and administrators charged with organizing professional learning have a hand in helping to provide these collaborative experiences that may allow teachers to feel more confident in their abilities to use technology effectively within literacy instruction.

Teaching Tenure and Philosophies

Russell and his colleagues (2007) found the number of years teaching is correlated to how open a teacher is to incorporating digital tools into his/her teaching. New teachers have been found to use digital tools less frequently in their instruction because they need time to develop familiarity with the school's curriculum, social norms, student skills, and the digital tools that are available (p. 395). It's interesting to consider that newer teachers have grown up in computer-rich environments but have been found to use technology less for professional

purposes (Russell, 2007). Further, teachers who have been teaching for three to ten years have been found to use technology in schools the most. This seems to be understandable considering brand new teachers need time to adjust to their school and environment whereas teachers with three years of experience or more may have had training and more experiences to use technology in classrooms and are feeling abler to instinctively use technology.

Teachers who are using digital tools currently in their practice tend to have commonalities in their beliefs. Several scholars (Ertmer, 2005; Hughes et al, 2005; Windschitl & Sahl, 2002) have found that teachers' beliefs about their own efficacy in integrating technology into instruction play a predominant role in how they conceptualize and use computer-based technologies in their teaching. Likewise, Becker (2000) found that teachers who have students use technology in the classroom have fairly distinctive teaching philosophies, being disproportionally supportive of constructivist pedagogies, such as developing student responsibility for selecting and carrying out learning tasks, emphasizing group work involving discourse, and the use of projects, products, and performances for outside audiences (p. 28).

New Expectations

There is a clash of world views, dispositions, and what is valued in schools (O'Mara & Laidlaw, 2011, p. 157). Our children have had a very different upbringing in terms of their relationship with screens and texts to those of previous generations and have very different dispositions to texts than adults do (O'Mara & Laidlaw, 2011, p. 156). In order to embrace this change of pedagogy, one which is highly infused with digital tools, there needs to be dialogue between the "insiders" and "outsiders: guardians of the old and proponents of the new" (Levin & Wadmany, 2008, p. 236). Luke and Luke (2001), suggest that education systems have tended to "delay and sublimate the emergence of new educational paradigms" around new forms of textual

and literacy practice, instead, focusing on "crises of print literacy" (p. 96) rather than embracing these new technological approaches and challenges. Luke and Luke (2001) cited that this stalling tactic is politically driven to aid educational systems time to "come to grips generationally and practically with the aging, creaky, industrial, print-based schooling infrastructure" (p. 96). The question becomes how can teachers be prepared and encouraged to take on the challenge of changing traditional views of literacy education (Kist, 2007)? Furthermore, when digital tools are used in the classroom teachers find themselves taking on roles they never had to fulfill before such as the role of instructional designer, trainer, collaborator, team coordinator, advisor, and monitoring/assessment specialist (McGhee & Kozma, 2003). It is through professional learning that teachers will acquire the skills need to manage these new roles on top of the ones they have currently. On the other hand, schools who are prolonging these new approaches may also delay this necessary professional learning. These decisions and interactions between schools and teachers can be examined through Cultural Historical Activity Theory.

Cultural Historical Activity Theory

Deemed as "the best kept secret of academia" (Engeström, 1993, p. 64), Cultural Historical Activity Theory (CHAT) was recently described by Engeström as, "an important challenge as educational processes become increasingly distributed and networked" (p. vii, 2016). In the following section, I will describe how CHAT not only provides methodological and theoretical guidance, but also offers perspectives on pragmatics when used in contemporary learning contexts.

Situating CHAT within Sociocultural Learning Theory

CHAT is a sociocultural learning theory that takes a learner-centered approach by taking into account the important roles that social relations, community, and culture play in cognition and learning (Wang, 2007).

Sociocultural leaning theory. Sociocultural learning theory provides an excellent framework to understand how students learn. The founder of this theory, Lev Vygotsky (1978) believed that adults foster a child's learning and development in an intentional and systematic manner. Because children learn mainly through interactions with other people in their social world, everything they learn is colored by the expectations and norms of the social and cultural contexts in which they are positioned (Goldstein, 2008; Vygotsky, 1978). These interactions today include those made in digital spaces and it's up to teachers to demonstrate for students the academic expectations in these spaces. In addition, sociocultural theory is based on the concept that "human activities take place in cultural contexts, are mediated by language and other symbol systems and can best be understood when investigated in their historical development" (John-Steiner & Mahn, 1994, p. 19). With technology there are special symbol systems like emojis and texting language that students may come to school already knowing. Teachers may need to model and discuss with students the situations when using these symbols is appropriate and not as widely accepted and the reasons why. Vygotsky (1978) also argued that effective tool use "is fundamental not only because it has helped them [learners] relate more effectively to their external environment buy also because tool use has important effects upon internal and functional relationship within the human brain" (p.133). When students imitate the ways adults use tools, such as a camera, the child becomes more experienced with using the camera through

repetitive actions of practice and these experiences with the camera serve as a "rough blueprint for possible types of action in the future" (p. 6).

A sociocultural perspective of learning is relevant to this study as it provides a basis for exploring "teachers as learners" as they integrate technology in their instructional practices. Doehler (2002) indicates there is abundant empirical evidence that cognitive development "hinges not simply on the involvement of social interactions as such, but on particular ways of expert guidance and learner participation" (p. 2).

CHAT. The acronym CHAT is used to denote the investigative theory developed by Vygotsky, Leont'ev, Luria and their immediate colleagues. Using CHAT theory, one is able to view "pieces of a larger puzzle" (p.4) and instead of viewing a single cause that accounts for change, one can ask themselves, "under what circumstances do particular kinds of changes take place?" (Grossman, Smagorinsky, & Valencia, 1999, p. 4) by focusing on the sociocultural elements of an activity.

Specifically, with technology, Murphy and Rodriguez-Manzanares (2008) state that "in the field of education, CHAT can facilitate understanding of how technological advances influence change" (p. 442) and the computer is simply another tool mediating the interaction of humans with their environment (p. 442). Other benefits of using CHAT in educational environments include the fact that CHAT theory provides insights into change in teachers' practices or how their teaching has been restructured when a new technological tool becomes part of their teaching activity (Murphy & Rodriguez-Manzanares, 2008). Within education contexts CHAT has been relied on to study contexts of implementation of innovation in education, such as technology (Buell, 2004). Kaptelinin and Nardi (2006) argue that CHAT is an

effective framework for understanding technology because it requires the scope of analysis to extend from tasks to meaningful context of a subject's interaction with the world.

CHAT theory considers "important educational issues in fresh ways" (Roth & Lee, 2007, p. 206). For example, CHAT does not separate the poverty or culture of a rural school district from the conditions of integrating technology into the classroom, the barriers of technology, or other unforeseen elements; each of these aspects is taken into account within the analysis. Using CHAT helps to overcome the range of "troublesome dualism in education: individual versus collective, body versus mind, subject versus object, and theory versus praxis" (Roth & Lee, 2016, p. 218).

The Basic Tenets of CHAT

The basic tenets of CHAT will be explained in detail here as they undergird each decision made in this study. Engeström (2001) listed the following as the five basic tenets of CHAT regardless of the generation:

1. The activity system is the unit of analysis
2. There is multi-voicedness within a system
3. Activity systems evolve over time and can only be understood against their own history
4. Contradictions are a source of change
5. Intervention and change

The activity system is the unit of analysis. To understand what comprises an activity system, it's important to think about a subject (an actor) who has an objective (or object as referred to by Engeström (2000)) and is "object-oriented," meaning there is a motive for an activity. Objects are "durable, collective intentions not reducible to short-term individual goals" (Engeström, 2008, p. 31). The motive for the activity is to transform the object into an outcome.

Included within the activity system are members of the community, rules within this system, and the division of labor. In order to understand the distributed nature of the learning that takes place in activity systems of any scale, these elements must be thought of as interconnected in complex, mutually dependent relations (as are represented by the bidirectional arrows) in the activity system model (Lecusay, Rosen, & Cole, 2008). With the third generation CHAT, the object of multiple activity systems joint work as they move in space and time, across various situations and boundaries, (Engeström & Kerosuo, 2007) can be studied. Examining the object of activity "reveals the internally contradictory and historically changing character of the activity systems" (Engeström & Kerosuo, 2003, p.324).

There is multi-voicedness within a system. Through these interconnected relationships, an activity system is always a community of multiple points of view, traditions, and interests making an activity system considered to have multi-voicedness (Nwosa, Allie, Demaree, Deacon, 2013). Taken from Bakhtin (1981, 1984), activity theorists (e.g. Wertsch, 1991) frequently use the term multi-voicedness to account for the internalization of ways of thinking. Within an activity system of a school setting, understanding how teachers and other members draw on and use the languages of people such as professors, school administration, or colleagues to inform their approaches to teaching (Grossman, Smagorinsky, & Valencia, 1999) represents the perspectives influenced by multiple layers within a context. Individual agency and collective activity as represented by multi-voicedness are focal points for third generation CHAT research as multi-voicedness is "a source of tension and innovation, demanding actions of translations and negotiations (Daniels, 2008, p. 124). In a schools setting, from a teacher's perspective there is a lot of multivoicedness they must be negotiated. Teachers first come into teaching with thoughts and opinions of their teacher preparation programs, then once they are in their own classrooms

they hear the perspectives of their principals and colleagues, in addition to view points from their own professional learning through books, blogs, social media, and the like.

Activity systems evolve over time and can only be understood against their own history. The third tenent, historicity Engeström (2001), takes into account how activity systems "take shape and get transformed over lengthy periods of time" (p. 136). In addition, when analyzing activity systems, researchers can only understand the system's problems and potentials through its own history (Engeström, 2001). Within a study using technology and CHAT, considering the participants' history with technology is central to "identify the preconditions and precipitating causes of the key actions that have shaped the system to date and may catalyze future development" (Foot, 2014, p. 343). When thinking about an action within a system, "action time is linear with a finite end; activity time is recurrent and cyclic. Activity systems take shape and get transformed over time through cycles of change" (Colville, 2012, p. 48).

Contradictions and Intervention as a source of change. Contradictions are not simply conflicts or problems, but are "historically accumulating structural tensions within and between activity systems" (Engeström, 2001, p. 137). A contradiction begins as a tension between two or more elements within the activity system. Once the tension has been repeated over and over then it is considered a contradiction. As a researcher examining these contradictions one can begin to identify solutions for the source of change.

While involved within the system(s), the researcher can support participants to articulate these contradictions and to help find new solutions as the object of the activity is transformed into a better version of itself (Coville, 2012, p. 50; Nwosu, Allie, Demaree, & Deacon, 2013).

Live Oak Elementary's (LOE's) behaviors management system illustrates all five of these tenets working together. All of the teachers (activity system) need to enforce the school's behavior

management system (object). As the teachers are thinking about implementing the behavior management system they think about their own opinions on behavior management, along with how it aligns with the school's, as well as what they were taught about behavior management in their teacher preparation programs, among other various opinions (multi-voicedness). Let's say that the teacher decides to use a tech tool called ClassDojo to assist with behavior management. With this tool the teacher rewards students for positive behavior and punishes negative behavior by taking points away. However, during an observation, the principal, while impressed that the teacher is using a tech tool in this way, notices a tension. The way the teacher is using the tool is not aligning with the school's Positive Behavior Intervention Support (PBIS) plan because it takes away points rather than only praising positive behavior. (This is considered a contradiction because it is a continuous tension.) Because of this feedback the teacher modifies her behavior plan to only using ClassDojo for rewarding positive behavior (change). This simplistic example shows the evolution of a small change over time within a teacher's activity system as well as how the tension with using the tool was clashing with the PBIS plan caused the teacher to change and adjust how she was using the tool.

Key Concept of Activity

In order to fully understand what composes an activity system it's important to understand the concept of activity. Activity is a purposeful interaction of a subject with the world; it is a process in which mutual transformations between subjects and objects are accomplished (Leont'ev, 1978). An example of a subject could be a teacher with the goal of integrating technology within literacy instruction as her object. Activities organize our lives; we develop our skills, personalities, and consciousness; we transform our social conditions resolve

contradictions, generate new cultural artifacts and create new forms of life (Sannino, Daniels, Gutierrez, 2009). An activity system is a bounded system related to the social environment in which object-oriented activities and goal-oriented activities are anchored with other related activities with similar objects (Gallimore & Tharp, 1990).

What distinguishes one activity from another is its object (Engeström, 1993). For example, multiple activities can be examined with technology use within a classroom as the activity system, but what separates one activity from another is the object (sometimes referred to as an objective or a goal) for examining technology. The object could be how a student or students are using technology without being prompted in their independent work, or like in my study the object is examining the specific ways teachers are integrating technology during literacy instruction. The various generations of CHAT follow.

Generations of CHAT

There are three generations of CHAT (Engeström 1996). Vygotsky's (1978) identification of the mediated action triangle is the first-generation (see figure 2.1). The second generation is attributed to the work of Leont'ev, who advanced Vygotsky's work and was instrumental in illuminating the dialectical relation between the individual and the collective (see figure 2.2). The third generation refers to the application of activity systems where the investigator takes a participatory and interventionist role to help participants experience change (Engeström,1987; Roth & Lee, 2007; Yamagata-Lynch, 2010) (see figure 2.3). CHAT scholars, such as Engeström and Yamagata-Lynch, now encourage investigators to use the third generation activity theory in order to act as an interventionist (Yamagata-Lynch, 2010).

First Generation

The traditional model used to represent the idea of activity systems as a unit of analysis is that of the classical mediational triangle, also known as the first generation (see figure 2.1).

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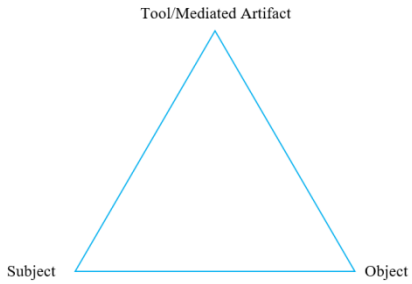

Figure 2.1: *First Generation CHAT*

With this model, Engeström (2001) specified that this model was limiting because the unit of analysis "remained individually focused" (p.134), meaning that the subject is the only individual acting upon his/her object. To overcome this limitation, the second generation model illustrates the activity system as a collective entity focused on complex interrelations between the individual subject and his or her community.

Second Generation

In the second generation, the activity system triangle was expanded to include the references: *rules*, *community*, and *division of labor* (see figure 2.2).

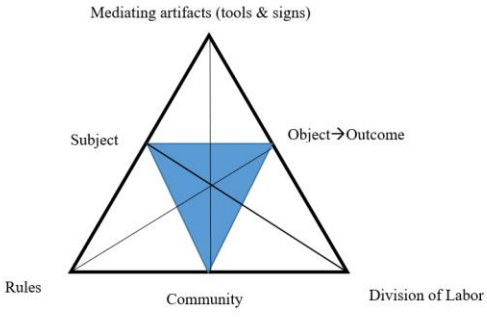

Figure 2.2: *Second Generation CHAT*

To begin expanding on this model, a *subject* is the individual or group who are the focus of analysis (Stevenson, 2008). The *object* or *objective* is the target of the activity within the system. It is the reason why individuals and groups of individuals participate in an activity and it is what holds together the elements in an activity (Yamagata-Lynch, 2010). Murphy and Rodriguez-Manazanares (2008) make clear that the *object* is what precedes and motivates activity. For my study, each subject shares a similar object (to integrate technology within literacy instruction). A *community* is the social and cultural group that subjects are a part of, with explicit rules or social norms that regulate and influence behavior. Mediated artifacts include tools or signs. A tool mediates an object oriented activity and a sign mediates social intercourse (e.g. linguistic signs) (Leiman, 1999). A tool could include a technological tool such as a laptop or software such as Microsoft Office. In this study, I will focus on mediated tools since my study did not focus on linguistics. *Rules* refer to formal or informal regulations that can, in varying degrees, constrain or liberate the activity and provide to the subject guidance on correct procedures and acceptable interactions to take with other community members (Engeström, 1993). The *division of labor* defines how tasks and responsibilities are shared among system participants as they engage in activity (Cole & Engeström, 1993).

When considering all of these components of the mediated activity triangle together, *mediation* is an important theme grounded in Vygotsky's work. Moll (2000) summarized the centrality of mediation as follows, "To put simply, human beings interact with their worlds primarily through … the use of cultural artifacts, tools, and symbols including language, (p. 257). Through their activity systems the teachers are using mediational tools of technology to meet their object of integrating technology within literacy instruction. I will discuss the third generation CHAT next as there were multiple interacting systems within my study.

Third Generation

In my study I used a modified third generation CHAT to examine three interacting activity systems. It's significant to note the difference between the term *contradiction* and *tension*. Yamagata-Lynch (2010) specifies that *tensions* are pressures that subjects encounter while participating in an activity and they can stimulate or interfere with the subjects' abilities to attain the object, but it's when these tensions become reoccurring that they are identified as a contradiction. Throughout the literature on activity theory and more specifically CHAT, scholars seem to use these two terms loosely and/or synonymously which could cause scholars to become overwhelmed with looking at each individual tension. Once a tension is deemed a contradiction then it would be worth the scholars' time to examine the elements which are causing this incongruity and then to think about how this contradiction could be alleviated. Admittedly, Engeström (2016, p. XV) acknowledges that contradictions of an activity remain an extremely touchy issue due to the multiple interpretations various scholars hold. For this study I will be using Engeström's (2016) differentiation between the terms. He explains, "Contradictions are historically accumulating systemic tensions that cannot be observed directly. Only their manifestations, such as disturbances and conflicts, are observable in the daily flow of actions. That is why the examination of contradictions requires historical analysis" (p. vii). Further, "Contradictions are seen as sources of development; activities are virtually always in the process of working through contradictions" (Engeström, 1987, 2001, p.143).

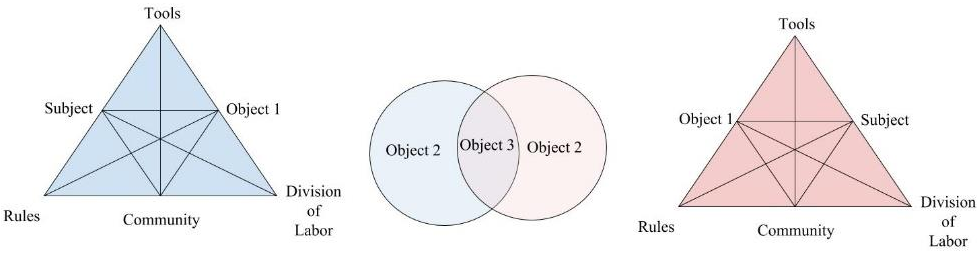

Figure 2.3: *Third Generation CHAT*

With the third generation model (figure 2.3), the mediated triangle is the same as the second generation, but now there are two interacting systems sharing a similar object. Object 1 is "raw material" of an unreflected goal which moves to a collectively meaningful object constructed by the activity system (object 2), and to a potentially shared or jointly constructed object 3 (Engeström, 2009). The lines between elements in the diagram show the possible relations on the social and cultural dimensions of the teaching activity guiding me to think about the relations between tensions or undesired conditions (Sezen-Barre, Tran, Mcdonald et al., 2013).

Conclusion

In this study it is necessary to understand the framework of CHAT in order to understand how I examined the complexities that exist within a school and more specifically a classroom. Infusing technology within literacy instruction may seem like an easy task for those who enjoy using technology, however, it is well documented that there are numerous barriers preventing this integration from occurring. Examining the specifics of a teacher's sociohistorical experiences with technology use even further reveals the rationale behind a teacher's decision making process when it comes to first considering the literacy content being taught, of course first, followed by the type of technology to use, when to use it during the lesson, the rational for its use, and the logistics of how it will be used. For this study I engaged in third generation

CHAT, as I played a participatory role within the activity systems of the teacher's classrooms. My process will be discussed in the following chapter.

CHAPTER 3

METHODOLOGY

The research design and methodology provided in this chapter details the research process applied from the beginning of the study to the end of the study. This study is the investigation of the relationships between teachers and those who support them in integrating technology within literacy instruction. Understanding these relationships is critical to assist in identifying the factors that may be contributing to instructional contradictions of technology-infused literacy learning in elementary classrooms. In addition, this study explores the socio-historical experiences of these teachers and how these experiences may be informing their pedagogical application of technology.

Today's students learn in a variety of situations. They acquire knowledge by using computers, reading books, doing hands on activities, and participating in discussions. When we are in learning environments that allow us to take full advantage of what other have to offer, to really interact and learn from those around us, we create new potentials for ways of thinking. Based on the work of Lev Vygotsky (1986), sociohistorical theory describes learning as embedded within social events and occurring as a child interacts with people, objects, and events in the environment. These interpersonal interactions can only "be understood in the context of, or with reference to, these same cultural and historical forms" (Ali & Faculty, 2007, p. 2). In this study, these interactions will be examined through the use of Cultural Historical Activity Theory (CHAT). Using a sociocultural theory, such as CHAT, I am able to examine the ways in which human activity is embedded within a sociohistorical context. The very existence of structures

within a school, such as teacher evaluations or lesson plans, is rooted in history and the culture of the school.

Theoretical Framework

Cultural Historical Activity Theory (CHAT) draws from the work of Vygotsky, Leont'ev, Luria and others cited throughout this chapter. Using CHAT theory to make sense of the classrooms in my study, I am able to view "pieces of a larger puzzle" (p.4) instead of discovering a single cause that accounts for change. I can ask myself, "Under what circumstances do particular kinds of changes take place?" (Grossman, Smagorinsky, & Valencia, 1999, p. 4).

As I began to use the third generation CHAT model to analyze my data, I found the model to have some limitations. With the triangle model, the object is on the outside of the triangle just like all of the other components of the triangle, when really all of the components are in relation to this object. The distance between all of the nodes to the object is unequal, which contradicts the reality that all components have equal importance within the activity system. In addition, when looking at the triangular model the connections with the *rules and artifacts, rules and division of labor,* and *division of labor and artifacts* are ambiguous when taking into account their relation to the object of the activity. As I halted my data analysis with this model, I continued to read about activity systems analysis and identified a model that improved the issues described above: Ian Stevenson's (2008) Third Generation Pentagonal Prism Model.

Developing A Third Generation Pentagonal Prism Model

The activity pentagonal model was introduced to me in two unrelated manuscripts. The first work was Jeremy Cross's (2011) work in the *Journal of Research in Language Studies*, where he explored the contradictions in second-language learning. He calls his model the "Joint activity system," which is a reorganization of the activity triangle into a pentagonal model,

however, he never mentions the word pentagon. He highlights that the diagram, "…is symmetrical in…reflecting identical contributions by each subject to the shared activity" (p. 829). This model represents the idea of mediation within the activity system well.

The second work using a pentagon model was Ian Stevenson's (2008) article in *Computer's in Education*. He used the pentagon model with his explorations of metaphors used with digital technologies. In his work he indicates:

> the pentagon places the "object" at the center of the relationships with outcomes in the plane perpendicular to the pages, capturing the symmetry and equity of factors. Second, different facets of the activity system can be identified to aid with the practical analysis" (p. 840).

Further, he discusses activity systems across time and refers to them as "slices," which

> capture the detailed evolution, providing a way of relating pedagogical process with its outcomes. However, the slicing is not determined by the passage of time but by the internal logic of an activity, represented by specific combination or roles, tools, and organization, dynamically related to the activities outcomes (p.842).

Stevenson does not refer to his model as a 3-dimensional prism or a pentagonal prism, but as I interpret the activity prism, it is a whole that can be looked at through specific slices in time or as "internal logic" progresses. With contributions from both models, I've shaped a model called the pentagonal prism (see figure 3.1).

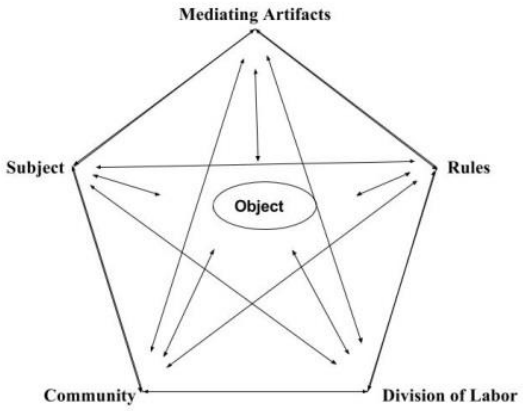

Figure 3.1: *Pentagonal Prism Model*

With this model, the object is placed at the center where each node is equidistant. I've also made a point to include the importance of mediation within the model though the lines and arrows as a reminder of this interaction through the naming of the "mediating artifacts".

Another portion of Stevenson's (2008) work that I've adopted for my study is his idea of the five facets of an action and how they relate to the objects and outcomes (See figure 3.2). An activity consists of *roles* that shape the relationships between the subject and the community, for example the relationship between teachers and learners are and their relationships with each other and other community members are shaped by the status and responsibilities affiliated with those roles. *Organization* is another facet which identifies how the subject and community are managed (division of labor). *Use* deals with how the mediating artifacts (tools) are employed in practice; how the subject is using the mediating artifacts. *Functionality* identifies the "range of possible uses for the mediating artifacts as specified by their designers, which are made available to an activity's participants" (Stevenson, p. 840). *Operations* represent "the space of possibilities for an action provided by the technologies and the site being used. It is built on the interplay

between the physical distribution of resources such as hardware, software, and learning materials and their management within a given context which both enable and constrain activities" (p 840).

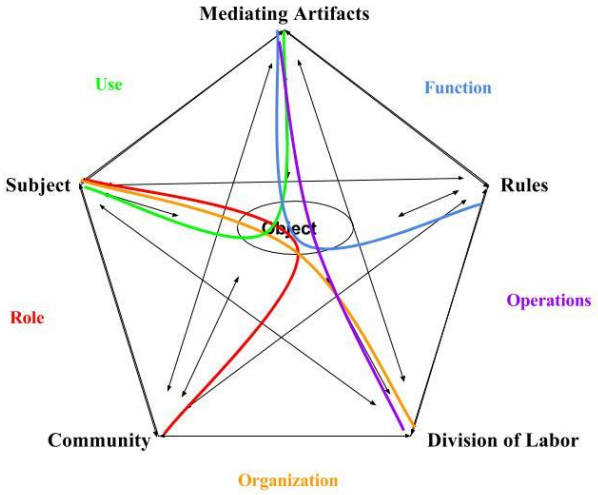

Figure 3.2: *Pentagonal Prism Model and the Five Facets of an Action*

The pentagonal prism model in figure 3.2 graphically represents the five facets of an action. I have color-coded the facets to represent the internal structure of the relationships. Through this diagram you see overlapping of facets and this shows the interrelations with the various CHAT elements. The arrows on the inside of the pentagon illustrate the various elements and their relation to the object.

Case Study

Several scholars (Anthony, 2012; Koszalka & Wu, 2004; Laferriere, Hamel, Searson, 2013; Roth & Lee, 2007) have found that activity systems analysis is compatible with case study research because activity systems analysis involves the examination of self-sustained systems that are difficult to remove from the context and when investigators engage in data collection and analysis they need to be able to treat goal-directed actions, oriented-activities, and activity

settings as separate yet highly interrelated bounded systems. With this in mind, I selected the case study method because it provides the best opportunity to examine technology use by teachers in their specific classroom environments.

Case study research is useful for the study of a phenomenon in its natural context (Stake 1995). It is a method that helps to bring an understanding of a complex issue or phenomenon and adds strength to what is already known through previous research (Dooley, 2002; Gerring, 2004). Case study is popular with practitioners as a tool for evaluation and organizational learning (Basjarada, 2014), and as Merriam (1998) indicated case studies can "directly influence policy practice and future research" (p. 19) within organizations. All of these conceptions of qualitative case study research were well aligned with my desire to understand a teacher's relationship with technology integration.

Since I have three subjects (two teachers and their school) in their three activity systems (or three cases), I engaged in a multi-case study, meaning that I studied more than one case; each subject in my study was a case (each teacher as their own case and the school as a third case). Herriot and Firestone (1983) specify that using a multiple case design allows for replication, improves generalizability, and provides an even stronger argument for theoretical replication. In addition, evidence from multiples cases is often considered more compelling, and the overall study is therefore, regarded as being more robust.

While employing third-generation cultural historical activity theory (CHAT), within a multi-case study design I was able to examine each teacher in their classrooms in relation to each other and to the school in order to understand the contradictions between the three systems.

Setting and Participants

For confidentiality purposes, I use pseudonyms for the district, school, and participants - Cedar Creek County School District (CCCSD), Live Oak Elementary (LOE), Dr. Eve (principal), Adam (media specialist), Abby (instructional technology specialist, ITS), Erin (third grade teacher), and Hazel (third grade teacher). The participants understood that the school administration and district leaders would likely read this report; therefore, I wanted to protect their identities as much as possible.

Setting

In selecting a setting for my study, the criteria I used for site selection included:

- a district that either had one device per child or has a bring-your-own-device program,
- a school interested in technology integration,
- a school with reliable and consistent access to technology, and lastly
- a school or a district that provides consistent professional development for teachers on integrating technology and/or has an Information Technology (IT) person that provides teachers with consistent guidance.

These criteria may sound like the ideal situation, but in most schools this is not typical. In fact, in the most recent data (2014), from a national survey from Amplify Education (reporting from 332 district leaders) 20% of total classrooms reported 1:1 ratio of devices to students, 29% have a policy that encourages students to bring their own device and 70% of these schools that implemented initiatives lacked professional development and support for teachers. While the school in which I conducted this study may not be representative of most public elementary schools, this school met my desire to conduct research at, from a resource perspective, had

"everything going for it" with regard to technology integration. I wanted to see what technology integration was like if teachers had access to a multitude of resources and support.

The School District and SAMR. This study was conducted during the 2015-2016 school year in Cedar Creek County School District (CCCSD), which happened to be the second full year of rolling out laptops for each student in grades three through ten. This is important because the teachers were more familiar with the logistics of the new technology and may have been more invested in using technology as part of their instruction rather than focusing on the overall logistics as they did in the first year of the rollout. CCCSD provided an environment that many districts strive to live up to, as far as technology integration is concerned and for my study it reduced the risk of researching a school that may not have technology professional development.

The model the district uses for evaluating how technology is integrated into classrooms is called SAMR (Substitution, Augmentation, Modification, and Redefinition). The Technological Pedagogical Content Knowledge (TPACK) (Mishra & Koehler, 2006) model is another well-known model used for teachers to thoughtfully interweave the three main foundations of technology—technology, pedagogy, and content—to develop good content and strategies for classroom learning activities. However, for this paper I will solely focus on the SAMR model because this is the model the school district uses. It's important to understand SAMR in order to comprehend one of the *rules* included in all of the activity systems of this study. Developed by Ruben R. Puentedura, the SAMR model is viewed as a ladder where S is at the bottom rung and R is on the top rung (See figure 3.3). The school uses this model as a way to look at a teacher's progression in their development of integrating technology into their lessons.

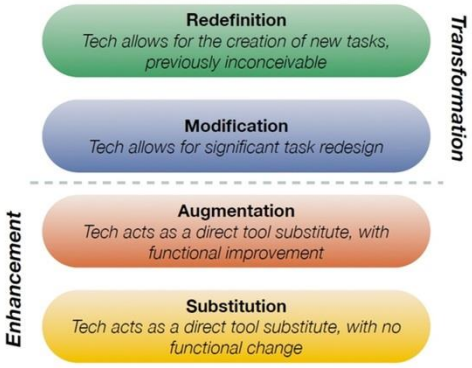

Figure 3.3: *SAMR*

At the Substitution level, an example would be a student using a Google document rather than a paper copy of a worksheet. The technology (Google document) is replacing a previous practice (using a worksheet) and there is no change in the learning style. At the Augmentation level, the student may use a Google document and send it to a classmate to collaborate. At this stage the technology is improving the function of the activity with the addition of collaboration. At the Modification stage, the student may use a Google document and collaborate with a classmate and then the classmate would use the comments feature to write feedback to the partner. At this level, there is not only collaboration taking place, but also critique of the work created between the students. The most advanced stage is the Redefinition stage. An example would be if students were to use Google Hangouts to collaborate with a classmate in a different city with a reciprocal arrangement, questions and pictures are shared using Google + and a group of students collaborate to create a report using their choice of Google Apps (e.g. Doc, slides, YouTube, Blogger) and the report would include multimedia elements. At this level, this is a task that could not have been considered before without the use of technology.

The School. Prior to deciding on a school to conduct my study, I chose to volunteer at the anticipated site, as soon as the school year began in August, in order to ensure that the school would be a viable setting for my study. I also wanted to meet the media specialist, whose love of

and expertise in using technology within literacy instruction I had heard a lot about from the community and from my own research. After volunteering for just one week I realized this was the site that I would conduct my study.

Live Oak Elementary (LOE) gives off a cheerful, positive feeling the moment you step foot into the lobby. Originally built in 1923, the school was recently renovated and includes the original ceilings, maple floors, the rotunda, and three brick arches were once in the front entrance. The new building features collaborative spaces and moveable walls. Each classroom is equipped with multiple outlets in the flooring, moveable tables and Hokki Stools that allow students to wiggle around while they stay seated. The environment allows for flexible seating and collaborative spaces, two recommended approaches for 21st century literacy learning.

LOE has a professional development partnership with a nearby research university. With this partnership, there is a professor on site at LOE for one day a week who teaches a course to university students, as well as, provides professional development to teachers. During the year of my study the university partnership course was a Makerspace course was taught in the media center. University students would come to LOE once a week during recess time and work with LOE's students and media specialist during their scheduled Makerspace time. Also, it is important to note that unique to the year of my study, each school in the district was able to choose if their students would take the end of the year assessment via their laptops, like that had the previous year, or as a paper and pencil assessment. LOE chose to take their end of the year assessment using paper and pencil. This decision was not made until March of the school year and was not a decision anyone at the school was expecting. It was assumed up until March that the assessment would be taken via the students' devices.

LOE has a “culturally diverse student body” according to the school’s website. The majority of the student population is white (44%), followed by 40% African-American, 7% Asian, 5% Hispanic, and 4% Multi-racial. The free and reduced lunch percentage is 58%. LOE is very proud of its digital learning and touts several highlights via their website:

- Media Specialist is certified with one prolific tech company in the US
- Interactive projectors and white boards
- iPads and iPods
- Laptops provided for teachers
- Mobile laptop computer labs
- Ongoing professional learning in the use of technology in the classroom
- Students in grades 3-5 take home district-provided devices
- Technology Model School
- Wireless Internet access school-wide

Participants

I was fortunate to begin and end with the same number of participants in my study. Next, I will describe of each of the participants in detail.

Adam. As mentioned previously, when I was first arranging the details of my dissertation study, and was looking for elementary schools to conduct my study, LOE was my first choice mainly because of Adam, the media specialist, and the work that I had heard he was doing with technology. I began to volunteer in the media center prior to the beginning of my study in order to build a relationship with Adam, the school, and to observe the ways in which he was using technology in the media center. Eagerly, I wanted to learn from him for my own teaching!

Adam is the school library media specialist at LOE and is certified as an innovator by a major tech company in the US. He has received many honors including the Library Journal Movers and Shakers during the year of my study, National School Board Association 20 to Watch in Education Technology, and a School Librarian of the Year finalist. He makes his work public through his award winning blog and is extremely active on Twitter.

As a media specialist who is very savvy with technology, Adam provides professional development in the media center to teachers at LOE. Teachers sign up for a time and then bring their students to the media center and either the teacher or Adam will lead the lesson. He believes this model to be helpful for the teachers in case something doesn't go as planned, he is there to assist and it's like a team-like environment. Adam shares why he prefers this model below:

> … (what) I've tried to talk a lot to teachers about is the idea that you don't have to be an expert in every piece of technology that's out there in order to use it because if you wait until you've become an expert in lots of things you've waited too long because then there is something new out and you've kept your kids from doing something. So, in the library I've tried to model to teachers the idea of risk taking in that if something doesn't work that it's not just "I'm going to throw my hands up and quit" (personal communication, November 12, 2015)

Adam hopes that eventually technology becomes more natural in the classroom where it's just a part of what the students are doing every day and "doesn't feel like this big event where everybody has to get out their computers and boot them up…" (personal communication, November 12, 2015). He sees technology becoming more natural to the classroom when the computers are "just always there and when they're needed…the kids move over and use the computer for this, but then they also have their book and have their paper and they just move

from one thing to the other very naturally like many of us do as adults" (personal communication, November 12, 2015). He feels that the way things are currently at LOE, technology is more of an event. He believes that it is going to take some time to get to that level where it's just part of what everyone does. "We are still really early in the 1:1 and so teachers are still figuring out what that means and how that changes that they are doing…" (personal communication, January, 24, 2016).

Eve. The principal of LOE, Eve, allowed me to conduct my research. There was a bit of negotiation process that occurred at the beginning of the school year, as my study was initially rejected due to a concern with the proposed amount of time for teacher interviews taking up too much of the teacher's time. You will read more about the negotiation process in the final section of this chapter. The study was approved once we were able to come to an agreement on a reasonable amount of time for interviews. Eve then emailed my research proposal to the entire school staff to assist in recruiting teachers. Her email allowed me access to one third grade teacher, Erin, and I was able to recruit an additional teacher, Hazel, through Erin.

Eve was a classroom teacher before becoming the assistant principal at LOE in 2001. She served as the assistant principal at LOE for nine years before she was named principal. Overall, she believes in what she calls a "balanced approach" to using technology. When planning lessons, she says teachers have to make decisions based on what they know about the students, about what the data says about their students, and about overall learning goals in order to decide if technology is the most appropriate tool to use in certain lessons.

Eve said that during her monthly principal meetings there has been a pretty consistent message across schools, especially this year about using higher levels of technology. As far as professional development for technology, Eve believes that teachers learn more from "on the job

training" where teachers are learning from each other. She also indicated that there wasn't much time for professional development during the school year, so during staff meetings she set aside time for teachers to share new technology that they have been using in their classrooms. However, I never heard the teachers talk about these instances.

Abby. LOE's Instructional Technology Specialist (ITS), Abby, is shared by four elementary schools in the school district and must be at each of the schools every week. Consequently, she is only working at each school one day per week. She is at LOE on Wednesdays to support teachers directly with their use of technology and to "help them integrate technology into what they're already doing and just really try to push technology and best practices with technology into the curriculum (personal communication November 18, 2015)." This is Abby's first year in the ITS position. Previously she was a gifted teacher at LOE. She feels it's important to have a good relationship with the teachers before she can talk about integrating any technology. She believes her work at LOE has been easier because she already had good relationships with the teachers due to her working at LOE in previous years.

In her role as the ITS, she said her job was to help teachers move from using technology as a replacement for pen and paper. "It [technology selection] depends on the grade level; it depends on subject matter. … the ultimate goal is getting teachers to use it [technology] in ways that really impact the kids, I think, and really open up windows for them to other places and simply wouldn't exist with a textbook and some paper" (personal communication, November 18, 2015).

In my study, Eve, Adam, and Abby are subjects within one activity system, identified as "the school". They all hold an administrative role and have responsibilities to support the

teachers with the integration of technology in their daily lessons. The other two participants, Erin and Hazel described below have their own separate activity systems.

Erin. Erin was the first teacher I met at LOE. She was eager to be a part of this study because she explained that she enjoys research and was currently pursuing a graduate degree. Her working career began in a bakery and she enjoyed it enough to pursue a degree in Food Science. With this degree she then worked in research and development for Skippy Peanut Butter in New Jersey. She also taught yoga and pre-school on a part-time basis. She found her passion while teaching preschool so she then pursued a preschool teaching certificate and then realized that she wanted to pursue a Master's degree in Early Childhood education. Following this degree, she ended up with a job at LOE. She began teaching kindergarten for three years, followed by three years in first grade, and this was her first year teaching third grade. At the time of the study, this was her seventh year at the school and by the completion of my study she was recognized as LOE's teacher of the year.

Since the focus of this study is on technology use, it's important to understand Erin's view of technology and the role it plays in her personal and professional life. She uses an app on her phone that wakes her up during a certain moment in her sleep cycle. Then, she reads the New York Times via an app on her iPhone and begins to get ready for work. Once she is at work she texts colleagues and friends throughout the day along with taking pictures of students, checking a variety of apps, and playing games. At work, on her district issued laptop, she creates documents, sends emails, creates presentations, conducts research, and reads online. While she uses a lot of technology in her personal and professional life she indicated that she used to feel tech savvy, but now feels "like it's starting to outpace me a little bit" (personal communication, December 8, 2015). She said that she's feeling this way because when she has student teachers

they come in and show her all sorts of new things she's never hear of before and this makes her feel behind.

At LOE, at the time of this study, this was the first year the entire school was using Google Classroom and it was the first year for Erin and her students participating in the 1:1 initiative as Erin had taught preschool the previous year and third grade was the first year students began participating in the 1:1 initiative. At first she thought "it's going to be a pain [to have laptops], it takes them so long" but then she realized, "I can't imagine them not having the devices because I rely on them so much for pushing assignments out to the students and having them do presentations together and sending e-mails and telling them to go to this website or that website for research" (personal communication, December 8, 2015).

Erin is one of four teachers on the third grade team. For lesson plans, each teacher is responsible for planning one subject per quarter and then they switch subjects. Erin likes that she is only responsible for planning one subject per quarter and feels that her team has "great lesson plans and feels really good about picking up what they plan and using it." For each week the lesson plans need to be drafted by Thursday which is the "walk through day." On this day, each member of the third grade team gets together so they can "wrap their head around what their supposed to be doing for the other subjects they didn't personally plan." During the course of my study, Erin planned science, reading, and writing. As for the format of the lesson plans, each teacher on the team uses the same lesson plan template. The teachers create their plans using a collaborative google slide show, which is displayed on the white board during the lessons. Below is a sample (figure 3.4) of one slide from a read aloud lesson which is displayed on the white board for the students to reference during the lesson, but also serves as a pacing guide for the teacher during the lesson.

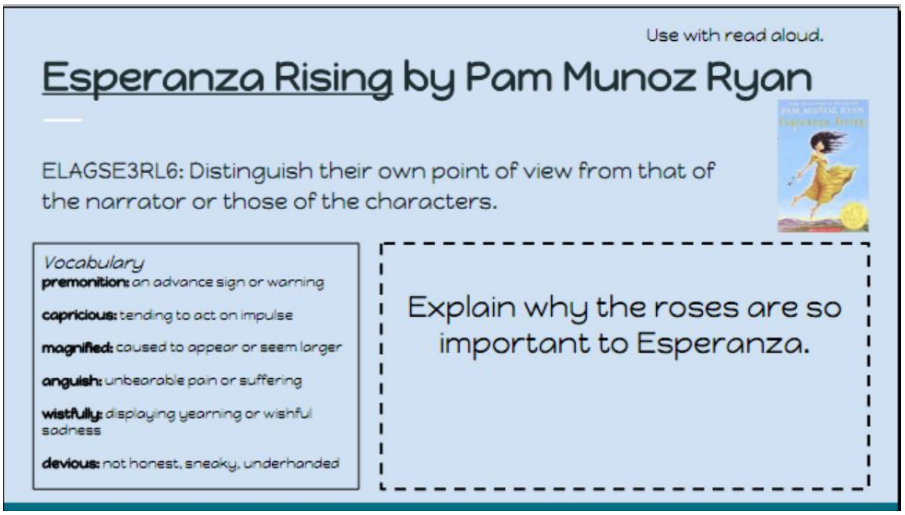

Figure 3.4: *Teacher Slide*

In Erin's classroom she uses the Daily Five (Boushey & Moser, 2016) structure during the literacy block. The Daily Five "is a framework for structuring literacy time so students develop lifelong habits of reading, writing, and working independently" (p.23) In Erin's classroom, this is how the Daily 5 looks:

10:15-10:20 Whole group reading lesson

10:20-10:25 Students choose between: read to self, work on writing, read to someone, listen to reading, or word work (Erin records their choices)

10:25-10:40 Students work independently while Erin pulls small groups

10:40-10:45 Whole group reading lesson

10:45-10:50 Students choose between: read to self, work on writing, read to someone, listen to reading, or word work

10:50-11:05 Students work independently while Erin pulls small groups

11:05-11:15 Whole group writing lesson

11:15-11:30 Students' writing time

Throughout the literacy time technology is used by both Erin and her students. During the whole group lesson, a Google slide is projected similar to figure 3.4 while the teacher either reads a book aloud or projects writing on the board for student and teacher interaction. During independent work students have the choice to use their netbooks depending on their Daily 5 choices. If they choose 'read to self,' the students chose to read a book in print or on their netbook. Students who 'worked on writing' would most of the time use their netbooks to access the Google doc they were working from. Students who were 'reading to someone' would sit side-by-side a partner and read the same book, which was always a printed book. 'Listen to reading' would always happen on their netbooks. Students would pull up the Sqworl (a visual bookmarking page) and make a choice from preselected links to find a story to listen to. 'Word work' would happen in a small group with me either on their netbooks, with paper/pencil, or with whiteboards.

Hazel. When my study was first approved I needed to recruit at least one more teacher. I set up a meeting with Erin to talk about the logistics of my study with the hopes of recruiting a second third grade teacher. I arrived at LOE right as the students were getting out for the day. As I was waiting in the hallway outside of Erin's classroom for her to return from car duty, I saw Hazel, a teacher who I had met before at my university. We caught up a bit and then Erin arrived back in her classroom for our meeting. During my conversation with Erin, I asked if she thought Hazel would be interested in being a part of my study. Erin said she would talk with Hazel, and thought that since I was going to be helping Erin and her students with word study (Bear, Invernizzi, Templeton, & Johnson, 2016) Hazel would definitely be interested. Later that week Hazel agreed to be a part of my study.

Hazel is an extremely caring teacher. She had a very close relationship with each of her students and it was apparent that her students felt comfortable coming to her about their personal worries or confusions with their work. The strong relationships that I witnessed Hazel having with her students could be due to her undergraduate degree in Child and Family Development. When she first started college she thought she wanted to do something with the Division of Family and Children Services, and then upon completing her degree she decided that she wanted to teach. She immediately pursued a Master's degree in Early Childhood Education. She completed her student teaching in pre-K at LOE along with working in the after school program. Upon graduation, she continued to work in the after school program and served as a long-term substitute PreK teacher. At the end of the year, the principal offered her a job in third grade and she has been at LOE ever since. At the time of my study, she had been at LOE for eight years and was in her second year of teaching third grade at LOE. Her first year in third grade was the first year of the 1:1 device roll out.

> In her personal life, Hazel says her husband makes fun of her and says that she is "old school"; however, she believes she handles technology well. I don't rely on it [technology] as heavily as I think some people do, but as far as my job and communicating with people…I feel like I'm always on my computer doing school stuff…I like to learn about new things that are happening. I'm on the technology leadership team for third grade and so I have meetings and we talk about things then I bring them back. It's kind of cool I'm doing lots of learning about it (personal communication, December 15, 2015).

Hazel hasn't taught third grade without the 1:1 devices. She said that during the first year of 1:1 initiative—the year before my study—she felt that she had difficulty keeping her students

on task, but this year she feels that she's been able to give her students more "appropriate and engaging things…and my monitoring has gotten better as I've gotten more experience" (personal communication, December 15, 2015). She says that she notices that her students enjoy learning the new technology as much as she does. Compared to her first year, she said that this year she was able to begin the year with things that she learned in the middle of the year last year, which were successful. Hazel felt that beginning the school year with the procedures for the tools that the students would use for the entire year was important so the students "know what they're supposed to do, they get it turned in, they know I'm going to grade it and send it back to them" (personal communication December 15, 2015).

Hazel's literacy schedule is very similar to Erin's in using the Daily 5 format. Her literacy schedule is as follows:

10:00-10:15 Whole group reading lesson

10:15-10:30 Students choose between: read to self, work on writing, read to someone, listen to reading, or word work (Hazel records their choices). While Students work independently, Hazel pulls small groups

10:30-10:45 Whole group reading lesson

10:45-11:00 Students choose between: read to self, work on writing, read to someone, listen to reading, or word work and Hazel pulls small groups

11:00-11:15 Whole group writing lesson

11:15-11:45 Student independent writing time

Students sit on small stools at tables of four to five per table. During whole group instruction, students come to the front of the room to sit in their "carpet space" so they can see and interact with the classroom white board. During the Daily Five activities students use their netbooks

during ‘Work on Writing’ to open up Google Docs and ‘Listen to Reading’ by opening up a Sqworl page that lists websites that offer audio books.

Me: The Researcher. With the use of third generation Cultural Historical Activity Theory (CHAT) the researcher can play an important role in the study. Through my interactions within both of the teacher’s activity systems, I was able to gain a perspective that I may have been unable to experience had I just been an observer. Since I was a participant within this study, it’s important to describe my background.

I have six years of experience teaching both first and third grade students, as well as, four years of experience teaching preservice teachers in their literacy courses. I have always had an interest in using technology in my teaching and had just come from an elementary school that had a STEM focus. As a third grad ELA and social studies teacher at this school, while we did not have 1:1 devices, we did have a wealth of technology that I incorporated into my lessons. As I reflect on the technology lessons I conducted and the current literature I have been reading with regards to how technology should be implemented, I feel that I was in awe of the wow technology had on the students rather than the enhancement factor.

Coming into these teachers’ classrooms and remembering my own experience as a teacher, I remembered really appreciating the visitors that did more than just observe. With this in mind, I informed both of the third grade teachers, Erin and Hazel, that I was willing to help them in any way and wanted to help them out rather than make them feel uncomfortable. Both of the teachers wanted me to pull small groups of students during their literacy block to work on word study using Words Their Way (Bear, Invernizzi, Templeton, & Johnson, 2016). Both of the teachers were required to use Words Their Way, but were unsure of how to differentiate the

groups. This happened to be something that I was familiar with and was able to implement in both classrooms using technology.

I was in each teacher's classroom two days per week (four weeks total per week) and throughout the course of the study I conducted small group differentiated instruction around Words Their Way in Erin's classroom. In Hazel's classroom, I pulled small differentiated groups focused on Words Their Way for half of the time I was in the field and then for the last half I pulled small homogenous groups to work on comprehension test preparation.

Research Methods

Data collection took place from November 2015 to May 2016 (see table 3.1). The data collected included audio recorded and transcribed individual interviews with teachers, the media specialist, ITS, and the principal; my interviewer notes; observation field notes from classroom observations; lesson plans from the entire course of the study; and email correspondence. See appendix B for a detailed data collection chart.

Table 3.1: Timeline for data collection

<table>
<tr><td colspan="10">Timeline for data collection for the 2015-2016 school year</td></tr>
<tr><td>August</td><td>September</td><td>October</td><td>November</td><td>December</td><td>January</td><td>February</td><td>March</td><td>April</td><td>May</td></tr>
<tr><td>Submitted research proposal to school district</td><td>Declination by school district of research proposal</td><td>Met with district research coordinator to revise proposal.</td><td>Proposal Accepted</td><td colspan="6">Observations in teacher classrooms 4 days/week (2)
Monday/Wednesday-Erin's Classroom
Tuesday/Thursday-Hazel's Classroom</td></tr>
<tr><td>Gained University IRB Approval</td><td></td><td></td><td>Initial interviews with all 6 participants.</td><td></td><td></td><td></td><td>Second Interview with teachers (3)</td><td></td><td>Final Interview with all 6 participants</td></tr>
<tr><td colspan="10">Volunteered in school media center (Aug.-May)</td></tr>
</table>

Interviews

The interviews I conducted with my participants mirrored Yamagata-Lynch's (2010) descriptions of interviews,

> "From an activity theory perspective, interviews help identify information about the subject, existing or lacking tools, and the subject's perspectives about the object. Participants may also share information regarding documents and artifacts that relate to existing rules and division of labor. It is also likely that participants will be able to provide information about the communities in which their activities are situated (p. 86).

I found this to be true as I conducted three one-hour, one-on-one semi-structured interviews with each of the two teachers and two, one-hour interviews with the principal, media specialist, and instructional technology specialist (see appendix A for interview #1 questions). The interviews took place in each participant's preferred location: the office (media specialist, principal, ITS) or classroom (teachers).

The first interview allowed me the opportunity to learn the educational background of each of the teachers, their view on using technology within their lessons, how they gain their technology knowledge that they implement in their classroom, and their plans for using technology during the school year. The second interview was conducted mid-study with the three teachers only and was focused on clarifying any questions that arose during my observations for the first half of the study (see appendix A for interview #2 questions). The final interviews with all six participants were focused on answering any final questions I had as I looked through the data collected and any clarifications I wanted to gain from what I had observed thus far (see appendix A for interview #3 questions).

Observation Field Notes

Observation field notes were taken during formal and informal interviews and during informal and formal observations (November-May). I spent four days per week observing each of the teachers. I was in Erin's classroom Mondays and Wednesdays and Hazel's classroom

Tuesdays and Thursdays. I recorded my observation field notes in a small notebook and took pictures with my iPhone, when it seemed necessary. The pictures were used to help aid my memory in expanding my observation field notes once I left LOE for the day. In order to be present and as a natural part of the classroom, I took small jottings during the observations and then expanded these jottings once I left the classroom for that day in ATLAS.ti so that I made sure not to risk losing important details from memory (Mack, Woodsong, MacQueen, Guest, & Namey, 2005).

Documents

Erin provided me access to the third grade teachers' Google Drive account where the teachers collaborate on lesson plans. I was able to have access to all of the lesson plans so that I could analyze the lesson plans I observed as well as the lesson plans for the days in which I was not present. Each quarter a different teacher was in charge of a different subject's lesson plans. I used the lesson plans to compare how the lesson plan was executed compared to how technology was positioned within the written lesson plan. In addition, I looked at the technological tools the teachers were using to see their purpose and how they aligned with the school's SAMR model. I was also provided access to observation tools used by the principal and the ITS, which included observations based on SAMR.

Data Analysis

I used the ATLAS.ti software (Windows version 7) to organize my observation field notes, pictures, lesson plans, and various other documents. ATLAS.ti is generally used for aiding researchers as a way to organize unstructured data and then provide a coding tool that allows for line by line coding and easy retrieval of data coded according to a specific code. In order to learn how to use this workbench of sorts I attended a two-day ATLAS.ti workshop in

January 2016 as well as watched several video tutorials offered by ATLAS.ti to learn the full functionality of the software. I then consulted Paulus, Woods, Atkins, and Macklin (2015) for the reporting practices of ATLAS.ti. It's important to remember that ATLAS.ti does not code the data, I, the researcher, used ATLAS.ti as a tool to help me organize and analyze the data.

After importing all of my data into ATLAS.ti, I referred back to the basic elements of CHAT (tools, rules, community, and division of labor) as well as looked at any tensions that seemed to stand out and any goals the subjects discussed. I read through all of the transcripts and observation field notes and coded each document with either tools, rules, community, division of labor, tensions, or goals, the critical components in third-generation activity systems. See Figure 3.8 to see how the open coding feature was used to code for the basic elements of CHAT. Coding the various tensions helped me to identify if it was a contradiction due the amount of times the tension was coded and if there was language that signaled history or repetition.

With ATLAS.ti, there is a way to filter the data so that you can view the data for each specific participant or two participants at a time (depending on the task at hand). This filtering of each participant's data is called a *code family*. For example, when I wanted to know all of the tools I coded for Erin in all of documents. I clicked on the code family for "Erin" and then click on the code "tool" and I would be able to quickly view all of the quotations that included tools for Erin's documents. See Figure 3.5 to see how the participant's documents have been filtered to only view those for 'Erin.'

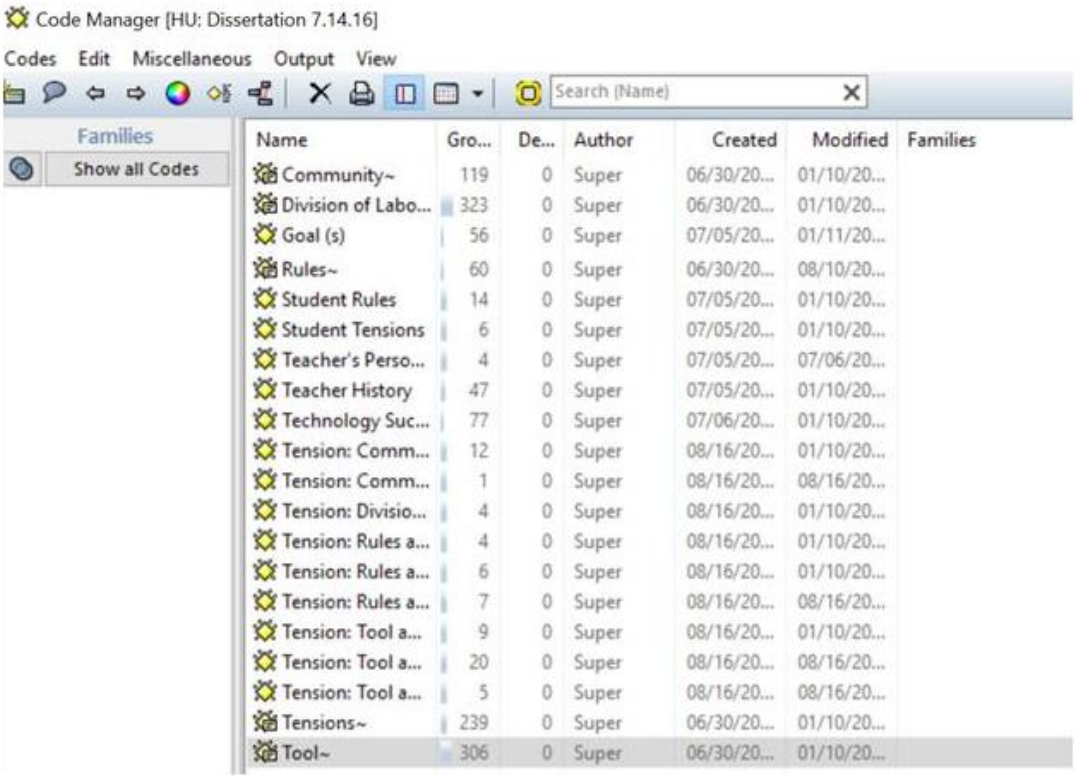

Figure 3.5: *ATLAS.ti Code Manager*

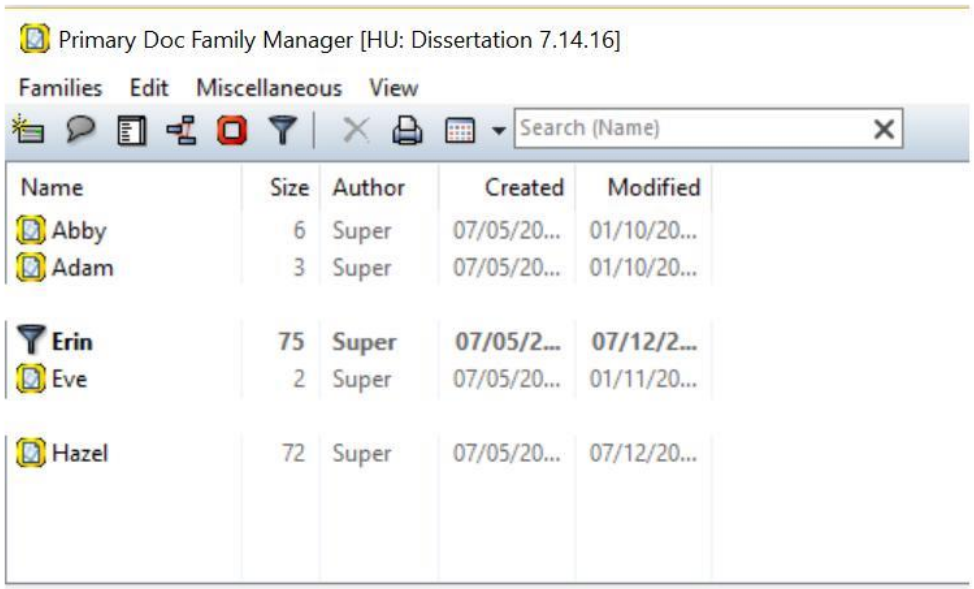

Figure 3.6: *ATLAS.ti Code Family Manager*

After coding all the data for all participants I then organized the data into the activity pentagon model. I used the five facets to organize the contradictions within each of the three

activity systems. Once all of the CHAT components and contradictions were identified, I was able to see the relationships between each activity system. I then wrote a case study for each participant and then was able to more easily conduct a cross-case comparison which helped identify the contradictions and the sources of change for each activity systems.

Following the analysis of contradictions, in order to answer my second research question: *How are teachers' socio-historical experiences with technology informing their pedagogical applications of technology?* I looked back at the data and applied the five tenants of CHAT as described by Engeström (2001) to the data, I looked at the data and considered my experience collecting this data and asked myself, in general: How are these activity systems interacting?, Who is involved within these systems?, What is the history of this activity system?, What has happened to bring them to this point?, Of the tensions and contradictions coded, why are they tensions/contradictions?, What other tensions/contradictions are there within these systems?, What transformations are occurring or could occur as a results of the tensions/contradictions? I documented my responses to these questions using memos in ATLAS.ti.

In addition to using ATLAS.ti, I used Microsoft Excel to analyze the lesson plans more closely. I created one spreadsheet for the reading and writing lesson plans, since both teachers used the same lesson plans. I combed through all 75 lesson plans and created a table to see patterns. I looked at the type of technology that was included in the lesson plans (e.g. Google Document, website, PowerPoint), the purpose or function of the technology (e.g. student literacy work, online writing, directions), who the primary intended user was for the technology (e.g. the students, the teacher), if the technology was required or if there was a choice in using it, the SAMR level, and if the technology used was planned or if it was a spontaneous/unplanned use. I conducted this analysis to see if there was any discrepancy between what I was observing and

what was planned with technology. If technology was not being used as planned, I wanted to look back at my descriptive field notes to understand the discrepancy. An example of how I analyzed the lesson plans can be found in appendix B.

Ethical Considerations

When considering the quality of my study, I relied upon Russell, Gregory, Ploeg, Dicenso, and Guyatt's (2005) perspective on the enhancing the overall quality of trustworthiness in qualitative case study research. These scholars posit that to achieve this, researchers have a responsibility to ensure that (a) the case study research question is clearly written; (b) case study design is appropriate for the research question; (c) data are collected and managed systematically; and (d) the data are analyzed correctly. Throughout my study I made sure to stay true to presenting this study with the most accurate depiction as I respect the school district and participants in this study.

In addition to trustworthiness, I also established credibility with my participants through prolonged engagement, meaning that I was in the field for a sufficient amount of time to truly understand the culture, social setting, and phenomenon of interest. As mentioned previously, I first began my relationship with LOE, in August, at the beginning of the 2015-2016 school year by volunteering in the media center while I was awaiting IRB approval from both my university and the school district. There was not an issue with gaining approval from the university IRB office, however, the school district initially rejected my study due to a few concerns. I visited the school districts office to discuss their concerns that they sent via email in mid-September:

- The principal of Live Oak Elementary had concerns about the time commitments of teachers participating in this study. She does not want to participate at this time.

- District-level personnel were concerned with the nature of the proposal itself, specifically with its focus on contradictions or tensions to literacy/technology integration. It is unclear whether these obstacles result from teachers' socio-historical experiences or some shortcoming of district or school-based personnel. An exploration of the infusion of technology in literacy instruction at one or multiple school setting(s) could result in valuable research findings, so long as the researcher does not assume the existence of obstacles at the outset. These assumptions serve only to bias research and narrow the focus of what should be a more open-ended project. This approach diminishes the usefulness of collected data, and the evaluation of ongoing activities. (personal communication, September 16, 2015)

It was district policy that researchers not contact the principals directly, but work with the university-district liaison and the school district Coordinator of Research. I gained permission to talk with the coordinator of research at the district office and reassured him that I was flexible with the time commitments and was willing to work with the principal to find a time allotment that she felt was feasible.

The major concern was with the idea of qualitative research and that I was coming in with assumptions that there were tensions for the teachers in using technology in their classroom. The district wanted to know what they would gain from my research study and that my sampling of "just two classroom teachers" wouldn't be helpful in generalizing the findings. In defending qualitative research, I ensured him that through the results of my case study he and other stake holders would be able to learn vicariously through my study of these teachers (Stake, 2005) which would offer a way to understand how this new initiative of one-to-one devices was working in reading and writing. I will be sharing the results of my study with LOE's school

board, which will offer insights and illuminate meanings that may not have occurred without an observer present and may allow for insights that have the potential to structure future research (Merriam, 1998).

A second major concern of my proposed study was the language of contradictions and tensions used in my research question, which was used because it is the language of my theory. We discussed the theory and how the contradictions and tensions are viewed a source of change. Through this discussion we were able to agree that I would look at how technology was being adapted and employed in the classrooms as well as how the teachers were being supported with technology use. Once we had agreement, I was able to move beyond volunteering in the media center and enter the classrooms of my teacher participants. I continued to volunteer throughout the entire duration of the study for two hours per week in the media center. Serving as a researcher for nearly two quarters of the school year, I was able to build trust with the teachers that they began asking for advice on technology.

I wanted to make sure that my study had transferability (Lincoln & Guba, 1984), meaning that other researchers would be able to replicate this same studying in different times, settings, situations, and with other people. I made sure that the specifics of my study were detailed in my descriptions in this chapter so that another researcher could replicate my study with different participants.

For dependability to occur in a study, external audits are recommended for an outsider to take a look at the research process and findings and have a chance to provide feedback that would lead to additional development of stronger and/or better articulated findings. Since this is a dissertation study, I will have my advisor and committee members provide feedback for this study in order to assist in improving the study.

Finally, to ensure confirmability the researcher can make sure to create an audit trail which is a description of the research steps taken from the start of a research project to the development and reporting of the findings. Through this study I kept a research journal of not only the observations I made, but the thoughts that I had and the decisions that I was making along the way. I believe that each of these measures taken ensure my study is of the upmost quality. In addition, prior to submitting any of my research for publishing, in order to honor member-checking (Doyle, 2007; Merriam, 1998) I will submit the manuscripts to all of the participants to gain approval for selected narratives that will appear in published pieces.

CHAPTER 4

FINDINGS PART I

In this dissertation, the findings are separated into two chapters. This chapter focuses on the first research question and the following chapter will focus on the second research question. The focus of this chapter is describing the relationships that exist between the teachers' activity systems and the school. All three of the activity systems share the same object of integrating technology within literacy instruction, but the nuances related to the object differ. In addition, I will describe the factors which may be contributing to instructional contradictions of technology-infused literacy learning in the elementary classroom.

This chapter is organized in four major sections. In the first section, I will describe each of the activity systems separately. The second section will highlight the relationships between each activity systems. Then the description of each activity system's contradictions will be described. In the final section, I conduct a cross-case analysis of the major contradictions across all of the activity systems within this study.

The Activity Systems

Three activity systems were analyzed as part of this study. Erin and Hazel were third grade teachers and their activity systems are analyzed separately. Live Oak Elementary's activity system, described last, is the third system and it includes the principal, media specialist, and ITS.

Erin's Activity System

Erin, the subject of this activity system, identified her objective (figure 4.1) for using technology in her classroom as something:

> they're [the students] going to have to use technology in their professional life. They're going to have to be comfortable with it. So, I think it's part of our job to get them prepared for that… I think they're also going to be needing to create things with technology and so I think they need to have a very high comfort level with technology to be able to do that in the future. I think it's a career readiness skill.

Erin feels that it is her responsibility to prepare students to use technology as a readiness skill and to feel self-efficacy in using it.

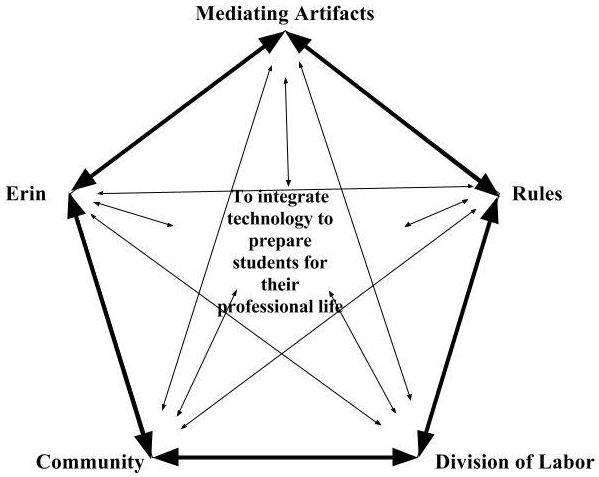

Figure 4.1: *Erin's Object*

Mediating artifacts. Within Erin's activity system there are mediating artifacts or tools that regulated interactions within her classroom (Cole, 1999). See figure 4.2 for the tools Erin

used most often. There were tools that were observed, mentioned in interviews, as well as, several tools that I did not observe, but were included in the lesson plans provided to me. I included both the observed and unobserved tools in my analysis. In Erin's classroom she uses the district-mandated Google Classroom Suite to communicate and collaborate with her students, parents, and colleagues (community). The features she used most frequently included Email, the documents feature for students to compete assignments, and the slideshow feature to create lesson plans to project onto her white board through an Epson projector. During many of the lessons, a worksheet was projected on the white board for students to raise their hand to answer a fill-in-the-blank or multiple choice question. During independent work time students would access their Sqworl page (a visual bookmarking tool) for their options during their work time. Choices on the Sqworl page were decided by the third grade team and included sites like Storylineoneline.net, americanfolklore.net, uniteforlitercy.com, and readingrockets.com. When it was time to transition between tasks Erin used ClassDojo as a way to reward student for good behavior, which also immediately notified parents who had downloaded the ClassDojo app on their smart phone. ClassDojo is a web-based behavior management tool for the classroom. Each student has a profile-complete with their own avatar- to which teachers can assign positive and negative points (or 'dojos') throughout the school day. An entire listing of the tools used in Erin's classroom can be found in appendix D.

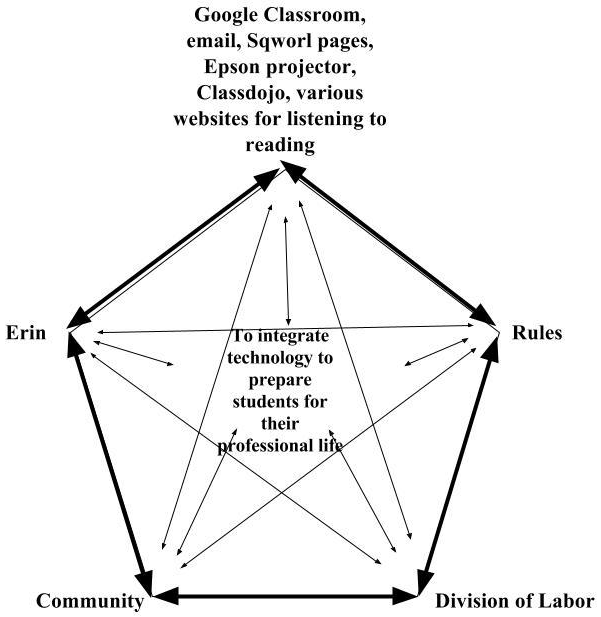

Figure 4.2: *Erin's Tools*

Rules. Within Erin's classroom there are rules (figure 4.3) she has for her students, rules that the school has for her, and rules that the school district places on the school. Erin has specific rules for her classroom that she enforces. One of these rules is that students must stay within Google Classroom and may only exit if they use an external link posted in Google Classroom. She encourages students to use their laptops safely by not going to inappropriate sites such as gaming or shopping sites. Through the district's provided software system called LanSchool she is able to keep an eye on all of her students' screens on her personal laptop, in addition the school district uses filters to block inappropriate websites to restrict student access.

The school has rules for each of the students with a 1:1 device. The students must take these devices home each night even if their homework does not involve their device. For the teachers, the school expects the teachers to use technology during all of their lessons and begin thinking about the SAMR model (discussed in detail in chapter 3) and where their lessons are on

the model. By beginning to think about this model then LOE can continue to keep up with the school district expectations of the teachers at LOE being the districts flagship technology school for using the most innovative technological practices. The district also expects the teachers to use the devices provided to the students during instruction. At the school level, teachers much follow the Positive Behavior Intervention Support (PBIS), described as:

> a framework or approach for assisting school personnel in adopting and organizing evidence-based behavioral interventions into an integrated continuum that enhances academic and social behavior outcomes for all students. PBIS IS NOT a packaged curriculum, scripted intervention, or manualized strategy. PBIS IS a prevention-oriented way for school personnel to (a) organize evidence-based practices, (b) improve their implementation of those practices, and (c) maximize academic and social behavior outcomes for students. PBIS supports the success of ALL students (Positive Behavioral Interventions & Supports, 2016)

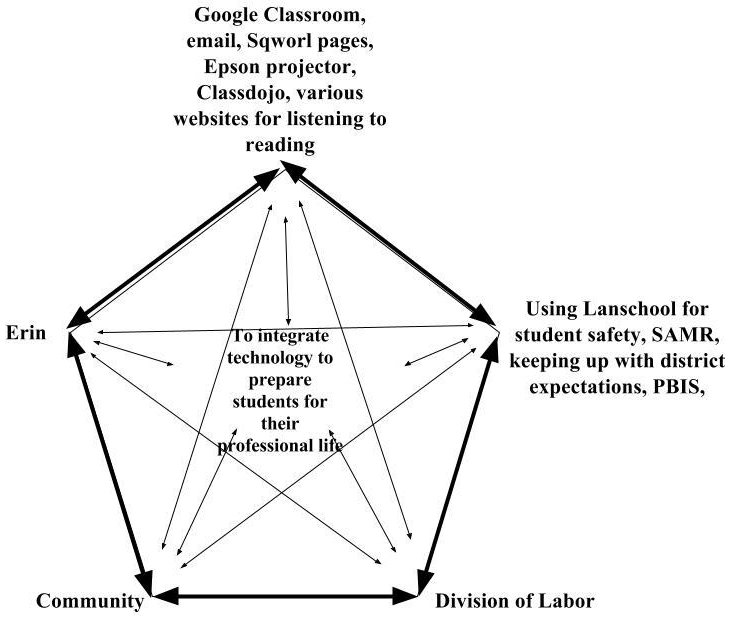

Figure 4.3: *Erin's Rules*

Division of labor. As you would expect, Erin's role (Figure 4.4) as an elementary school teacher is fairly typical during the literacy block. She assists students in revising their writing, holds small group instruction as well as whole-class instruction, makes sure the class follows the designated class schedule, controls students on-task behavior, grades students work (mostly through Google classroom), prepares students for assessments, coordinates with the special education teacher to ensure their lesson plans align, and collaborates with her grade-level team on lesson plans. A full listing of the division of labor within Erin's activity system can be found in appendix E.

Erin teaches all subject areas to her class of third grade students. Erin communicates with the families of her students through Email, ClassDojo (an interactive classroom management tool), and through paper communication if the family specifically requests printed communication. Erin is interested in technology and thinks it's important to help tech leaders

like Google Classroom and ClassDojo evaluate their tools, so she makes sure to compete the evaluation surveys each time she receives one by Email

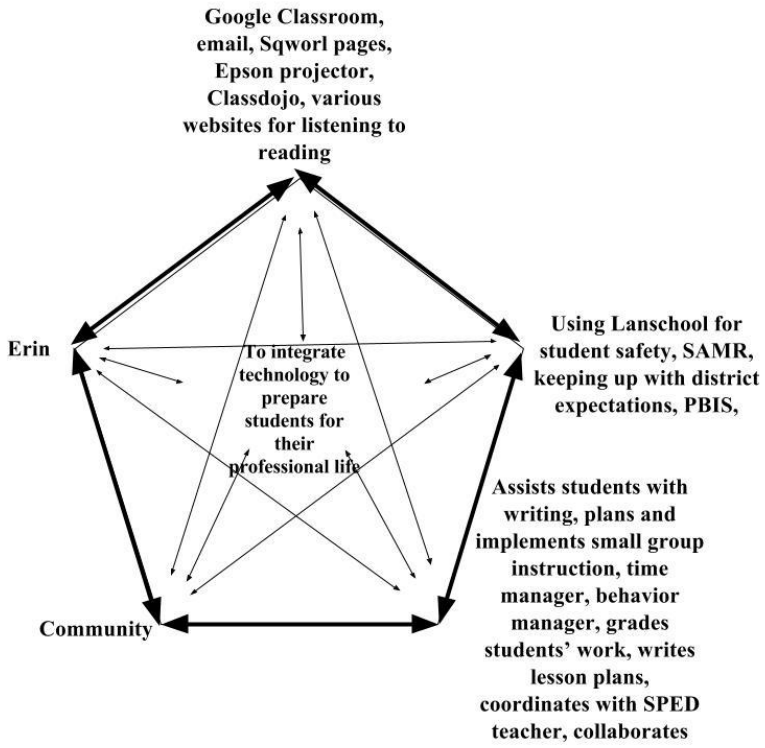

Figure 4.4: *Erin's Division of Labor*

Community. Periodically the principal, vice-principal, or members of the school district come into her classroom for observations using a standard evaluation form which is used for every teacher in the school. At LOE there is an instructional technology specialist (ITS) whom is at the school one day per week since she is split between four other schools in the district. Other technology support at the school includes the media specialist who holds classes for all grade level in the media center throughout the day. Unique to Erin's classroom is a special education teacher who comes into the classroom every fifteen minutes for a four of the students in Erin's class. During the time of the study, Erin had a student teacher in her classroom for the second half of the year who taught the lessons planned by the third grade team for two weeks. Erin also had me, a researcher, in her classroom two days a week observing and teaching small

groups of students during the 90-minute literacy block. See figure 4.5 for a listing of Erin's community.

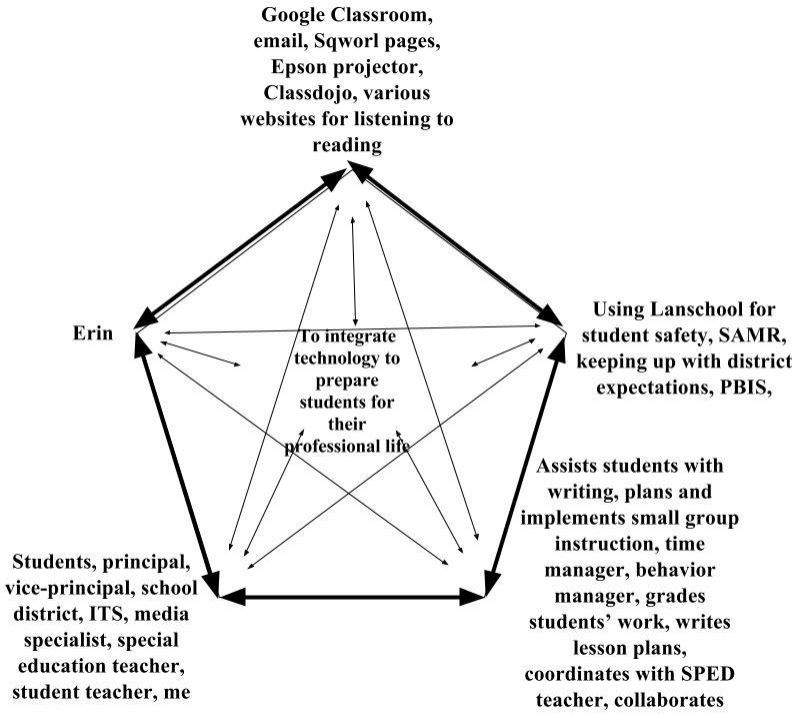

Figure 4.5: *Erin's Community*

Hazel's Activity System

> Hazel explains her objective (figure 4.7) for integrating technology:
>
> To be able to provide: access to technology because as they [the students] get older they're going to have more opportunities to use it and so especially for my kids who don't have a lot of resources, it's just a really good for them to have experiences with technology (personal communication, March 17, 2015).

Hazel feels that by providing access to technology in her classroom will allow her students to have technological experiences that they may not get from their home environment.

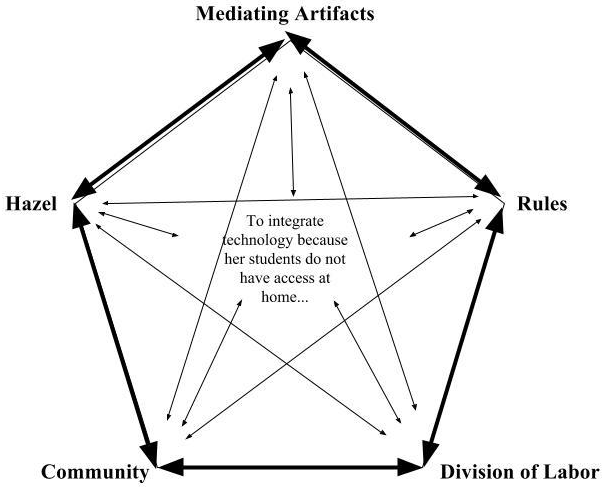

Figure 4.6*: Hazel's Object*

Mediating Artifacts. When it was time for the Daily 5, and the majority of the students were settled and on the carpet in front of the white board, Hazel would project the ClassDojo page and give points to students were sitting in their spot quietly ready to learn. After the points were awarded she would pull up a Microsoft Excel spreadsheet listing all of the students' names. This spreadsheet was used as a way of keeping track of which student's turn it was to choose the Go Noodle song. After a whole group lesson and the students had made their Daily 5 choices, those students who were working independently would either be reading a book, working on writing on their netbooks via a Google document, or would choose from a list provided on a Sqworl page to find a story or video to listen and/or watch. The links they could choose from to listen to reading included were the same as Erin's options. See figure 4.8 for a visual of the mediating artifacts.

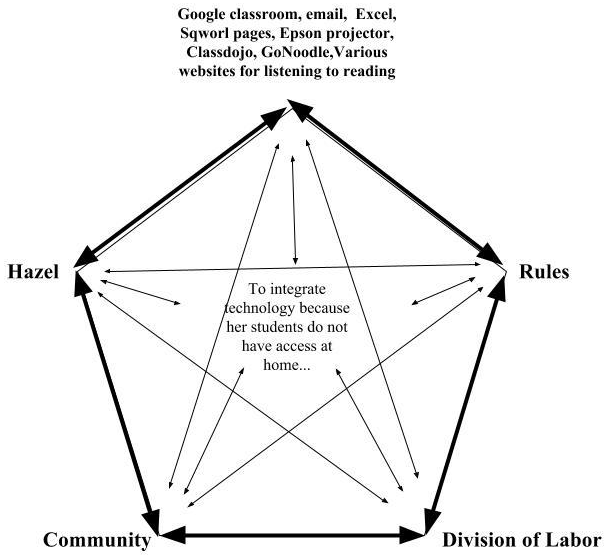

Figure 4.7: *Hazel's Tools*

Rules. Each morning when I entered Hazel's classroom students were just finishing up their independent Math work. In order to transition to the Daily5, Hazel would whisper to one of the students at about 9:58am to ring the chimes in the corner of the room to signal that it was time to clean up and head to their carpet square. The students knew that when they heard the chime the rule was to clean up and gather at the carpet for the next task. Another one of Hazel's rules for listening to reading was that if students forgot to bring their own personal headphones, then they could still listen to the story they chose they just had to make sure the volume was low enough that only they could hear it. Similarly, as Erin, Hazel had to follow PBIS, think about the SAMR model, and use LANSchool to observe student's screens.

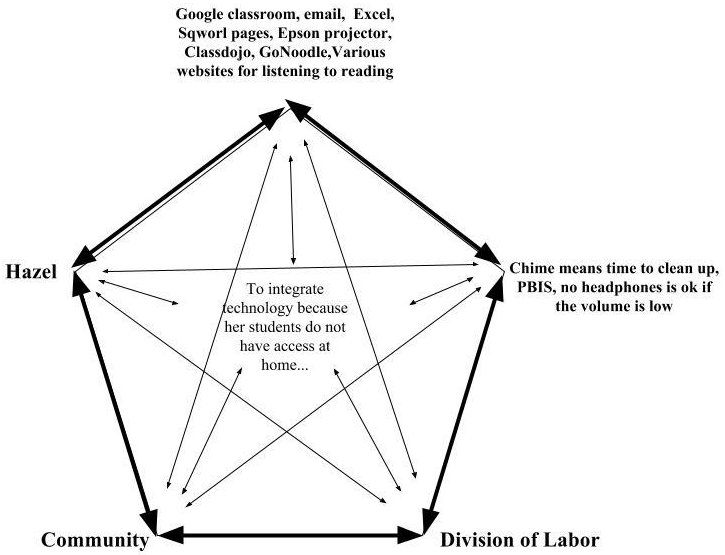

Figure 4.8*: Hazel's Rules*

Division of Labor. As explained in Erin's section, the lesson planning for the third grade team was split up by subject and rotates teachers each quarter. While discussing lesson plans, Hazel said that she was excited to incorporate new technology into her plans, but didn't want to overwhelm her teammates. To avoid them feeling overwhelmed, she said she would try out the new technology first in her classroom and then share with the team about how it went in case they were interested in using it after she had tried it out.

If you were to walk in to Hazel's class after students had made their Daily 5 choices, you would see students scattered all around the room. Hazel would be working at the kidney table with a small group of students either reading a book together, talking about a section of a book they had just read, or working on writing together on their netbooks. You would see me in the front of the room near the white boards with a group of five to six students working on word work either on their netbooks, on mini white boards, or on paper.

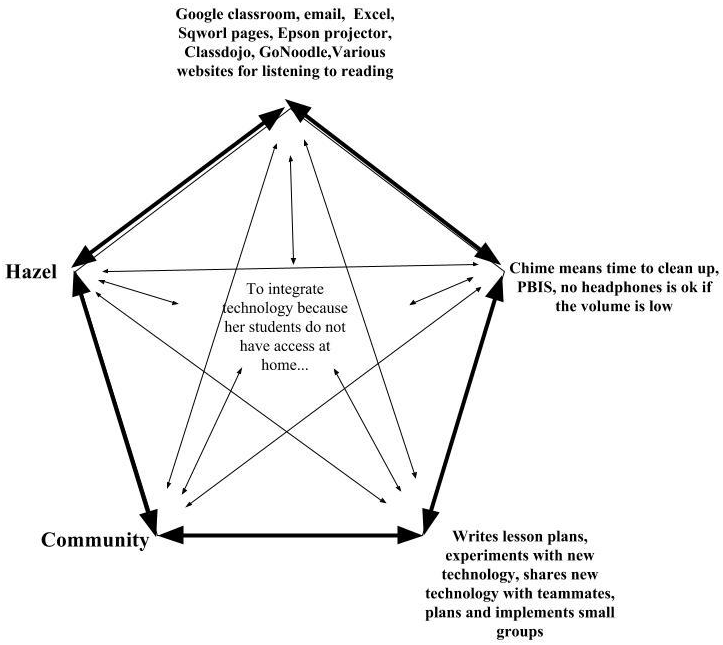

Figure 4.9*: Hazel's Division of Labor*

Community. Hazel's community included, of course her students, Adam, Abby, Eve Hazel, and the other third grade teachers. Hazel was also a part of the technology leadership team. Hazel also had a special education teacher in her classroom. See figure 4.11 for Hazel's entire Activity system.

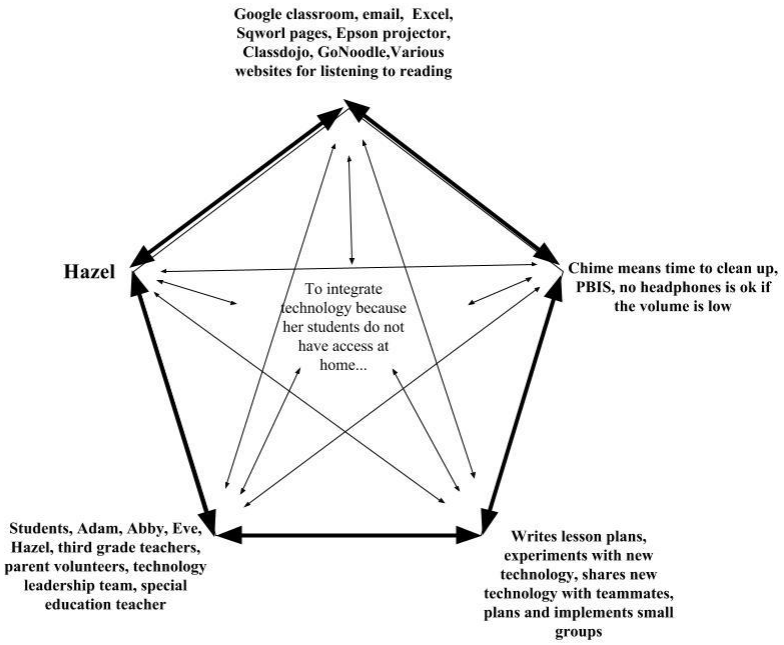

Figure 4.10*: Hazel's Community*

Live Oak Elementary's Activity System

The school's case or activity system includes those who assist teachers in learning best practices for integrating technology. Those included in this case include the principal, Eve; the media specialist, Adam; and the instructional technology support, Abby. Each of these participants' objectives within this activity system must be noted to understand the activity. Eve explains the importance of integrating technology as something that:

> …opens up lots of different resources that we don't have access to and it allows students and teachers to learn in different ways together and there is so much out in the world to be able to use to enhance learning that you wouldn't necessarily get from print resources and so I think it's important for kids to be able to have access to that and I also think it helps kids learn just about the world they live in and I love all the ways we allow kids to

> share their work with audiences outside of our school and that's really important for kids to feel like things they do matters to somebody (personal communication, May 17, 2016).

Adam feels that "it's important that we're modeling for kids what it's like in the real world and how we use devices and how we manage to balance our time as much as we can which comes harder and harder to do with so many distractions with technology." As for Abby, she confirmed that technology is important because, "… kids like it, kids learn with it and without it, they're bored, they're not learning like they did" (personal communication, May 17, 2016). All three subjects acknowledge that technology is allowing students to learn in authentic and meaningful ways. Because this is an activity system with multiple subjects (Eve, Abby, Adam) there needs to be a shared objective that is transforming the activity of the subject(s) (Postholm, 2015). Postholm (2015) stated that the subjects can decide what they want to develop within the frames of these themes, hence their explanations of their goals above. Further, "… there has to be dialogue between all practitioners in school, both teachers and school leaders, so that they can develop a shared object or a vision they can act on" (Postholm, p. 51). At Barrow, this "dialogue between practitioners" is in the form of a school improvement plan. For the 2015-2016 school year, performance objective D, Initiative 3 was to "Monitor and evaluate the ongoing development of digital learning environments" (LOE's school improvement plan, p.4).

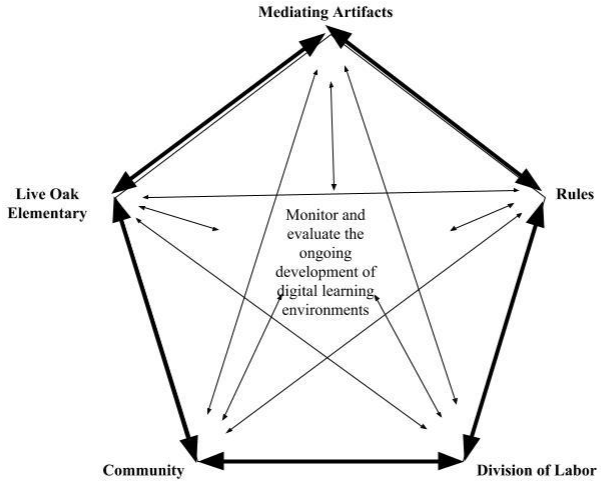

Figure 4.11*: LOE's Object*

Mediating Artifacts. The school has all of the tools available that both Erin and Hazel used within their classrooms plus a wide variety of tools that I never observed the teachers using. An entire listing of the school's tools can be found in appendix D. Highlighted in the table are the tools I did not see in use by either teacher.

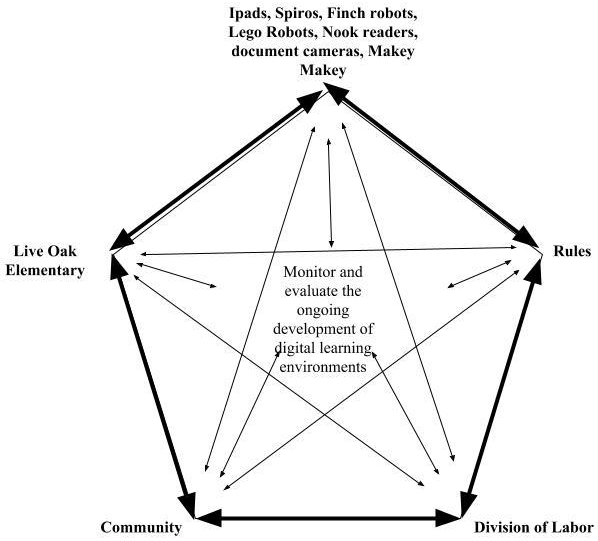

Figure 4.12*: LOE's Tools*

Rules. In addition to reinforcing the rules within Erin and Hazel's classroom, related to going to safe sites and staying on task, those within the school's activity system were responsible for monitoring a variety of rules. Eve and Abby made sure teachers were using technology with their students and looked at how they were using technology as well as discussing the SAMR model with these teachers. Adam made sure the teachers felt supported in using technology that they may be unsure of using. Eve also had the responsibility of making sure the teachers were teaching according to the Common Core State Standards. Figure 4.13 highlights some of the rules within LOE's activity system.

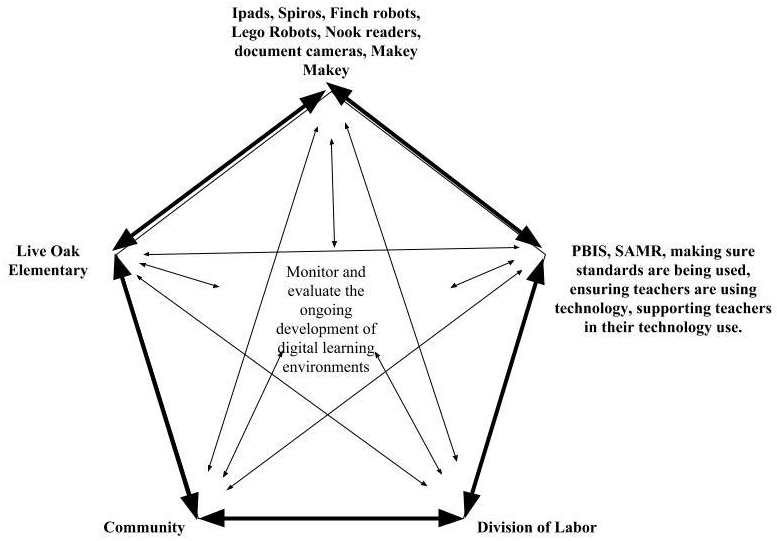

Figure 4.13*: LOE's Rules*

Division of Labor. All three participants within the school's activity system were responsible for providing professional learning for technology to both teachers. Unique to this activity system, in addition to providing professional learning, Adam also worked with a university professor in conjunction with the school's Maker space and the universities course on Maker spaces. In addition, Adam attended several national conferences for his own professional development. Both Adam and Abby were active on Twitter where they engaged in Twitter Chats for their own professional learning. Eve's major responsibilities were observing teachers and their use of technology during their lessons, writing goals for the school improvement plan, and troubleshooting issues with funding for fixing technology.

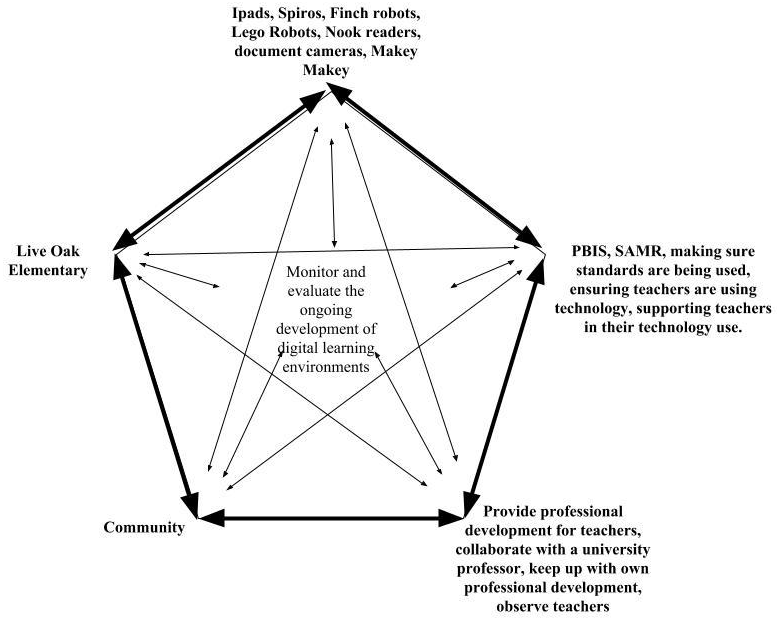

Figure 4.14*: LOE's Division of Labor*

Community. The school's activity system included teachers, students, the PTA, university faculty, and the school district leaders. Newer to the community was a part-time student support technician (SST) who helped alleviate time repairing student netbooks from Adam and Abby.

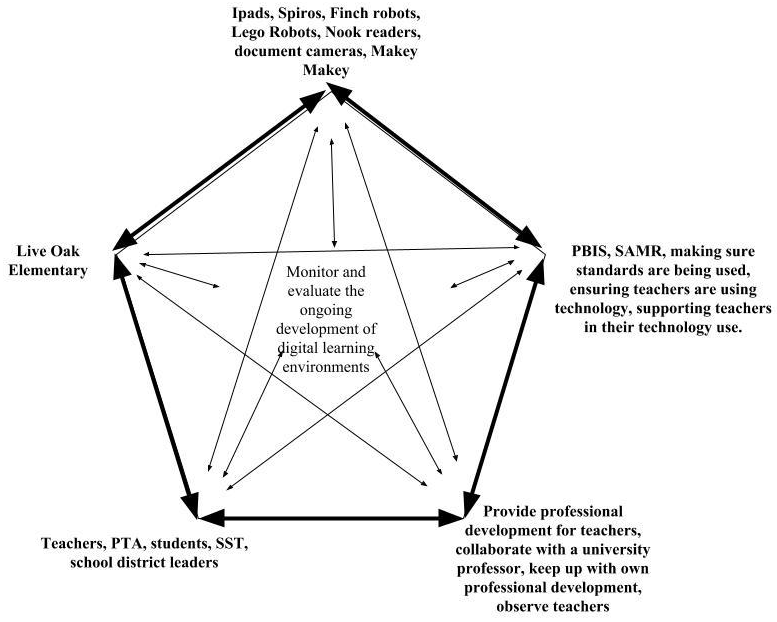

Figure 4.15*: LOE's Community*

The Relationships Between Activity Systems

The relationships that exist between the three activity systems (1) Erin, a third grade teacher's classroom, (2) Hazel, a third grade teacher's classroom, and (2) Live Oak Elementary (LOE), which includes Eve, the principal, Adam, the media specialist, and Abby, the Instructional Technology Specialist (ITS) revolve around professional learning, observations, and lesson planning. Before discussing these three types of relationships, it's important to discuss how each of the participants view the school culture as it relates to technology.

School Culture

All of the participants have very similar descriptions of the school's technological culture. Eve, the principal, explains, "We all learn together and it's [technology] new for everybody and hopefully I've communicated that it's okay that if I come in to do an observation and it doesn't work I know that you're trying something different." Similarly, Adam the media

specialist says, "…there is definitely a culture of innovation and wanting to try the next new thing…" Both third grade teachers feel well equipped with the amount of technology available for use in their classrooms and Erin explained she is "impressed with the way our school uses technology. They're [school district officials] often coming to us and taking pictures and interviewing teachers here, and so I think they see us as kind of the technology flagship school…" All of the participants spoke very proudly that their school was best known for the wealth of technology available. In the same vein, third grade teacher, Hazel, "feels like we have so much [technology]. I feel like Cedar Creek County School District has so many tools. I feel we're good right where we are" and there was no other technology that she felt the school needed, she felt content with the resources they currently had. The instructional technologist, Abby who works with four different schools within the district feels that LOE sets itself apart from the other schools in the district. She explained, "LOE is really lucky…not all media specialists know what he [Adam] knows. So, he has kind of made himself into a role of the librarian … and the instructional technology person all rolled into one." All of my participants had admiration for LOE as does the surrounding community for having "high expectations for students, a multi-faceted curriculum, and extensive use of technology" (parent, district website).

It's clear the participants hold a high regard for LOE with respect to the amount of technology available, the school's reputation, and for this feeling of innovation throughout the school. In the following sections I will explain the relationships between activity systems with respect to professional learning, classroom observations, and lesson plans.

Professional Learning

Professional learning is "critical to ensuring that teachers keep up with the changes in statewide student performance standards… [and] learn how to make the most effective

instructional use of new technologies for teaching and learning" (Lawless &Pellegrino, 2007, p. 575). For teachers, professional learning is often perceived as unproductive, but most would agree that done in the right way, professional learning can be beneficial in pushing teachers to improve their practice by considering new perspectives in the ever-changing teaching profession.

Official professional learning happens with Abby during third grade team meetings and during staff meetings. With Abby, individual teachers can call on her to be assisted in their classrooms on lesson that involve technology that they may be nervous about trying out for the first time. However, Haley only worked with Abby one time at the end of the year and Erin did not have her come into her classroom at all. Not only does Abby meet with individual teachers, she also leads the tech leader's committee, where one teacher from each grade level is a part of. For the third grade team, Hazel is the representative. Hazel reports back to the third grade team about what she learned from the tech leader's committee, nonetheless Hazel indicated that the team only met once during the school year. Also once a quarter at these third grade team meetings, Adam meets with the entire third grade team to figure out a lesson that he could collaborate with them on. Eve identifies this problem with the lack of time for professional learning, and provides time during staff meetings for teachers to share lessons and techniques they are using that have been effective. She describes professional learning as "a lot of it is teacher leadership and action, people teaching each other" (personal communication, November 12, 2015).

Unofficial professional learning happens with Adam and between teachers. Due to his expertise and passion in technology, and the school's desire for him to share this expertise, Adam has organized a way to assist teachers in learning new ways to use technology while still being able to help students who come into the library to check out books and various other

technological tools. If a teacher has a lesson idea that includes technology that they would like Adam's assistance with, a teacher can sign up via his Google calendar and then bring their class into the library. Adam believes in a teammate approach when teachers are learning something new. So when teachers come into the media center with their class either Adam or the teacher leads and the other is there in case something goes wrong. Adam articulated that, "…one of the important things about teachers coming in with their class to the library… they'll see how it's done and have a level of comfort with that particular tool and then when they go back into their classrooms, they do more with it after they've seen me use it" (personal communication, November 12, 2015). When asked about the most useful professional learning, both Hazel and Erin reported that they rely on each other most of the time for learning new things and troubleshooting with technology. Erin said that she would ask Hazel before asking anyone else about a tech question.

Classroom Observations

Accountability for using the devices and various technology in the classrooms occurs through classroom observations which are connected to the CCSS. The teachers get formally observed two times a year either by the principal or vice-principal. With these types of observations, the observer uses the *Teacher Keys Effectiveness System (TKES),* a state-wide instrument. This observation assessment looks at ten standards, with only one standard including technology, which, more specifically examines a teachers' "instructional strategies" that include technology. Teachers need to be able to "use[s] accessible technology to enhance learning" (Barge, 2012, p.73). Following each observation with the principal and the vice-principal there is a conversation with the teachers about how the observation went and ideas for growth.

In addition to the principal/vice-principal, the district occasionally does walkthroughs to observe the practices going on in classrooms. During my study, Hazel had a district walkthrough and got feedback that they were impressed with her use of Google slides during the lesson they observed. According to Abby, the ITS team was working on a SAMR model walk-through form that they could use to get an idea of what students and teachers were doing with technology in order to get feedback on where their lessons were falling on the SAMR model.

Lesson Planning

A teacher's plans for instruction document how a teacher intends a lesson to be carried out. There are several influences on these plans according to who plans the lessons. As mentioned in the previous chapter, each teacher on the third grade team uses the same plans. Each teacher is responsible for one subject per quarter and then the plans are combined for each team member to use. The lesson plans are created on Google Slides, which are projected during the lesson for students to see and to help the teachers with pacing. Erin indicated that she likes this format, "I've always embraced the culture of sharing in teaching…" (personal communication, March 16, 2016).

The third grade team meets weekly to discuss lesson plans, to share what happened during instruction with regard to technology, and to look ahead to the following week. For long range planning, at the beginning of each quarter, Eve provides the teachers with a half day, which she feels is not enough, to strategize for the quarter ahead. Specifically, the teachers, "plan out…how the units are going to integrate technology and how they're going to use technology to enhance their instruction, any kind of creative projects they're going to do and so they kind of nail that out about three weeks before the quarter starts" (personal communication, May 17, 2017). At these meetings, Adam attends in order help and give input to the team on at

least one major project per quarter than involves technology. In theory, this set up provides time for the third grade team to discuss potentials for technology with an expert like Adam, however, there are some strains with this model. The goal of having Adam come to these meetings was to ensure at least one collaborative project with him per quarter, but by the end of the year only one collaborative project occurred.

While the relationships described among these three activity systems indicate smooth coordination and operation, there are contradictions within each activity system that may be hindering the activity systems from reaching their goal of integrating technology. In the next section I will examine these contradictions.

Contradictions Within Each Activity System

Each teacher's story is unique due to their own personal experiences as well as how they perceive technology integration and being supported to learn new teaching techniques. It is these differences between teachers that serve to educate us on the instructional contradictions of integrating technology within literacy instruction.

Each activity system, as a case, is organized into two sections: the five individual elements previously described and the contradictions within the activity system. These case studies represent my efforts towards capturing the complexity of the context associated with technology integration for these teachers and those that support them in learning how to best integrate technology within their literacy lessons. Next, I will take my analysis deeper as I answer my research questions of understanding the contradictions present within this incredibly complex puzzle that is elementary literacy teaching with the integration of technology. (Several elements of each activity system will be highlighted within each section. An entire listing of all of the elements can be found in a table in appendix E.)

Contradictions within Erin's Activity System

I will use Stevenson's (2008) idea of facets to organize these contradictions. The facets include: *roles, organization, use, function, and operations*.

While examining Erin's classroom (activity system) during literacy instruction, there are multiple contradictions within her activity system which may be hindering her from reaching her objective of integrating technology into literacy lesson with her students in order to prepare them for their professional life. Contradictions are historical evolving tensions; they are tensions that have accumulated over time. In order to differentiate between a tension and a contradiction, I looked for words that signified time and volume. Examples of time signifiers include when Erin describes an event that happened more than once, when she references a previous time, or when describing something that was reoccurring. Within Erin's activity system contradictions exist between the elements*: community, division of labor, community, subject, rules, mediated tools,* and the *object.*

I used Stevenson's (2008) activity pentagon model, which I call a pentagonal prism activity system (see figure 4.6) to analyze the contradictions within Erin's activity system. The pentagonal prism model is useful in analysis in several ways. First, the model makes explicit all of the connections that are only implied in Engeström's triangular model. Secondly, the pentagon model places the object at the center of the relationships with the outcomes in the perpendicular plane. Thirdly, the various facets of the activity system can be identified to aid with practical analysis and lastly, due to the three-dimensional nature of the model, the "slices," correspond to the actions of an activity's evolution. The double arrows are important in showcasing the relationship between all of the elements within the activity system along with each elements relation to the object.

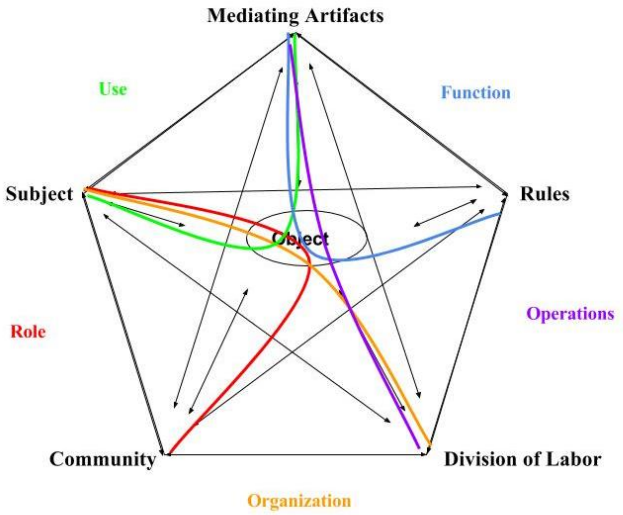

Figure 4.16*: Pentagonal Prism Model with Five Facets*

Stevenson (2008) identifies five facets of an action and how they relate to the objects and outcomes. An action consists of *roles* that shape the relationships between the subject and the community, for example between teachers and learners. *Organization* is another facet which identifies how the subject and community are managed (division of labor). An example of this would include how the third grade team shares lesson plans by each team member being responsible for one subject per quarter. *Use* deals with how the mediating artifacts are employed in practice; how the subject is using the mediating artifacts. For example, Erin uses the tool ClassDojo for rewarding behavior. *Functionality* identifies the "range of possible uses for the mediating artifacts as specified by their designers, which are made available to an activity's participants" (Stevenson, 2008, p. 840). An example of functionality would be Erin, using Google Docs for students writing activities, but not allowing the students to use the collaborative feature. *Operations* represent "the space of possibilities for an action provided by the technologies and the site being used. It is built on the interplay between the physical distribution of resources such as hardware, software, and learning materials and their

management within a given context which both enable and constrain activities" (p 840). The key word for this facet is the word *context*; an example within the *operations* facet would be using the tool Skype to talk with an author, but the microphone not working, which causes a tension. This operation is constrained due to the faulty equipment. I use these facets to organize the contradictions within Erin's activity system.

Roles. Within the facet of *roles,* Erin reported she was self-sufficient in learning how to use new technology in the classroom and didn't need much assistance. However, a contradiction in Erin's activity system was that she was not able to have a relationship with the ITS (community) because there was only ITS for the district and she was only at LOE one day per week. This was no fault of the ITS, as it was the school district's decision to split up the ITS's across the county. Erin expressed comfortability using technology such as ClassDojo and Go Noodle which was the result of her colleagues sharing their experiences with those programs prior to Erin using them. Had she heard of an augmented reality app such as Aurasma, would she have used it? By having the ITS as part of her learning community, Erin may learn about new tools that may be helpful for her instruction and for her students. In addition to the minimal amount of time Erin had to collaborate with the ITS, she said, "They want us to use it [technology] in new and innovative ways, but they don't always tell us what those new and innovative ways are and so sometimes I don't know that I'm necessarily doing anything innovative." Erin uses the tools that she's comfortable with, but doesn't know if what she is using is considered to be innovative.

Organization. Looking at the contradictions within the facet of *organization,* there seemed to be expectations Erin has for her students that are not being met. Before students had their devices and before the use of Google Classroom, teachers sent home student work with

handwritten comments on them. This is the format the students and parents are most familiar with coming from second grade without the devices and reliance on Google Classroom. Since Erin and her students were using Google Classroom in third grade for the majority of their work, the work that students turn in is returned with typed comments sent back via Email to the students. Erin stated in informal conversations and interviews that both students and parents were not reading the comments that she had spent hours writing, as she had learned from conversations with parents. The contradiction lies with the parents not understanding the importance and expectation of reading these comments in order to help their students at home. Households go beyond the focus of this dissertation as they are their own separate activity system with their own rules and expectations. Getting families expectations for their student and the expectations of classrooms in sync will aid in the teacher's intentions of students learning from feedback on their writing. Possibly setting these expectations at the beginning with the parents would remedy this contradiction.

With the new 1:1 devices there were also new classroom management issues for Erin. She described and I also observed during my small group instruction -students having multiple computer windows open at a time, such as a minimized game ready to be clicked on while students were supposed to be working on their writing. In addition, Erin expressed and I found similar issues with students taking too long to complete assignments on the computer due to them wanting to spend time changing the font, font color, and adding images. Sometimes Erin and I found it easier to have the students just handwrite assignments rather than use their devices for quick tasks such as a word sort or jotting down ideas.

Also, within the facet of *organization* there are some contradictions within how Erin is learning new technological skills. The way professional development was planned did not seem

to work for how Erin was learning the skills she was implementing in her classroom. She reported that she learns more from her friends (colleagues, especially Hazel) than she does the professional development sessions. Within these professional development sessions, there have been sessions on the Substitution, Augmentation, Modification, Redefinition (SAMR) model. Erin's says, that "SAMR seems impossible" and she doesn't think about it when planning. She says, "there is a different evaluation program every year so it's hard to keep up with how they are supposed to be doing things". Perhaps more time understanding SAMR model and the technological possibilities within her classroom could help Erin understand the importance of this evaluation model for her own teaching practice.

Use. The facet of *use* involves contradictions in Erin's activity system with how the digital technologies are actually being employed in practice. For one, Erin indicated that there were so many demands that she has to meet (rules) that she feels that she can't go into too much depth with the tools they are using. For example, the class uses Google documents for most of their work, but Erin says they are not using the collaboration feature like they should due to not only time, but also classroom management issues. Possibly providing students time to tinker with the tools prior to their implementation in practice would allow Erin time to go more in-depth with some of the tools she frequently uses. Another contradiction within the *use* facet is with the use of ClassDojo. The students see Erin giving points and this inspires some of them to go to ClassDojo and create their own classes with their classmates who are the avatars. Erin commented during our informal discussions during my observations that this was becoming an issue of bullying.

Functionality. Within the *functionality* facet, there are a few issues with the mediated tools and how they are being used in the classroom. ClassDojo is used as a reward system for

behavior in Erin's classroom and she said that using this tool along with PBIS is something she had to get used to. ClassDojo allows the teacher the capabilities to give and take away points and this was something she had to consider with the PBIS system already in place at her school. She said that in order for the two systems to work together she needed to make sure to only reward points and not take them away. This is an example of a contradiction that has been resolved and the activity system has evolved "by the internal logic of an activity" (Stevenson, 2008, p. 842). Another contradiction within the *functionality* facet has to do with the reliance of the students to type on their netbooks is causing, as Erin describes, "their handwriting is atrocious…I think it physically hurts them to write because they just never do it…" (personal communication, March 16, 2016). Possibly more balance between handwriting and typing should occur, as handwriting is a necessary skill according to scientists that have found that the cognitive process of reading may be connected to the motor process of forming letters (Klass, 2016). A final contradiction within this facet is that there are a multitude of resources available in the media center, but Erin admits that she hasn't checked out anything from the media center this year. She has gotten used to using the tools available in her classroom and doesn't see a need to use the additional tools available. If the school wants the tools to be used, more convenient access and ideas for their use needs to be communicated.

Contradictions within Hazel's Activity System

Again as I did with Erin's activity system, using Stevenson's (2008) five facets I will describe the contradictions present within Hazel's activity system. Hazel's objective for integrating technology was to provide access to her students, whom she said many lacked.

Roles. Beginning with the *roles* facet, Hazel noticed that some issues with the students' (community) problem solving skills, perseverance, and attention on task (rules). She found that

students were “giving up if things are too complicated” so she only used tools that they were more familiar with, like Google documents to avoid them just giving up. In addition, if they had troubles with their computer not turning on, freezing, or not responding at all they wouldn’t try to fix their computer problems on their own. Instead, they found this as an opportunity to take their computer to the media center to be looked at by the part time Student Support Technician (SST) stationed in the media center whose sole job was to help with student computer repairs in order to free up the media specialist from doing this job. In order to remedy this situation Hazel created a classroom job where one student in the classroom was designated as the “tech person” who has a list of things he/she tries on the inoperable computer before it needs to go to the media center for “repair. Hazel found that this issue minimized the amount of trips students made to the media center, but didn’t completely solve the contradiction. Another contradiction via the *roles* facet was students having so many distractions or places to go on their devices that they were not staying on task.

Functionality. Although, Hazel had the capabilities to monitor on-task time via LanSchool, she found it was a task that was almost impossible to do if she wanted to attend to the students’ needs with various assignments. Hazel said, “It’s hard to monitor all of the student’s computers on LanSchool with all of the other things that need to be monitored during class.” Another contradiction within the *functionality facet* is with the SAMR model. Hazel says that there are so many other models they have to think about such as the creativity model that it’s hard to really understand one model. With regard to the student’s devices, I observed Hazel’s frustration when students came to class without their devices being charged or the devices not working which caused students to miss class as they headed to the Student Support Technician (SST).

Organization. Hazel described one of her roles as being on the technology leadership team member for the third grade team as disappointing because the team only met once during the school year. Abby (the ITS) who initiated these meetings wasn't as available as Hazel thought she was going to be because "she is at a lot of other schools." Furthermore, the way that students are first oriented with their devices at the beginning of the school year is something that Hazel has considered and would like to improve upon. Last year before the students received their devices, there was an orientation about the importance of taking care of your device. This year there was not an orientation and Hazel believes that students "seem less responsible this year about their computers." At the beginning of the school year Hazel describes the process of passing out and the students first navigating their devices as being "madness! There are students who cannot log on…" She said that they jump right into the curriculum because of time and as they go along she can throw little tips in as they go. This example could also be within the functionality facet. This shows the overlap with the various facets. I observed Hazel show one of the students how to brighten his screen that she noticed was a bit too dim. Hazel felt that it would be time well spent at the beginning of the year if they went over with the students "how to learn basic stuff like how to Email, make folders on Google drive, how to log in, and how to use the caps lock and shift keys." These would be skills that would need to be routinely practiced.

Use. With the use of the Google Classroom Suite, there are some contradictions with the way that she and the students were *using* this tool. As a third grade team, one person plans each subject, so if Hazel didn't plan the reading and writing for the week then she must follow the plans and use the resources that are provided. There were several times during a read aloud when a slide was projected that went along with the lesson that was not referenced during the lesson, or an activity that Hazel was not sure about so she decided to come back to it later. In

addition to how Google Classroom was being used, Hazel said that "students delete things other students are writing on when they are working on collaborative assignments so we don't use that function much."

Operations. Hazel and the other third grade classes use Sqworl pages for a couple of reasons. Using a visual bookmarking site helps minimize the website choices (sometimes distractions that students have. There choices are made visible with an icon and all they have to do is click on the image to take them to that specific site. In addition, it saves time when the students just have to click on the image rather than typing, with the risk of mistyping, the web address into the browser. However, Hazel and I found that using this site, while it does have convenience may be hindering students from learning about how to go to a site that may not be bookmarked on her class's Sqworl page, which is in direct contradiction with her goal of teaching students to use the resources that are right at their fingertips.

Contradictions within LOE's Activity System

Roles. Within this activity system I've identified contradictions between the subjects (Eve, Adam, and Abby) and the community- within the *roles* facet. Both Adam and Abby do the majority of their work within the media center, also the location of the Student Support Technician (SST) who fixes student computers. When the SST is not in the media center both Adam and Abby comment about how they can easily get caught up fixing student computers rather than being able to do what they are supposed to do in the media center, which is either working with students or teachers. Along these same lines, Eve feels that students aren't being as responsible as they should with their devices. Eve has already thought of an idea to remedy this contradiction by issuing licenses to students. The would have to pass a little test in order to keep their device and would do renewals mid-year and have a card system where they can earn

positive points for taking good care of their computer. Also, technology seems to get in the way of how students, teachers, and the community are viewing the media center according to Adam. He said, "When you think of libraries the number one thing that you think about is reading and I feel like a lot of people look at our library and they don't necessarily think that because they see all of the technology that we do." There are some contradictions between the *roles* the teachers may be expected to engage in according to Adam, Eve, and Abby. With the addition of the 1:1 devices, Adam says that teachers are having to learn a new type of classroom management protocol. He is also concerned that teachers are not "embracing personalized learning" and he doesn't want teachers to feel that they have to wait for him to try something new. He feels that teachers are not feeling comfortable with what they are supposed to be doing with technology. Because Abby is only at the school once a week she is concerned that she is not able to model for the teachers exactly what specific lessons look like on the SAMR model. She and her other ITS colleagues created a website showing sample lessons based on SMR at the end of the year to assist with this contradiction, but the teachers were not aware of this tool yet and at the time that I viewed the website there were no examples for third grade literacy lessons.

Organization. Looking at contradictions with how the subject and community were managed will be explained through the o*rganization* facet. As far as how the teachers and students were managed in relation to technology integration, Adam admits that there has been "a lot of "new" that teachers have had to embrace very quickly on top of all of the other things they do. I don't think our district has done a great job with giving teachers professional learning." From Eve's perspective as a principal she says that the district "…revises the curriculum every year and they don't always have it ready by the time the teachers have to teach it and a lot of times they are revising it right at the point the teachers have to teach it and the teachers don't

have a lot of time to read all of the materials and think about how this going to look in action" which also adds to the teachers feeling overwhelmed and ill prepared to incorporate technology within their lessons. The way the handing out of the devices to the students was organized much differently than the previous year according to Adam. He said, "this year the district said we didn't have to do an orientation" which has led to students not taking care of the devices as well as they should, as well, as the parents not knowing how the students should be using their devices at home.

Use. *Use* deals with how the mediating artifacts are employed in practice; how the subject is using the mediating artifacts. There was an overwhelming amount of comments from each of the subjects in the school's activity system that suggest the teachers are overwhelmed with the amount of tools that are available along with the amount of information they have been receiving on how they should be integrating this technology. An effect of this feeling is that teachers were choosing not to use a majority of the tools available to them for their literacy instruction. Abby said, "…it can be overwhelming for teachers to have all that we have" and this is an important statement because not only is Abby the ITS, but she has the perspective of being a teacher at LOE. The principal commented, "we have a set of iPads in the media center that doesn't get checked out…" Adam pointed out that "When it comes to reading students don't think about reading on the computer necessarily, and you can certainly see through our circulation of e-books that there just isn't a big demand for those that there is for print versions of books." In addition to using technology to the full potential, Adam advised that "we are not taking advantage of the global collaboration where we are thinking beyond the walls of our schools."

Functionality. As a reminder, *Functionality* identifies the "range of possible uses for the mediating artifacts as specified by their designers, which are made available to an activity's participants" (Stevenson, 2008, p. 840). With regards to technology use, Eve mentioned that "technology isn't useful at times because kids aren't sustaining their attention at a deep level…its more surface level learning." For example, she said that during the literacy block the Sqworl pages seem like they would be useful for the students in choosing a site to listen to reading, but she sees that students are disinterested with the amount of choices, and are just clicking on things and not reading or listening to reading.

Operations. *Operations* represent "the space of possibilities for an action provided by the technologies and the site being used. It is built on the interplay between the physical distribution of resources such as hardware, software, and learning materials and their management within a given context which both enable and constrain activities" (Stevenson, 2008, p 840). Abby says that this year is difficult being a transition year with the SAMR model because, "There is no formal policy of level of expectation right now and you definitely see different uses depending on the teacher and even building to building." With the discussions that are happening with the SAMR model, Abby said that it "stresses people out because they think every lesson needs to be a redefinition lesson and teachers don't know exactly what this type of lesson looks like." In addition to how the district is operating, how teachers are able to access certain sites is a problem Adam said, "there isn't good communication between the people at the district level who allow certain content to come through and who understand what really happens in a classroom… I've basically had to write a ten-page paper to get certain sites approved." Adam was referring to sharing the students work via social media and how the districts filters didn't allow him to access these social media sites.

Cross-Case Analysis

To illustrate the relationships that exist between the elementary teachers and the school activity systems working together to integrate technology into literacy instruction, I looked at the major contradictions from all of the activity systems to find common themes. I will detail these findings from a cross case analysis below.

It is important to note that when using a CHAT lens for research, analysis can quickly become unwieldy, as *everything* is interconnected. Specifically, both teachers in this study had the same basic tools in common (netbooks, Epson projectors, internet access, etc.) see appendix D for a full listing, as they were provided by the school. Each teacher dealt with similar rules concerning the Common Core Standards, PBIS, and the necessity of using the netbooks during instruction. The community for each teacher was similar with the exception of a student teacher for Erin. The division of labor for each teacher was comparable in that each teacher was expected to plan her single subject for all of the third grade team. Finally, in general terms, each teacher brought to the system her own beliefs about education and the purpose for integrating technology into literacy lessons; these beliefs and goals differed by teacher, but they were significant in terms of how each teacher made decision about integrating technology.

The key contradictions that will be discussed in this cross-case analysis include:

1. A lack of **orientation** at the beginning of the school year for students and teachers to:
    a. learn how to take care of their device
    b. learn computer tasks that will benefit them throughout the year
    c. show them how to be “problem solvers”
    d. explicitly state the expectations to students and parents for tasks such as reading comments, Email, etc.

2. A problem with **management** when students are using their devices. Students are all tempted to multitask. Is this ok? Is there an appropriate time to do this? What should we tell students? However, remembering what could be missing is important (handwriting, deep learning).
3. The format for **professional learning** is not ideal. What is the best way for professional learning to occur? Is the ITS a necessary position? What about personal learning communities -the teachers learned best from each other or through their own exploration.
4. There is an **adjustment period** to learn new things (models, teaching with tech). There seem to be high stakes expectations that come along with technology and the idea that things can be done better and faster with technology.

These findings will be described in detail in the remainder of this chapter. The implications of these findings will be further described in chapter 6.

Orientation

There was an overwhelming amount of instances where all of the participants commented about the students needing explicit instruction on how to take better care of their devices, how to preform simple everyday computer tasks that may be taken for granted, as well as setting up expectations for students and parents to read emails and comments on student work. The first year of the 1:1 device rollout, which was the year prior to my study, there was an orientation for both parents and students that all participants said was effective. Parents had to pay an insurance fee at the beginning of the year, which was forgone the year of my study. Adam described last year's parent orientation and lamented its absence this year:

> This year there was not a session for parents when the devices were given out. The previous school year, in order for the child to get the device the parent had to come to a session or

> come to the school and watch a video that kind of gave them an overview and then they had to sign a release saying that they had done that and that they gave permission. So, this year the district sort of said, "No, you don't have to do that. We just want the kids to get the devices." And so I feel like that was an important missing piece this year.

Eve points out that the kids need to take better care of their devices. In planning for the following year, Eve considers, "For next year, we've talked about them [the students] getting a license to have your device, they have to kind of pass a little test in order to keep their device and do like renewals mid-year and some kind of like little card system where the kids earn positive points for taking good care of their computer. They're just not being as responsible as they should." While observing I noticed students purposely trying to break off buttons so they could go to the media center to get a different, maybe newer device.

From Hazel and my prospective, students were having trouble logging on to their computer and also typing in web addresses. She said,

> there needs to be some kind of lessons on Google Drive and email and how to make folders in your email…just the basic stuff. I mean, the first week of school…I think we could be teaching them about the computers. You don't have to push caps lock and then push a letter and then push caps lock again...like some of mine still…. Keith, the other day was still doing that, and I said, "All you have to do is hold "shift"" and he was like, "Oh!!" …. it's just those little things that we know that we don't think about saying to them. I think it would be a cool thing to think about how to teach them about...like even within third grade, like if we had each teacher and the kids rotated, something fun like that…."

From Eve's description and Hazel's classroom experience there is evidence that orienting the students with various functions of their device may need to be throughout the year rather once at the beginning of the year.

Erin talks about an instance where she was using the collaborative feature on Google Docs for the first time with the students at the beginning of the year. She said, "those sorts of things were really hard to do because the students didn't know that if you delete something that somebody else wrote…I could pull up the revision history and tell them, "I see that you are the one that deleted all of this and I think you did it on purpose" and the students realized that they shouldn't do that." Similarly, Hazel described a similar situation using the collaborative feature with writing. She said, "we ran into this problem where kids were deleting things that other kids are writing...it's like they don't get it. "

From my experiences working with the students in small group word study, I also observed the need for more orientation of how computers work. When I would have a lesson that required the students to go to a certain website, students had difficulty finding where to type in the web address because they were used to clicking on icons in the Sqworl pages. They would also misspell the web address occasionally and give up and say "it doesn't work!" I used a website for multiple lessons and wanted to show students how to bookmark a site so that they did not have to type in the address each time. This of course took time from my short 15-minute lesson with each group to show them how to exactly create a bookmark or type in a web address. In a recent article released about the districts use of technology, a high school math teacher in the district commented, "we're putting the technology in their hands, but we're not teaching them how to use it" (County newspaper, 2017).

In addition to showing students how specific programs and keyboard functions work, it was apparent through each of the activity systems that the expectations for students reading comments on student's work and email were not being met, but may be remedied if they were explicitly stated and routine.

Management

When using a computer there is no doubt that there are lots of distractions. As a third grade student having your very own laptop for the first time to use during reading and writing is even a more challenging task. While observing students work on their netbooks in both Erin and Hazel's classroom I would notice students working on their writing on Google Docs and then have a tab open to listen to music on Pandora, and another tab open for a game they could play when the teachers wasn't watching. However, when I work I do the same thing and all of my participants talk about this being something they do as well. When working with students we like to have control and we want them focused on what we are teaching them because as teachers we are responsible for the measurable outcomes. Nonetheless, Adam said, we need to learn "how to manage all those different multitasking things that go on when you have that many devices out there. So, that's been a big obstacle…" The use of the student screen surveillance tool, LanSchool "has been helpful, but not as helpful when you have other things to keep track of" Hazel and Abby said, LanSchool "doesn't always work the way we want it to. I think a lot of teachers had challenges with it and they kind of have a poor taste in their mouth about it…" One suggestion Abby had for the third grade teachers was to project LanSchool onto the classroom whiteboard so that everyone could see each individual laptop screen, so then everyone was monitoring who was on and off task. For both Hazel and Erin, this did not work or help the situation.

Professional Learning

All of the participants felt some type of contradiction with professional learning. Eve feels like there isn't enough time for professional learning on technology, so LOE's way is "having teachers share different projects that they're doing and ways that they're integrating it" during regularly scheduled staff meetings. With Abby, there doesn't seem to be enough time or carbon copies of her to adequately show teachers what various lessons on the SAMR model look like and with Adam and Erin the way professional learning is currently setup isn't what they see as the most effective. For Hazel, if she is going to learn something new that she will use in her class she wants to know about it at the beginning of the year.

Erin said that she learns best from talking with her teacher friends on what they've used that have been successful in their classrooms. In addition, Erin has really strong opinions on Abby's Instructional Technology Support position. She says that she would rather have someone that is there every day because she doesn't "respect or want to hear their feedback" if she doesn't have a relationship with someone that knows what's going on at LOE. Working in Erin's classroom, I noticed that once I had been in the classroom for a couple of months, she saw me as someone she could ask for advice. She wanted to learn how to use a website called Newsela, but wanted me to help her figure it out. We worked together to figure it out, and when she first implemented the tool I was in the classroom with her; similar to Adam's team-approach.

Adam feels similarly with the format of professional learning, he said that as one person he feels like he doesn't have enough time to do his job in the media center and provide professional learning to teachers. He says, "being stretched in so many directions and with so many devices out there, it can't just be me, it has to be a team effort." He feels that the district isn't providing adequate professional learning and the professional learning he does see "is still kind of one-size-

fits-all. We have these initiatives, everybody has to have that same training and so I don't feel like there's not enough opportunities in the kinds of professional learning we have right now that exposes people to new ways of thinking." He proposes a new format:

> it's possible now to individualize professional learning in a way that you couldn't before because I think we've always had thought of professional learning as going to a conference or bringing in some three-thousand-dollar speaker that you've got to pay for but…it doesn't have to be those things. With the tools that we have now and with so many people putting their work out there, but we do have to take time to show people how to do it and allow them to do it...

Adam talks about having teachers partake in Twitter Chats and read blogs as their individualized professional learning. He admitted at the end of the year, "I don't know if I've had the impact this year that I would like to have as far as the professional learning aspect."

With Hazel, the contradiction with professional learning comes with the timing and the consideration of teachers wanting to tinker multiple times before implementation. "It depends on like what time of the year it's coming to me. Like we have this new thing called Waggle that we can use with literacy and it's like "If you'd given that to me in summer, I could've looked at it and could've gotten ready" …it's like it was November whenever they told us about it and I was like "I just can't think about it."

Abby knows that her schedule provides a challenge for not only her, but for the professional learning she hopes to provide at each of the four schools she is placed at. She said,

> The question my team gets a lot is "What does that look like?" …what does redefinition [SAMR] look like in general?" And I'm the same way, too, I want to see…. I don't just want to hear conceptually, I want to see examples of "Okay, what could you do?"

With the hope of making this situation better the ITS team created a website where they began collecting teacher examples from Cedar Creek County of lessons teachers were doing. It tags the lesson on where they fall on the SAMR model and the grade level. With this website Abby helped create this is an area of growth for the activity system and also a way that teachers can individualize their learning at their own pace and place, as Adam described. In a recent, online article published the year after my study, one teacher in the district was quoted, "teachers haven't gotten training on how to use the new computer technology appropriately, I don't think they [school district officials] have any idea of what good uses would be" (County newspaper, 2017).

Adjustment Period

The SAMR model was just being introduced and was indeed being familiarized before the stakes were high and the teachers were held accountable for creating lessons around this model the following year. The introduction of the 1:1 device was also new to the teachers, with only less than two years of them being in the kids' hands. The subjects of the school's activity system were comfortable talking at the SAMR model, as they were the ones to initiate the conversation surrounding the SAMR model during our interviews.

In our final interview Eve stated that she felt that as a school "they did a good job introducing it to people and having them think about the projects that they're doing, the way they use technology now, and where they fit on the model." Adam, the media specialist said SAMR was something that the "superintendent started talk about this year…and we're starting to do a lot of professional learning on that and how we're going beyond just using technology as a substitution for something that we would've done on paper but doing something that's more significant with the technology"

SAMR was not brought up by either of the teachers, but I was curious about what the teachers knew and thought about the model. When initiating this conversation about the SAMR model, both teachers were very uncertain when discussing it. Erin described SAMR:

> So, I've been to some professional learnings about it. Every time I think *that's great*, but I don't have a great idea for a lesson and so it's hard to come up with something just out of nowhere. And I think there are some good aspirations there and it's like an interesting thing to be aware of or just a paradigm for thinking but I don't think about it when I plan.

Similarly, Hazel described it as something that:

> …they're (Eve and Abby) really into...there are so many models that we have to think about…it's not really something that we think about a lot, but I'm on the technology leaders team and we talked about it before… as we were talking about it I was like, in my mind, I feel like we have examples of each of these and I get the whole like "You want to do more of …the bottom of the model where everybody is sharing and….it feels like you have a purpose for it" and all of that which is really good and feel like we do some of that but we need to think about it more.

Before becoming ITS, Abby was a classroom teacher at LOE, which helps with her relationships with the teachers she is already used to working with. She details her understanding of learning how to take lessons to that next level in her own classroom and her description of a lesson moves gradually up to the R level evolve over the course of a couple of years. It took time- an adjustment period- to get comfortable with the technology and the lesson to think about how they could work together.

In addition to an adjustment period for the use of SAMR there is clear adjustment period for understanding what tools are available at the school and how they can be used within literacy

learning. Eve and Adam discussed the variety of tools that were available to the teachers (e.g. iPads, e-books) that were not being used. Abby stated, "it can be overwhelming for teachers to have all that we have." Eve had the same sentiments, "there is always so much to learn that it can be overwhelming for teachers to try to just keep up with all of that." Similarly, Adam admitted that "It's been a lot of "new" that teachers have had to embrace very quickly on top of all of the other things that they do."

Erin mentioned that with technology and literacy, "we have so much to do we can't go into too much depth. There is a lot of newness with the standards, materials available, classroom management strategies, technology available, and the like before teachers can feel comfortable going into depth." Additionally, in a recent online newspaper report about the districts technology use, one teacher indicated that "we have these wonderful ideas, but we try to do all 35 of them, we do none of them well" (Country newspaper, 2017). It's clear through these conversations and observations with all of the participants that it takes time to really understand how to integrate technology well into a literacy lesson. Taking time to adjust and really think about and see examples is essential before the stakes of being held accountable for certain models, such as the SAMR model. This cross-case analysis serves to synthesize the findings in the three activities systems in this research and, more importantly, to frame these findings within the larger context of technology integration within literacy instruction.

Summary

By using a CHAT framework, I was able to make the typically invisible contradictions become visible and perhaps verify speculation about the relationships between technology and teaching in elementary schools. I was able to demonstrate the issues involved in a teachers' efforts to integrate technology within literacy instruction. Finally, I explored how Hazel and

Erin were attempting to integrate technology, as well as, how difficult it sometimes may have been.

By examining the teacher's' views as well as the contradictions in the systems, one may have a better sense of why there needs to be change in how teachers are learning how to integrate technology within literacy instruction. These teachers' views and contradictions may be representative of those found in other schools or those across the country complicate the typical professional development model, the way students may be oriented to using a device, how student's behavior is managed on a device, and the time needed to adjust to a new style of teaching. Technology seems to be equated to speed and that has been extended to the implementation process. These findings may lead one to wonder if we are asking the impossible of elementary teachers who are already overwhelmed by so many other tasks. If we are serious about literacy education being transformed by means of using technology at the elementary level, we must be ready to face different perspectives and contradictions and provide more opportunity for growth and expansions of systems. It is important, in addition to these contradictions, that we understand the socio-historical perspectives of teachers to be able to gauge how a teachers' repertoire of technological knowledge can be expanded upon. In the following chapter, the second research question describing how the teacher's sociohistorical experiences with technology are informing their pedagogical application to technology is discussed.

CHAPTER 5

FINDINGS PART II

In this chapter I discuss how teachers' socio-historical experiences with technology seem to inform their pedagogical application of technology in different ways. These experiences were shaped by both teachers' schooling, adults they have interacted with professionally, the students in their classes, and the technology tools they have experimented with.

When considering socio-historical experiences, it's important to remember that we do not just live in a social world; the social world is already within us, influencing how we think, speak, and act. The ways in which we talk and interact with other people become internalized and changes the ways we think (Vygotsky, 1978). The social worlds teachers live and work in on a daily basis, is extremely complex. They hear viewpoints from multiple sources and are then required to find the style of teaching that best fits their students' needs and this may take time through trial and error. Learning is embedded within social events and occurring through interactions with people, objects, and events in the environment (Vygotsky, 1978). As a researcher, viewing these interactions through an activity systems model assists me in allowing these internalized thoughts, beliefs and actions to become apparent.

At a general level, a socio-historical perspective asserts that action is mediated and that it cannot be separated from the social environment in which it is carried out (Wertsch, Del Rio & Alvarez, 1995). With this study it is important to understand the experiences these teachers have previously had in order to understand how they are learning about the technology they are currently implementing and what may be the best format for them to learn new techniques.

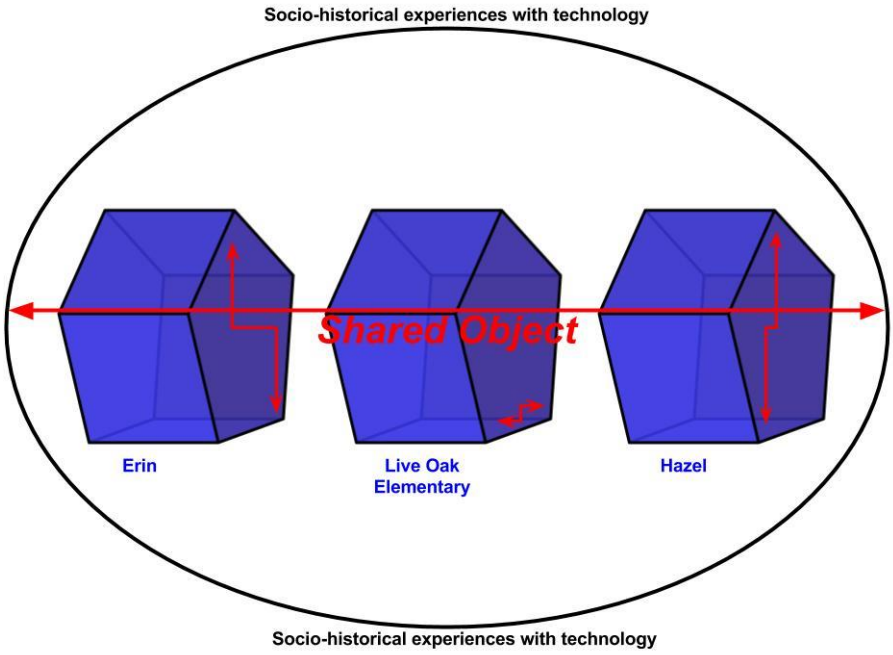

Figure 5.1: *Relationships between activity systems, contradictions, and socio-historical experiences with technology*

Figure 5.1 illustrates all three activity systems with the shared object of integrating technology within literacy instruction. The red zigzag arrows within each activity system represent various contradictions previously discussed in chapter 4. The outer oval surrounding all of the activity systems represents the socio-historical experiences with technology that influence all systems. In the following section I will describe the socio-historical experiences with technology the teachers had with their own education.

Socio-historical Experiences with Schooling and Preferred Learning Style

Both third grade teachers, Erin and Hazel, recall taking a course during their teacher preparation which focused on the use of technology in education. However, what they recall from this course is somewhat fuzzy and they do not attribute the learning from this course with the practices they are currently employing in their classrooms. Erin recalls one of the major projects in the course was to create a class website through Blogger. She described this project

as “really hard” and realized that she had not used it since. She also remembered already knowing how to use Microsoft Word, PowerPoint, and Excel, which she describes as not being “issues” for her so it was a replication of content for her. Erin says that she feels comfortable with most technology and describes herself as “technology savvy” because she has grown up using it and does not mind learning it on her own. She noticed through taking this course that there were people who found everything in the course helpful because it was new to them and they probably “got a lot out of it because they were being forced to make things using these programs [Microsoft]” (personal communication, December 8, 2015).

Hazel’s also remembers taking a technology in education course during her teacher preparation. She recalls creating a school website, buts nothing else specific from the course. She credits her knowledge of how to integrate technology, not to this one course, but from what she’s learned,

> in teaching, like trial and error, and also from our technology support specialist… she’s really good about telling us about things. Also, almost every time I’m with teachers I’m hearing them talking about things and so I’m like, “Oh, that sounds cool” and then I’m looking at it later (personal communication, December 15, 2015).

One example of Hazel learning from others is through the Newsela example. Once she heard Erin was using it in her small groups, she incorporated it into her classroom.

Erin says that she learns how to integrate technology mostly on her own. However, she indicated that she didn’t feel completely supported with technology integration at school and would prefer to have a professional technology coach at the school daily rather than the current ITS who she doesn’t feel she has a good enough relationship with to assist her in learning how to use new tools when she is wanting to learn how to use them. Erin’s learning is self-initiated

and/or best when in an informal community of people she trusts. To support this statement, Erin and I had created a good social relationship about two months into my study. She casually asked me during class if I had heard of a website called Newsela. I had not heard of the website before, but told her if she wanted help using it, that I would investigate how to use it and then we could meet to talk about how she could use it with her guided reading groups. In this situation, I was someone that Erin had built a relationship with, I was available for on-demand professional development, and I was available to be there during her implementation of this tool in the event that something did not go as planned.

Hazel has a good relationship with the ITS in comparison to Erin, possibly because Hazel is the third grade representative for the school's technology team with Abby (ITS), allowing for more interactions with her. According to both Hazel and Erin they had a reciprocal relationship in sharing new technology they had experimented with. Erin told Hazel, after our success with Newsela that it was a useful tool for test preparation. Because of this recommendation, Hazel asked me to use the Newsela site half way through the study during my small group instruction with her students. In addition, through my word study instruction with the students because I was only in each classroom for two days per week I wanted the students to be able to practice their words on days I was not present. I found a website called Spelling City that the students could access (after I helped them practice accessing) to practice their words in a variety of ways. Both Hazel and Erin reminded students to go to Spelling City during class and at home. It was through these social interactions that new tools, such as Newsela and Spelling City were discovered and implemented throughout the course of my study.

Socio-historical Experiences Through Interactions

Vygotsky (1978) highlighted the importance of situating individuals within specific social systems of interactions. Through the various interviews with both of these teachers they described interactions with professionals at Live Oak Elementary (LOE) who served to support them with integrating technology within their literacy lessons. The teachers also described how the interactions with their students helped to shape the types and process of using the technology they used with their students as well as how they used the technology for their own professional use.

With professionals. As the researcher, I was interested in understanding how the teachers in my study first learned about the technology they were currently implementing. Both teachers used the website www.GoNoodle.com as a type of *brain break* during transitions between various literacy tasks. Erin said that she had first implemented the practice of a brain break when she heard from a friend about a series of YouTube videos, created by five PE teachers from the Midwest, called Koo Koo Kangaroo. It was through these videos that she came across the GoNoodle site that not only had Koo Koo Kangaroo videos, but similar videos with a similar philosophy to "help kids channel their physical and emotional energy for good...to help teachers manage their classroom and improve student performance" (GoNoodle, 2017). Hazel also used GoNoodle daily in her classroom and she reported that she first heard about it from a fellow third grade colleague.

When discussing other social relationships that have influenced technology that Hazel used during the Daily 5, Hazel routinely mentions Abby, the ITS. One specific experience with technology that Hazel described that was out of her regular literacy routine, was when she did a mystery Skype with her class and another class at another school in the country. Abby sent an

email to all of the teachers at LOE asking if they were interesting in doing a mystery Skype with their class. Abby handled the specifics which enabled Hazel to focus on content and experimentation. After this experience with Abby, Hazel said that she "wanted to seek her out more next year, like try to figure out ways to use her with projects especially because anything when there are extra hands in technology the better."

This experience also got Hazel thinking about how she could use Abby not only for one-time projects like the mystery Skype lesson, but also how she could use Abby's expertise to help with the day-to-day technology routines during the Daily 5. She had thought about forming small groups in her classroom where, for example, she would teach about the organization of Google Drive and Abby could teach about the organization of email and then they would switch. The benefits of this format would be that students would be in small groups so all of their questions could be easily managed and students would learn everyday tasks that would make the day to day classroom routines run more efficiently.

In addition to thinking about the organization of technology in her classroom, one issue that always frustrated Hazel was when students had computer issues. She would have to stop what she was doing to help the student, taking up time when she was assisting a student with a literacy task. Hazel learned from a colleague in her graduate program about assigning two students in the class the role of *technology support*. Assigning this role to students freed her up from dealing with technology issues that could be easily solved with a restart or closure of multiple windows and would also empower students to try to solve their own issues first before having to leave class to go to the media center where the student support technician would then investigate the issue further.

With students. It's been well cited (Grisham, 2011; Hutchison & Reinking, 2011; Stover, Kissel, Wood, et al., 2015) that teachers are hesitant to use technology for fear that they will know less than the students do and they will no longer be the bearer of all knowledge. However, both Erin and Hazel did not seem to have this fear and took it as an opportunity to fine tune their own practice through their student's verbal comments and experiences. Acting always as a test group, the students provided both Hazel and Erin with quite a bit of voluntary knowledge about technology integration. With my experiences using a variety of tools with the students in small groups during the daily 5 and then as I observed both teachers, there was always something unexpected that occurred. Many times these would be management issues, but other times it would be clues about how the instruction for using the tool may not have been specific enough. For example, how to copy a link of their personal google document to one shared document was one that I observed in Erin's classroom. Many of the students had trouble with this task with Erin's verbal directions so she wrote the directions on the white board for the students to follow.

Since these students were in third grade, this was their first year with the 1:1 devices within their classroom learning environment. Hazel described the beginning of the year for these students as "madness…their little brains are like, "OH, what about this, What about this? It's all very new to them and there are lots of things they want to try out." Even though this was her second year with experience handing out the devices to her students, there were still things that she wanted to be more specific about after observing that her students were unable to do some things, such as using the caps lock key versus the shift key. Erin also unfavorably describes the beginning of the year as "a mess…their cases are everywhere…" She describes how they basically wean the students into using the devices by first handing them the devices and showing

them how to login with their password, how to type their name, and what it means to be responsible computer users. After the first week of using the computers at school then they got to earn taking their devices home. Erin indicated that this was something she wanted to replicate the following year because it allowed the students to learn about being responsible with a computer before they took them home where they would be exposed to siblings and liquids.

Continuing with the specificity of technology lessons with the students, Hazel said that she gradually introduced the students to the various tasks with the Daily 5, but when it was time to put everything together and students were to work independently, they were confused about what they were to do during *Word Work*. She said, "I need a fresh start next year because these kids are like "What are you talking about?...a lot of it was I didn't know what worked for me, but now I know what definitely doesn't work for them, so next year will be different."

Learning from her students is something that I observed Erin also doing while using a website. Routinely, Erin used a tool called Online Stopwatch during the Daily 5 to keep track of when it was time to switch to the next literacy task. She had heard her students talking about how the timer could be turned into different type of stopwatch like an egg timer, a metronome, or a cash clock. On one occasion she asked the students to show her to do this, and then she continued to use a different type of stopwatch each time. In addition, Erin is on a committee that helps decide how money is spent on technology. Through her students she learned that they would prefer to read a paper book rather than an e-book, so her students helped her make these types of purchasing decisions.

Socio-historical Experiences Through Experimentation with Tools

Rosa and Montero (1992) remind us that “history is not simply a narrative that permits an understanding of the past; rather, history relies on material bases to explain the events that have affected a particular society” (p. 60). These “material bases” within the activity systems in my study refer to the mediating artifacts or mediating tools the teachers used to meet their objective of integrating technology. It’s important to remember that the tools these teachers used either personally or with their students had a history. For the teachers the history of the tool begins from when they first learn the name of the tool, how the tool works, and then how it could be used within their classroom, which was described in the previous section. The way the teacher first uses the tool in their classroom may change over time depending on a multitude of variables, which is something I observed in both classrooms. In other words, "[The] tools …are essentially cultural tools transformed historically by the circumstances of social and economic life" (Rosa & Montero, 1992, p. 69). Both Hazel and Erin describe how their experimentation with various technological tools changed over the course of the time they implemented them in their classrooms.

One of the most frequently used tools used by the teachers was Google Classroom. This was a tool used district-wide for those in grades three to twelve with the 1:1 devices. During the year of my study, Google Classroom was just released and was not yet available to every school district in the country. At the time of my study time, Erin had just begun teaching in third grade, but before transitioning to third grade she was used to creating her lesson plans on Google slides, sharing them with her colleagues via email, and then posting the lesson plans on the country website. When she was moved to third grade it was her first time with the 1:1 and Google

classroom. Erin was nervous at first about how she was going to figure it all out, but after playing around with it she realized "it wasn't that hard."

With Google Classroom, creating lesson plans via slides was the same, but now it was easier to share the plans with Google Classroom because she just had to share the lesson plan folder once and the entire third grade team and whoever else had access to the plans. Erin said Google Classroom,

> changed a lot about how we [third grade team] did things professionally and it saved me a lot of time, but then it also made us do things in a different kind of way just as far as how we produced information for each other and for our kids (personal communication, December 8, 2015).

Erin also recalls the school's gradual transition to a 1:1 format. She remembered that once LOE had been remodeled and they were in their "new" classrooms" each classroom had new projectors and the teachers got new laptops. Then slowly each classroom started getting more devices for the students. Each classroom had six netbooks for the whole class, and the following year every kid had Netbooks. Erin said, "...at first I thought, "Oh, it's going to be a pain, it takes them so long," but now I can't imagine them not having because I rely on it so much…" (personal communication, December 8, 2015).

Hazel recalled using Google Classroom her first year with the Daily 5 framework as a year of many challenges. She said that during the Daily 5 she would have individual conferences and small group conferences and she wanted to figure out how to use technology in those groups in a way that was meaningful, but not distracting. She experimented with what she calls TIP charts where students would pick an interesting word from a book they were reading, then they would type the word into one of the columns of the TIP charts, then use the Google dictionary

tool and copy the definition into the chart, followed by inserting a picture from Google images. She wanted to think more about how she could create similar activities like this.

She liked using Google Classroom because "it's a cool way to help kids become independent, but I think it's also cool to figure out how they can work together using technology which is the harder part, you know, figuring out how they can collaborate" (personal communication, March 15, 2016). Hazel describes one example of how Google Classroom has allowed her students to be more independent and that is through using the reference tools in Google Docs. Compared to her students from last year, she said she feels that the student's vocabulary has improved because she has found ways this year to get them to use the reference tools like the dictionary and thesaurus within Google Docs.

Hazel has the mindset that she always thinking about how she can improve her practice. Now that she has a good grasp on how Google Classroom and the 1:1 devices can be used within her classroom, she has begun to think about how she can make use of these devices outside of the classroom. She said,

> I really want to figure out a way at the beginning of the year next year to teach about Google offline and how to do that before they go home so they can keep working on that awesome piece of writing that they've done at home … (personal communication, May 8, 2016).

Both teachers learned from their student's approaches to using technology that have caused them to make immediate changes or have caused them to think about goals for the following school year.

Summary

In this chapter I focused on looking at how both Erin and Hazel's schooling, interactions with adults and students, and their experimentation with various technological tools. Live Oak Elementary is a school with a 90 plus year history and it's clear that the teachers within this building are evolving with its innovative infrastructure. Experiences with technological tools with various groups of students and various literacy tasks will undoubtedly bring change to how technology is used by these teachers in different literacy tasks. Gallimore and Tharpe (1990) stated that "Schools will not be reformed until it is understood that schools must be a context for teaching and that context must itself be a teaching context" (p. 201). Valuing how teachers are learning new tools is important to not only respect a teachers' time, but to also create teachers that are technologically and pedagogically knowledgeable. Being open and receptive to these changes and learnings will cause evolution and growth of "internal logic" for each of the activity systems.

CHAPTER 6

DISCUSSION, CONCLUSION, IMPLICATIONS, AND DIRECTIONS FOR FUTURE RESEARCH

Selfishly, as the researcher in this study, I was eager to get back into the elementary classroom as I had been away for four years, which seemed like far too long. I wanted to get back into the classroom because part of me that felt like I was missing out on the newest technology teachers were using and I did not want to feel like that researcher who was "out of touch" with what was really happening in classrooms. I came into this study as a teacher who had used/experimented with technology in my own elementary ELA classroom and was currently an instructor who was implementing digital tools with preservice teachers.

Before this study, I knew that having support with using technology was important for me as I felt like I was supported through a technology coach at my previous elementary school; yet, I had gained such an appreciation for using technology in my lessons that when I became an instructor at the university level I integrated technology without the support I was used to having. However, I also had experience with my elementary colleagues in public schools who had the same type of support as I did, but were reluctant to integrate technology in their classroom. My experiences elicited wonderings: How were teachers integrating technology in their classrooms? More specifically, were the teachers thinking about the way the literacy content and the technology are working together to make, or were they just so excited about the new digital tool that they were finding a way to fit it into the literacy content, as I admittedly remember doing.

Also, did support matter or was is more of an individual endeavor to keep up with new tools and then decide how they could be used with the content?

As mentioned in chapter 1, the purpose of this study was to understand the relationships elementary teachers have with the technology they use as part of their literacy instruction as well as explore the combination of social and historical factors that may have contributed to a teachers' integration of technology in their literacy instruction. The overarching research questions were:

What are the relationships that exist between the two activity systems of (1) elementary teachers and (2) the school, in which these teachers teach in, who share the same objective of integrating technology in literacy instruction?

1. *What factors might be contributing to instructional contradictions of technology-infused literacy learning in the elementary classroom?*
2. *How are teachers' socio-historical experiences with technology informing their pedagogical applications of technology?*

In this qualitative multi case study, the participants included within the activity systems were two third grade teachers, the principal, the media specialist, instructional technology support for this elementary school, and me the researcher. Using case study methodology, I acknowledge that the findings from this study cannot be generalized to other populations or settings. The data collected for this particular study reflect the perspectives of these participants at this particular school in the Southeastern United States.

Guided by Cultural Historical Activity Theory (CHAT), I set out to examine the intricacies that exist between teachers, those who support them, and the technology infused literacy pedagogy that was executed. In chapter 4 and 5 the relationships between the three

activity systems was described in detail. In the following section I will describe the major findings in relation to the research described in chapter 2, in addition to research not described in chapter 2 as some of the findings were unexpected.

Discussion and Conclusions

An exciting component to qualitative research, or any research for that matter, is that there are unanticipated findings, you can never truly predict what will happen. In chapter 4 the key findings included the contradictions that seem to have been hindering the activity systems from integrating technology within literacy instruction:

1. A lack of **orientation** at the beginning of the school year for students to:
    a. learn how to take care of their device
    b. learn computer tasks that will benefit them throughout the year
    c. show them how to be "problem solvers"
    d. explicitly state the expectations to students and parents for tasks such as reading comments, email, etc.
2. A problem with **management** when students are using their devices. students are all tempted to multitask. Is this ok? Is there an appropriate time to do this? What should we tell students? However, remembering what we could be missing in between is important (handwriting, deep learning).
3. An outdated format for **professional learning**. What is the best way for professional learning to occur? Is the ITS a necessary position? What about personal learning communities -the teachers learned best from each other or through their own exploration.

4. The need for an **adjustment period** to learn new things (models, teaching with tech). There seem to be high-stakes expectations that come along with technology and the idea that things can be done better and faster with technology.

In the following section I will discuss these findings as they relate to the current literature.

Orientation. All of the participants discussed the need for students to have more background knowledge about using their devices at the beginning of the school year and also time during the year to introduce skills as they notice students need them. Research on this is quite limited, but there are many strong options on this from educators via a quick Google search.

In Hsu's (2016) most recent mix-methods study of 152 teachers in grades K-6. One of the barriers these teachers mentioned was students' lack of computer skills. One of the teachers in this study stated that, "students are not well trained at a young age in basics like logging on, word processing and simple tasks like saving and editing. A lot of instructional time is wasted teaching these simple tasks" (p. 38). I found Hazel saying very similar things. She said third graders "just don't know how to use their computers. It's madness. I have students who still can't long on. It's just those little things that we know that we don't think about saying to them" (personal communication, March 15, 2016). According to Hazel she also finds it difficult to find time to teach her students these skills throughout the year.

When thinking about skills needed to use a netbook, such as the students did in my study keyboarding is one skill that may come to mind. Poole and Preciado (2016) specified that teaching keyboarding skills has the potential for a faster transcription rate via keyboard rather than via pencil and paper. In addition, it was believed that teaching touch typing automaticity combined with a systematic and rigorous writing curriculum can help students become proficient writers. Agreeing, the Common Core State Standards (CCSS) have specifically mentioned that students

should have sufficient keyboarding skills beginning in grade three, however there is not universal agreement (Bartholome, 1996; Flemming, 2002; Jackson & Berg, 1986; Russell, 1994). Despite the potential benefit of efficient keyboarding skills, touch typing curriculum has not systematically been implemented into U.S. schools (Trubek, 2011). Lack of time is mostly attributed for the lack of keyboarding instruction, even though early elementary teachers are spending hours laboriously showing their students how to hold a pencil and the correct way to write a letter (Trubek, 2011). In Cedar Creek County, Abby, the ITS at Live Oak Elementary (LOE), indicated that there wasn't "a clear typing program here or any time set aside necessarily to learn how to type. So, none of the kids in CCCSD know how to properly type anyway which is amazing when you watch how quickly they can type by middle school." It seems that Abby believes that students are somehow learning on their own how to type without formal instruction and the "hunt and peck method" may not be a problem if the students are able to type at a reasonable speed.

Management. At LOE, managing students online, multitasking behavior was a concern before my study began as they had implemented software called LanSchool so teachers and administrators could keep a watchful eye on what students were doing on their personal devices. However, during my study even with access to this monitoring tool teachers still discussed and I witnessed issues with students being off task and accessing sites not intended for the specific task at hand. There are few research studies that suggest teachers are having management issues with one-to-one computing.

Edweek (2013) reported that teachers were entering a "new frontier…with classroom management" (para. 2). Discussing how districts are using internet firewalls and pre-loaded applications to help kids on tasks, the authors admitted that these software systems were far from foolproof and additional measures need to be taken to keep students from straying. One addition

measure suggested is making sure teachers are wondering the room. By doing this, students are less likely to stray from the task at hand. Tech coordinator Julie Davis (2015) also suggests teachers walking around for monitoring purposes as well as being "a strict disciplinarian regarding technology use" (para. 3) by using off-task behavior as teachable moments. I believe that if teachers model their own multi-tasking and monitoring of this behavior then students will become more aware of when they are off task.

Professional Learning. Throughout my study it was clear through all the conversations I had with each participant that the way professional learning was organized was not ideal. At LOE teachers had access to the media specialist, Adam to schedule lesson involving technology. Once scheduled, the teachers would bring their classes into the media center and Adam and the teachers would teach the lesson together. Adam would also attend teachers planning sessions once per quarter to see where he could assist them with integrating technology. However, at the end of the study Adam felt that he had not been as available for teachers as he had wished he had and neither Erin or Hazel sign up to bring their classes to the media center for a technology lesson. Abby, the ITS was available once per week to meet with teachers in their classrooms—but both Hazel and Erin say she was not as available as she wished they had been. Even with the opportunity to sign up to work with Adam, it seemed like it was more convenient for both teachers to have someone come in to their classrooms, as opposed to going to the media center. It was a common theme that Hazel and Erin mention using new technology in their classrooms that they had learned from each other.

The current research available directs the focus on incorporating more professional development in schools. In fact, in Tondeur, van Braak, Ertmer, and Ottenbreit-Leftwich's (2016) meta-aggregative analysis of 14 qualitative studies conducted in the U.S. and abroad that

focused on the relationships between teachers' pedagogical beliefs and their classroom uses of technology, found a common theme to be professional development. Their findings indicated that a teacher's beliefs and practices changed from teacher-centered beliefs to more varied beliefs after participating in traditional professional development. Most notable of their findings was from Lim and Chan's (2007) study of teachers in Singapore where there was a change in teachers' roles, "from a knowledge receiver to knowledge constructor, and technology's role from tools to assist students in receiving knowledge to tools that facilitated knowledge construction" (p. 483). In this study the teachers had to work collaboratively on authentically situated scenarios. They were provided scaffolds such as worksheets with guiding questions and some web links. At the end of this scenario they were required to present their findings to their peers on Powerpoint slides. With teachers in my study I could see how grade level teams could work collaboratively to learn a new way to use Google Classroom and then present it at a faculty meeting.

The format for professional development recommended by scholars is not the typical explanation of new ideas to a group of teachers, who will more than likely never find time to implement these ideas, but rather professional development that is more individualized encouraging, leading, and assisting teachers along the way (Hutchinson & Reinking, 2011). It should be conceived as part of a culture of lifelong learning, knowledge sharing, and peer learning (Levin & Wadmany, 2008, p. 260). Harris and Hofer (2009) offer their professional development suggestion which is to first focus on standards first and select the educational technologies last so that the technology does not overtake the content of the lesson. Most teachers tend to choose the technology first and then see how it can fit into the lesson.

Additionally, using Adam's suggestion of encouraging the development of professional learning communities is another way scholars can help teachers integrate more digital tools. Putnam and Borko (2000) said that a teacher's practice is more likely to change as they participate in professional learning communities that discuss new materials, methods, and strategies, and that support the risk taking and struggle involved in transforming practice.

This idea of professional learning communities and more individualized professional learning seems to be what these teachers are already doing. However, the technology these teachers are implementing, based on the SAMR model, all fall within the Substitution level, meaning that the technology is being used to perform the same task as was done before the use of computers. There still needs to be outside support for these teachers to ensure they are working toward thinking about what the next SAMR level could look like. Agreeing, Adam stated,

> We have these initiatives, everybody has to have that same training and so I don't feel like there's not enough opportunities in the kinds of professional learning we have right now that exposes people to new ways of thinking (personal communication, May 8, 2016).

One suggestion Adam had for the school district in rethinking professional development is allowing teachers to be able to individualize their learning. Adam describes his vision:

> …what I'd like to do at some point … is to really show people what it's like to individualize your professional learning and to have permission to do that. But that would mean district or school level professional learning stepping back a little bit and so there's a lot of things that would have to happen. And to be able to show, "This is what I've done". Like last night I participated in a Twitter chat. Does that count for anything? No. I learned a lot during it and I contributed a lot but as far as my principal or my

> superintendent or other district leaders knowing that I did that, there's no way to show that I did that. But I think that's a big piece that holds people back from doing that is that it's not valued as a part of the requirements that we have, you have to do it as an extra. And it's not that people don't want to do it but you'd have to make that choice about balancing. I was doing the Twitter chat while I was laying in the bed with my three-year-old and he was watching a YouTube video. But even being able to leave school early at the end of the day to say, "Okay, tonight I have an hour long Twitter chat so I'm going to leave right after dismissal today" …. I think people would be much more likely to do it if they got credit for it (personal communication, May 8, 2016).

I believe that this individualized personal learning is something that teachers are already doing and would be encouraged to do more of if it was valued by administration. One way I could help create this is to conduct Twitter chats with preservice teachers to get them in the habit of this practice which may then snowball into them following other educators for ideas, similar to how they are already using Pinterest. In fact, these types of chats are already happening through hashtags such as #pretchat for preservice teachers to connect and collaborate, #edtechchat for those interested in expanding student opportunities via educational technology, and various others. If invited to offer professional development at an elementary school, I could also introduce this idea by starting a school Twitter chat where the teachers share how they are currently using technology. This could serve as a springboard for other online chats throughout the year that they could participate in from anywhere at their convenience. My goal would be to open up this idea to the teachers to get them comfortable and to see the value in this type of professional learning that would allow them to be able to define their own learning and professional needs.

Adjustment Period. During the year of my study, teachers were in there second year of implementing the 1:1 devices and they were in the first year of learning about the SAMR model, that they would in the following year be evaluated on. The teachers were very much in the mindset of continuing to learn how to use the student devices within their lessons as well as how to incorporate Google Classroom within their lesson. Because of this focus, teachers were not using any of the other available technology (e.g. iPads, digital cameras, robots) that could be checked out in the library and commented during our conversations that they were not quite sure what the SAMR model was and seemed to feel very uncomfortable and overwhelmed with what a lesson at each level specifically looked like. It was important that these teachers were beginning to get familiarized with SAMR, as indicated by the principal, media specialist, and ITS, because in the year following my study teachers would be required to create their lesson plans around this model with each lesson having an identified level of S, A, M, or R.

Within technology education, the word "tinkering" is used to describe a creative, improvisational problem-solving process. As one who 'tinkers,' the learner gains new insights and improvises new solutions because the end point is unknown (Bevan, Petrich, Wilkinson, 2014). With tinkering, one goes through a process of trying something to figure out what works or doesn't to find the best way to the solution, often going through many iterations, or changes, along the way. According to Escalante (2016) tinkering is more of a philosophy than a single practice and thus can be applied to many forms of learning for all learners. With teachers as learners of integrating technology within literacy instruction I believe there is a tinkering process that takes places and continues to take place as new types of technology are introduced. It's also important that there is an environment that is accepting of this ongoing experimentation. With

both technology and early literacy there is real-life tinkering that occurs before students feel that they have a handle on how to use technology, how to read, and how to write.

In Grisham and Smetana's (2011) work with teachers using technology in their classroom with elementary aged students, they found that teachers expressed concerns of the time demands of technology and in order to feel confident with technology it requires practice and time for mastery. Erin and Hazel expressed these same concerns of feeling overwhelmed, as well as, needing more time before they feel more fluent in their use with technology. To provide more time for teachers to tinker and become comfortable with new teachers, teachers could form professional learning communities with their grade level and spend ten to fifteen minutes one or twice a week after school tinkering with a new tool.

The Influence of Socio-historical Experiences

In this study the socio-historical experiences influencing the teacher's pedagogical application of technology within literacy instruction included their own schooling, adults they have interacted with professionally, the students in their classes, and the tools they've experimented with.

Neither Erin nor Hazel feels that the courses they took during their teacher preparation programs had an impact on the way they think about integrating technology within their classrooms currently. It's difficult to blame the instructors in these course because when you think about the intersection of technology and curriculum they move at different speeds (Ham, 2010), obviously with technology outpacing the curriculum. The idea of preparing teachers to adapt to a constantly changing landscape of technology is more important than preparing them to use a specific tool (Kozak, 1992) seems relevant when school budgets with technology may be an issue. But the question becomes, how do you prepare teachers for a constantly changing

landscape? Perhaps training teachers about models that can evaluate any tool as it's used in the curriculum such as SAMR or TPACK would be more useful in the long run. For the short term, intentionally placing preservice teachers in classrooms where the teacher is strong in integrating technology would be helpful in showing new teachers how curricular integration of technology looks like. Also, setting up professional learning communities with preservice teachers and inservice teachers (mentor and student teachers) learn together and plan together could help build this idea of working together to learn new skills.

It was a common theme that both Erin and Hazel used technology in their classroom that they learned through informal conversations rather than formal, pre-schedule professional learning meetings. Having both the media specialist and the ITS as professionals in the school that these teachers could have used for assistance, they found that the logistics of designating a time with them inconvenient and ineffective. Learning from interactions with grade-level colleagues as well as from their own students seemed to be how these teachers were accessing new knowledge.

Experimenting, or tinkering with tools is how the teachers, over time became more routine with their ways of using a variety of tools. This was how both Erin and Hazel decided if the tool they were using was something that would fit into their daily routine during the Daily 5 literacy block. When these teachers found a tool that worked, such as Google forms for a quiz, they shared it with each other and then their third grade colleagues.

Implications for Teaching, Learning, and Literacy Research

Possibly the most important pieces of a research study are the conclusions and implications-the "So what?" As the researcher, I've had to step back from the data and think about why this research is significant to someone other than me. The key findings for this study

were discussed in chapter 4 and 5 have implications for future research involving elementary teachers, administrators, pre-service teacher educators, and for literacy researchers.

Implications for teachers

This study illuminates just how complex integrating technology within literacy instruction is and how difficult these decisions can be. From the findings it was clear that teaching students basic computing skills at the beginning of the year and throughout the year is important. Teachers should not feel as if they are wasting time when they are teaching these skills as they are skills that the students will use for the rest of their lives.

Being open and frank to students about multi-tasking, also it would be an important discussion to have with students, each other, and administration throughout the year. While having monitoring tools such as LanSchool to be able to keep track of all of the students' devices, it's just not realistic when the teacher has a more important job of assisting students. As adults, we multi-task and get our assignments completed. Students should also have the space to practice these same skills.

For teachers, professional learning takes time away from other teaching responsibilities, most times is not a topic that is of immediate relevance, and rarely is something that is immediately replicable into the classroom. However, if professional learning was individualized, teachers were given credit for this type of learning, and they were able to show growth in their teaching through this approach then this may be an effect approach. ISTE (2015), acknowledging the need for a new professional learning format suggests:

- **Tech Tuesday session**: the staff stays after school for 15 minutes (snacks are provided) and teachers share relevant tech resources or websites. They found that

some teachers often stayed longer than the 15 minutes once they were engaged in a session.

- **Lunch and Learn**: teachers are provided with lunch and they get to spend 30 minutes exploring a website that they can utilize in their classrooms immediately
- **Twitter**: getting teachers interested in using twitter by first starting off with a group book study on Twitter. Many teachers who joined the book study continued throughout the summer
- **Voxer**: similar to the Twitter professional learning, but teachers are able to talk to one another asynchronously via a walkie-talkie type app
- **5 Minute PD**: a short time frame to expand teacher knowledge about a new resource or strategy

Implications for administrators

In this study, the administrators included the principal, media specialist, and the ITS, as they were the ones to assist the teachers in using technology. To overcome the contradiction of students not knowing certain computer skills, administrators need to acknowledge that it's time well spent to teach these skills thought the year and teachers are not wasting their time when doing so, yet acknowledge the pressure associated with high-stakes assessments and federal evaluations. Students will be using computers for the rest of their lives and this would further develop their College and Career Ready Skills as indicated on the CCSS.

It was discussed that there was not enough time or the quality was not what was expected with professional learning. Thinking about a new model of professional learning that include teachers as leaders in this process would allow for time well spent for professional growth. Fostering a community of teachers who are interested and engaged with their own learning may

inadvertently create personal learning communities who embrace this idea of tinkering and discovering together.

Implications for pre-service teacher educators

Teacher education programs are key in preparing future educators for what integrating digital tools into the curriculum looks and feels like. Russell and his colleagues (2007) indicated that:

> While it may not be possible to pair every pre-service teacher with an experienced and sophisticated technology-using teacher, efforts to bring the practices employed by these teachers into the vision of teaching pre-service teachers has the potential to enhance beliefs about and increase instructional uses of technology (p. 415)

While it may not be the best use of pre-service teacher educators' time to teach about specific tools as they quickly become outdated it would be valuable to talk about evaluation models such as SAMR and TPACK and the philosophies behind these models. Because with these specific models, the view that technology should not be the focal point is transparent. In addition, providing prospective teachers opportunities to engage in authentic meaningful learning activities such as participating in individualized professional learning via Twitter chats instead of disconnected from the real world classroom assignments would ease that overwhelmed feeling that is well documented by novice teachers.

Implications for researchers

Lessons learned from the act of research can be just as important as the lessons learned from the data collected. The final implications stemming from this research are in terms of theoretical framework applied to this study: Cultural Historical Activity Theory (CHAT). What I

have learned from conducting a CHAT-framed study may inform other educational researchers regarding what CHAT was able to assist me in seeing as well as the limitations of CHAT.

As previously stated, Roth, Lee, and Hsu (2009) observed that CHAT is useful for making visible normally invisible structures, processes, relations, and configurations. I found this to be quite true for this study, as the CHAT pentagon forced me to think about each component individually and then in relation to other components. This can easily be seen in how I coded and analyzed the data, taking each component step by step. Additionally, contradictions in systems are often 'invisible' as well, but because these contradictions were such a key part of the CHAT framework, my attention was drawn to interactions causing tension within the various systems in this study. Consequently, I believe that CHAT was incredibly fruitful for school-based technology research. This framework may allow researchers to have a better grasp of complexity involved in school settings as well as an appreciation for the different and multi-layered relationships within a school setting. This is certainly a framework I would recommend educational researchers to investigate when designing a school based study.

On the other hand, CHAT – like any theoretical framework- cannot do it all. When Vygotsky, Leont'ev, and Luria built the foundations for CHAT, computers did not exist. The ways of thinking that correspond to the internet in our current society was not historically accessible to them. With the exception of the work being done in posthumanism (Bennett, 2010), the internet cannot be seen, touched, or localized, although it is based on servers-it is nothing but a communication system which continues to improve in quality as you are reading this now. Today we communicate via blogs, wikis, and other social software. We can communicate and collaborate in networks globally and unlimitedly. There is no telling how things will turn out.

We cannot anticipate the consequences of the emerging transforming processes of the data we are putting out into the world.

Due to these concepts CHAT fails to perceive the reality of global networks that make possible these forms of networking. There is no way to characterize the communication networks adequately in terms of subject, activity, goal, or motive. These global networks are material, but not objects or tools. Ruckriem (2009) posed these questions:

> Can those automatically and independently functioning technical systems still be called activities or activity systems? Are they really just tools? And whose tools? Is there any identifiable individual or collective subject of those systems? Can activity theory and its methodology still be applied to its digitized reality? (p. 91)

I believe that CHAT can be applied to our current digitized reality because of the affordances that third generation CHAT provides. These global networks can be identified as their own separate activity systems interacting with the subjects of focus. However, I believe this is an area of CHAT that could be examined more closely.

Connected to my specific study, people like Adam or Abby could have been used as a resource for technology. Can those who are part of the community also be considered a tool at times and part as the community at other times? Would this effect any contradictions if one person was used as a tool more often than another? These are questions I continued to ponder throughout the analysis process.

In my study, in order to account for this ambiguity described above, I was consistent in including people as part of the community and tools such as Google classroom as a tool. Additionally, when examining the interactions between teachers and other people or objects, I was acutely aware of how the people and tools were being used within each of the activity

systems. As a result, I would recommend that researchers who adopt CHAT as a theoretical framework to keep in mind the complexities that come with using various types of technology as part of the activity systems analysis.

Directions for Future Research

This study is just the beginning of the research that needs to be done concerning the many issues that arose from this study. Branching off from this study I am interested in researching individualized professional development for teachers, teacher's management and implementation of student collaborative writing via Google docs, and the relationship between students tinkering in Makerspaces and writing.

As a former elementary teacher I was already privy to the disconnectedness with professional development and actual implementation. However, as I had my final interview with Adam I was very interested in this idea of individualized professional learning where teachers engage in learning through twitter chats, teacher blogs they find via Pinterest, or through websites and/or videos they find via a simple Google search. As we were having this conversation I thought about the tools I was currently implementing with pre-service teachers and the way I was learning about these tools was through my own investigations. There are several people I follow on twitter who tip me off to new tools and from there I try to find out all I can about this tool and then begin practicing with the tool myself. This made perfect sense and I'm curious if other educators learn this way and how this learning is valued in school districts.

One type of literacy/technology integration that I was looking forward to observing the third grade teachers use was having students collaborate on writing via Google Docs. However, both teachers said that they had attempted to do this, but students would complain about others deleting their work and said that it just was not feasible with these third graders. Nonetheless, I

know that collaboration is one of the advantages of using technology and on the upper levels of the SAMR model. If students are provided with scaffolding, then it would be possible for students as young as third grade to collaborate on a writing project. I am interested in seeing the projects the come from these types of collaborations as well as observing teacher's strategies to get students trained to work in this way.

As a volunteer in the media center I was aware of the Makerspace that students had the option to visit. Students would sign up for a time to visit during recess. I had never heard of a Makerspace before this study, and began reading more about it and hearing more about it via Twitter. Throughout my study I also kept thinking about this idea of tinkering with a Makerspace in a classroom setting and the issue with writing in the classrooms I was observing that was very structured, formulaic in preparation for the third grade end of the year assessment. I couldn't help but think about the possibility of combining Makerspaces and writing and what this what look like.

It has been about a year since I began collecting data for this study. Whenever I talk to someone within the community and even in neighboring states about LOE they have rave reviews of the school faculty and, of course, the technology that is being used at this school. Despite the contradictions that were found in my study, I still feel that the school is cutting edge in its desire to use the most innovative practices and a strong aspiration for students to create content that is shared with the global community through tools such as Flipgrid. Very soon, I believe, technology will be "a part of what the students are doing every day and it won't feel like this big event" (Adam, personal communication, November 12, 2015) as long as we continue to be intentional with the technological tools we use to enhance the literacy content.

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APPENDIX A

INTERVIEW QUESTIONS

Interview 1

For all Participants

- What are the district's expectations for teachers using technology in their literacy classrooms?
- Are the technology expectations school-wide vs district-wide and how are these expectations reinforced?
- How do you think teachers are or should be using these tools?
- If you were to ask a teacher at this school to provide professional development with technology, who would you ask and what would you like them to focus on?
- Are there any technological initiatives or tools you wished the school had? Why?

For Media Specialist & Technology Integration Specialist Initial Interview

- How do you see your role as far as technology use in the school?
- What types of technological tools are available to the teachers?
- How are you supported in learning how to assist teachers in learning how to integrate technology?
- How have you seen the teachers utilizing technology in their classrooms?
- In what ways do you believe teachers are supported in their understanding and use of technology?
- What obstacles do you have or see about technology use in literacy classrooms?

Interview 2

- How often would you say you plan lessons with Adam/Abby in the Media Center? Who initiates these ideas?
- What lessons you collaborated on with Adam/Abby in the past? (Puppet Pals) Future plans? Where are these projects posted?
- Do these lessons ever occur in the classroom? Why not?
- What is the SAMR model? How do you see it playing out in your classroom or lesson plans?
- When you are being observed by Dr. Eve, what does she specifically look for in terms of your technology use during lessons?
- What do you see as the pros and cons to using Google classroom? Do you ever have student collaborate on a project/assignment with google drive? //Go Noodle? //Class Dojo? How did you learn about these things and first implement into your classroom?
- I've noticed that laptops are sometimes take away as far as behavior management. What do you think about this?
    - What is your behavior system in your class?
    - I've also noticed that laptops are used as a reward system. What are your thoughts on this?
- What is the grading process like for students submitting assignments through google classroom?
- Do you ever check out the iPads or other devices? If so, how are they used?
- (Hazel)I noticed that you have a student job that is to help other students fix their computer problems. How often do they fix computer problems?

- (Erin) What were your thoughts on using Newsela? Will you use again? Have you shared this with other 3rd grade teachers?
- Do you have a class newsletter? If so, are they sent digitally or printed or both?
- Do you or the school provide info session for parents on using computers or how to help their children use computers?
- What do you think is one thing that could be improved with the student's devices to make using tech easier?
- Why are students encouraged to take netbooks home if they don't have homework/not allowed to have homework that requires internet access?
- What does the beginning of the year look like as far as tutorials for first learning how to use Google Classroom or even their netbooks?
- How do you decide if students should write in notebooks or netbooks? What are your thoughts on this balance?
- Are the students ever taught about the ethics of being online-rights, roles, identify, safety, security?
- Anything I can help with? How do you think WTW is going? How can we make it more effective? Would it be possible to check out iPads one week? How would I go about doing this/ I've found some apps that may work well with WTW?

Interview 3

Dr. Eve, Adam, Abby

- What would you say is the importance of integrating technology?
- If you had to give examples of good technology integration versus not so good tech integration what would you say?

- As far as the SAMR model, how are teachers learning about this? Is it something they used this year?
- Especially after the 3rd grade classes chose to do the Milestones paper/pencil, I noticed a lot more use of paper/pencil versus the laptops for test preparation. I know you are seen as the tech guy, but how do you feel about the balance with reading and writing with tech vs. more traditional paper pencil use?
- Adam: In thinking about 2 different models of supporting teachers: you either going to them in their classroom, or them coming to you in the media center. I see your goal is for the teachers to have you there for support if something goes wrong and then to eventually feel comfortable enough to try it out in their own classroom.
- How do you feel about the difference between both of these models? Does the location matter? Are you seeing the teachers that come to you for support with tech lessons in the media center-replicating similar lessons in their own classrooms or is it a one and done type of lesson? (For example if you are using Flip grid in the media center-are teachers using this in their classrooms for lessons?)
- What do you think is the best way to get teachers to incorporate more technology that supports collaboration and inquiry outside of using google classroom or closer to the Redefinition stage of the SAMR model? Or is this even a goal? Are what teachers are doing with tech sufficient for right now?
- Abby: How often would you say you plan lessons with 3rd grade this year? Who initiates these ideas?
- Abby: Last year you were a classroom teacher and as a ITS this year, are there things that you think about differently with this new perspective as far as tech integration goes?

- Dr. Eve: As I've walked through the school I've noticed a combination of the old building integrated throughout the building, do you have any documents that talk about the History of Barrow Elementary?
- Do you or the school provide info session for parents on using computers or how to help their children use computers? Or do you think most parents here are tech savvy?
- Why are students encouraged to take netbooks home if they don't have homework/not allowed to have homework that requires internet access?
- What are your goals for next school year as far as tech goes? And for supporting teachers to use more tech?
- What do you feel are your accomplishments this year as far as tech goes for supporting teachers with tech?

Erin and Hazel

- When I left students were working on creating a writing portfolio. How did that end up going and in what ways did the students end up publishing their work?
- What would you say is the importance of integrating technology?
- If you had to give examples of good technology integration versus not so good tech integration what would you say?
- What do you think is the best way to get teachers to incorporate more technology that supports collaboration and inquiry outside of using google classroom or closer to the Redefinition stage of the SAMR model? Or is this even a goal?
- What are your goals for next school year as far as tech goes? And for supporting teachers to use more tech?

- What do you feel are your accomplishments this year as far as tech goes for supporting teachers with tech?
- How well do you feel like you were supported, when you needed it this year in using technology?
- How do you feel about the professional development model of going to Adam to watch him do tech lessons with your students? Do you think it matters if he did them in your classroom or if he did them in the media center? Did Ashley come in to do any lessons with you?
- Did your students ever read any e-books, EPIC apps?
- What do you see as the pros and cons to sharing plans with everyone as far as tech integration?

APPENDIX B

LESSON PLAN ANALYSIS

(15 weeks of lesson plans total)

	A	B	C	D	E	F	G	H	I	J
1	**Lesson Plans (Week.Day)**	**Writing or Reading?**	**Type of Technology**	**Purpose/Function**	**Intended User (primarily)**	**Required/Choice**	**SAMR Level**	**Which Class Observed (E or H)**	**Planned/ Spontaneous**	**Notes / Other**
2	Daily	Writing and Reading	Website & App	Behavior Monitoring	Teacher	Choice	N/A	E and H	Planned	Not in lesson plans
3	Daily	Reading and Writing	Website	Adaptive assessment based on standards	Students	Choice	S	E and H	Spontaneous	Not in lesson plans, but always a choice
4	Daily	Reading and Wrting	Iphone App	Time monitoring reward for good behavior	Teacher	Choice	N/A	E	Spontaneous	special education used it to time how long a student was allowed to play on websites
5	Quarterly	Writing and Reading	Google Doc	Description of Classroom Jobs	Students	Choice	N/A	H	Planned	students looked at this to determine which classroom job they would like to apply for, they would submit their application to Haley for the job they were interested in.
6	Occasionaly	Writing and Reading	Website	Time Monitoring	Teacher	Choice	N/A	E and H	Spontaneous	Not in lesson plans
7	Occasionaly	Writing and Reading	Website	Gathering information	Students	Required	S	E and H	Planned	pebble go is similar to an encyclopedia
8	Daily	Writing and Reading	Website	Reading and listen to reading	Students	Choice	S	E and H	Planned	uniteforliteracy.net, not in lesson plans but on squorl page
9	Daily	Reading	Website	Listen to Reading	Students	Choice	S	E and H	Planned	youtube.com, not in teachers plans
10	Daily	Writing and Reading	Website	Physical Activity	Teacher and Students	Choice	S	E and H	Spontaneous	Not in lesson plans

APPENDIX C

DATA COLLECTION DETAILS

Data Source	Participant collected from	Frequency
Interviews (Audio recorded & transcribed)	Eve Abby Adam Erin Hazel	3 separate, 1-hour 3 separate, 1-hour 2 separate, 1-hour 2 separate, 1 hour 2 separate, 1 hour
Interviewer's notes	Eve Abby Adam Erin Hazel	Taken during each interview Taken during each interview Taken during each interview Taken during each interview Taken during each interview
Descriptive field notes	Erin Hazel	2x/week 2x/week
Documents (e.g. lesson plans, evaluations, emails)	Eve Abby Adam Erin Hazel	Collected when mentioned Collected when mentioned Collected when mentioned Collected when mentioned Collected when mentioned
Photographs	Erin's classroom Hazel's classroom School environment (media center, Hallways, ceilings)	2x/week 2x/week beginning & end of study

APPENDIX D

TOOLS

*The tools highlighted are tools that were never observed either teacher using and were not mentioned in the lesson plans. I was privy to these tools through interviews and other informal discussions.

Erin's Tools	Hazel's Tools	School's Tools
Netbooks	Netbooks	Netbooks
Epson Projector	Epson Projector	Epson Projector
Headphones	Headphones	Headphones
Web Camera	Web Camera	Web Camera
Go Noodle	Go Noodle	3D Printer
Microsoft Excel	Microsoft Excel	iPads
Online stopwatch	Online stopwatch	Spiros
Storyline Online	Storyline Online	Finch robots
Google Classroom Suite	Google Classroom Suite	Lego Robots
Class dojo	Class dojo	Hummingbird robot
Uniteforliteracy.com	Uniteforliteracy.com	Little Bits
Swirl	Swirl	Makey Makey
Pebble Go	Pebble Go	Smartboard
American Folklore.net	American Folklore.net	Nook Readers
YouTube	YouTube	Digital Cameras
Puppet Pals	Puppet Pals	Document Cameras
Pandora	Pandora	Microphones
IXL	IXL	Chromebooks
Reading Rockets	Reading Rockets	HP laptops
Popplet	Popplet	ACES netbooks
Waggle	Waggle	Kindles
Newsela	Newsela	Go Noodle
BrainPOP	BrainPOP	Microsoft Excel
Ticket to Read	Ticket to Read	Online stopwatch
Read Works	Read Works	Storyline Online

Weather.com	Weather.com	Google Classroom Suite
LanSchool	LanSchool	Class dojo
Google Earth	Google Earth	Uniteforliteracy.com
Padlet	Padlet	Swirl
Spelling City	Spelling City	Pebble Go
Xtra Math	Xtra Math	American Folklore.net
Learn Zillion.com	Learn Zillion.com	YouTube
Calm.com	Calm.com	Puppet Pals
Math in the Fast lane	Math in the Fast lane	Pandora
Skype	Skype	IXL
iRead	iRead	Reading Rockets
Flipgrid	CC Pensive	Popplet
Super Quiz	S'more	Waggle
	Flipgrid	Newsela
	Super Quiz	Brain pop
		Ticket to Read
		Read Works
		Weather.com
		LanSchool
		Google Earth
		Padlet
		Spelling City
		Kahn Academy
		Xtra Math
		Learn Zillion.com
		Calm.com
		Math in the Fast lane
		Skype
		Voice Recognition Software
		iRead
		CC Pensive
		S'more
		Flipgrid
		Epic App
		Capstone Library
		Super Quiz

APPENDIX E

ACTIVITY SYSTEM DETAILS

TABLE A.1 Erin's Activity System

Erin's Activity System **Object:** to prepare students to use all of these tools to prepare them for their professional life	
Tools	Storyline Online Pebble Go American Folklore.net Sqworl YouTube Class dojo Epson Projector Web Camera HP laptops Netbooks Headphones Puppet Pals Online stopwatch Google Classroom Suite Pandora Chromebooks Go Noodle Uniteforliteracy.com IXL Reading Rockets Newsela BrainPOP Ticket to Read Read Works Weather.com LanSchool Google Earth Kahn Academy Xtra Math Learn Zillion.com Calm.com Math in the Fast lane Skype

	iRead Super Quiz
Rules	Students must only go to things posted in Google Classroom Follow Positive Behavior Intervention and Supports Keeping up with being the districts "flagship technology school" Making sure students are using their laptops safely and not going to inappropriate sites Blocked Websites Use the devices provided to the students during instruction Cannot assign homework that requires internet
Division of Labor	Evaluates tech tools Asking students for assistance with technology Assisting students in revising writing Expanding students' knowledge after watching a video Time manager Choosing the Go Noodle for the students to participate in Shares knowledge with 3rd grade team Takes away laptops for inappropriate behavior deciding if students should handwrite or type Efficiency manager Student Behavior manager Lesson planning with special education teacher lesson planning one subject per quarter Task Manager Grade student work through Google Classroom Preparing students for assessments Contacting parents
Community	Students The School district Media Specialist ITS Me Other 3rd grade teachers Parents Student Teacher Principal & Vice principal Special education teacher

TABLE A.2: Hazel's Activity System

Hazel's Activity System	
Object: A lot of my kids really don't have access to technology and so in that case I really think it's a good tool because as they get older they're going to have more opportunities to use it and so especially for my kids who don't have a lot of resources, it's just a really good….and there are cons for sure especially with how much access our kids have with one to one but I mean, there is so much information just right at their fingertips. Like research projects are so accessible for kids, there are so many things that are so much easier to do because everybody has a computer. I don't have to have twenty-one encyclopedias about every single animal that we do research on.	
Tools	Netbooks Epson Projector Headphones Web Camera Go Noodle Microsoft Excel Online stopwatch Storyline Online Google Classroom Suite Class dojo Uniteforliteracy.com Sqworl Pebble Go American Folklore.net YouTube Puppet Pals Pandora IXL Reading Rockets Popplet Waggle Newsela BrainPOP Ticket to Read Read Works Weather.com LanSchool Google Earth Padlet Spelling City Xtra Math Learn Zillion.com Calm.com Math in the Fast lane Skype iRead

	CC Pensive S'more Flipgrid Super Quiz
Rules	When Ms. Hazel rings the chimes it's time for students to clean up and come to their carpet spot for the next lesson Students don't have to wear headphones when they are listening to something on their computer as long as it's quiet enough for only them to hear Hazel must follow the common commitments, what's expected during walkthroughs. Hazel needs to do 1 big project per quarter with her class connected to the library Hazel needs to be using technology in her lessons, using waggle. Hazel uses a six step behavior system with her students that includes moving them to other classrooms if needed Cannot assign homework that requires internet
Division of Labor	Hazel allows students to take turns choosing the GoNoodle song. She keeps track on an Excel spreadsheet Hazel gives points for good behavior on ClassDojo page Hazel Follows lesson plans created by third grade team members Hazel points our specific vocabulary on lesson plans for book that is being read aloud Hazel comes up with lessons for small groups during daily 5 independent work time Students choose tasks during daily 5 independent work time Students learn how to navigate a variety of task on their personal laptops Superintendent brings in guests to observe Hazel's classroom. Students check out and return books to the media center Adam and gifted teacher help students in the media center with puppet pals project students have classroom jobs. One of these jobs is the "tech support" they are to help their classmates with computer problems. Their first step is to turn of the computer if it is frozen or not working. If students want the class to see video during transition time they submit it to Hazel via email for her approval Hazel shows student's pictures of vocabulary if they are unsure of the word uses her personal cell phone to text special education teacher, if needed Provides student choice on if they would like to write with a pencil or in their digital journals Hazel shows student's short cuts on their keyboards. Example is showing them where the tab key is or how to make their screen brighter or dim I worked with students on words their way integrating technology in some lessons I worked with students on comprehension test prep Hazel found texts on Newsela that she thought fit the students interest for me to use during my lessons If a students' laptop doesn't work Hazel sends them to Mr. Jordan Students emailed Hazel if they wanted to share a piece of writing with the class. Hazel prepared students for the Milestones exam. Hazel attends professional development sessions. Hazel shares info to team on what was discussed at technology leadership team meetings Helps students know when it's time to check email student changes language of his computer to Chinese, Hazel can't help him

	considers a variety of models when teaching: creativity model among others when planning Comments and grades student work Hazel carries her phone with her when they go to specials or other places in school because she has ClassDojo app on her phone and turns the volume up so that students can hear it when they are walking down the hall Hazel reads the students job applications each quarter to "hire" for each job Hazel uses S'more to write newsletters to the parents Hazel reviews with students how to take care of their computers after breaks from a reminder from the principal
Community	Parent volunteers Superintendent Adam (media specialist) Gifted Teacher Special education teacher me Mrs. Jordon (computer repairer) district personnel technology leadership team parents principal/assistant principal Abby (ITS) Third grade colleagues Students UGA class (during recess makerspace)

TABLE A.3: Live Oak Elementary's Activity System

<table>
<tr><td colspan="2">Live Oak Elementary's Activity System

Object:
Eve: it opens up lots of different resources that we don't have access to and it allows students and teachers to learn in different ways together and there is so much out in the world to be able to use to enhance learning that you wouldn't necessarily get from print resources and so I think it's important for kids to be able to have access to that and I also think it helps kids learn just about the world they live in and I love all the ways we allow kids to share their work with audiences outside of our school and that's really important for kids to feel like things they do matters to somebody
Adam: it's important that we're modeling for kids what it's like in the real world and how we use devices and how we manage to balance our time as much as we can which comes harder and harder to do with so many distractions with technology
Abby: The really most important thing is that kids like it, kids learn with it and without it, they're bored, they're not learning like they did.</td></tr>
<tr><td>Tools</td><td>Netbooks
Epson Projector
Headphones
iPads
3D Printer
Web Camera
Spiros
Finch robots
Lego Robots
Hummingbird robot
Little Bits
Makey Makey
Smartboard
Nook Readers
Digital Cameras
Document Cameras
Microphones
Chromebooks
HP laptops
ACES netbooks
Kindles
Go Noodle
Microsoft Excel
Online stopwatch
Storyline Online
Google Classroom Suite
Class dojo
Uniteforliteracy.com
Sqworl
Pebble Go
American Folklore.net</td></tr>
</table>

	YouTube Puppet Pals Pandora IXL Reading Rockets Popplet Waggle Newsela BrainPOP Ticket to Read Read Works Weather.com LanSchool Google Earth Padlet Spelling City Kahn Academy Xtra Math Learn Zillion.com Calm.com Math in the Fast lane Skype Voice Recognition Software iRead CC Pensive S'more Flipgrid Epic App Capstone Library Super Quiz
Rules	SAMR model Common Commitments School improvement plan monitoring teacher's individual goals, one which must have to do with technology teachers should be using technology in all areas Adam meets with each team each quarter all grade level teams should do quarterly planning and include how they are going to include digital learning within lessons students are required/expected to take their devices home each night
Division of Labor	Provides Professional Learning to teachers Works with professors at UGA Meets once a month with all district media specialist and focus on professional learning Attends conferences to keep up with the latest trends and present works with individual teachers, grade level teams, and sometimes entire faculty Goes into classrooms to support teachers with technology lessons collaborates with grade level teams on projects

	professional learning via twitter split between 4 schools to help teachers and kids shares with tech leadership committee monthly monitors student computers via LANSchool professional learning via Blogs walking through teacher's classrooms encourage teachers to use technology that is helpful for students observe teachers
Community	6 district ITS personnel teachers students tech leader's committee Adam Abby Dr. Eve Twitter followers PTA Parents/Families Superintendent part librarian part ITS PL during faculty meetings