Beyond Replicative Technology: The Digital Practices of Students with Literacy-Related Learning Difficulties Engaged in Productive Technologies

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Beyond Replicative Technology: The Digital Practices of Students with Literacy-Related Learning Difficulties Engaged in Productive Technologies

by

Aimee Frier

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Curriculum and Instruction with an emphasis in Special Education and Literacy Studies Department of Teaching and Learning College of Education University of South Florida

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Keywords: Literacy, Reading Difficulties, Digital Literacies, Writing, Struggling Readers, Struggling Writers

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DEDICATION

It is with love and gratitude that I dedicate this dissertation to Aeriauna Blanton and our two beautiful babies, Holland and Hendrix. This work would not have been possible without your love and support. It’s been a long journey – but we made it to the finish line. Always.

Dad- As I listen to you playing with Holland and Hendrix in the background while I write this dedication, I want to acknowledge that without you, this document would have never been finished. Thank you.
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confidence to be the best I can be as I join the work to improve outcomes for students with learning disabilities.

Dr. David Hoppey, your passion for the profession has been an inspiration. You always treated me as a colleague, instead of just a student. Your actions have helped me see how important it is to form partnerships in collaborative work. Thank you for the mentorship and sharing your insight.

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In this dissertation, I present the findings from a qualitative case study of the digital literacy integration of a teacher and the digital literacy practices of three students with literacy-related learning difficulties within her classroom. As a researcher, I was interested in the ways students with literacy-related learning difficulties navigated digital tools in a technology-infused environment created by a teacher who has experience using digital tools for instructional and student-learning purposes. My research was guided by the following questions: (1) What was the context, content, and structure of the teacher’s technology instruction? (2) In what ways did the students use technological tools? (3) How did students with reading difficulties compose during digital literacy events? The data for this case study included classroom observations, interviews, field notes, work samples, and lesson plans. Through the use of both inductive (Phase I and II) and a priori (Phase III) analysis, the data highlight several important findings to inform the research questions: (a) Knowledge of Technology Does Not Ensure Technological Pedagogical Content Knowledge (b) Students with Reading Difficulties Still Have Difficulty with Reading Despite Technology Integration and (c) Change in Writing Tool (technology) does not Guarantee Change in Writing Performance.
CHAPTER ONE:
INTRODUCTION TO THE RESEARCH

In June 2013, President Obama shared the ConnectED initiative designed to enrich K-12 education for all students by “empowering teachers with the best technology and training to make the most of it, and empowering students through individualized learning and rich, digital content” (ConnectEd Initiative, 2013). Since then, the Office of Educational Technology (OET) has called for increased technology use and mandates that schools need to incorporate 21st-century technology in order to motivate, inspire, and engage all learners to achieve (ConnectEd Initiative, 2013). In order for students to be life-long learners, schools need to change what and how teachers teach to match “what people need to know, how they learn, and where and when they learn and change our perception of who needs to learn” (ISTE, 2015).

Although the digital funding gap has been largely closed due to increased federal and state funding of varied educational initiatives (U.S. Department of Education, 2017), the U.S. Department of Education Strategic Plan (2017) identified a new kind of digital divide, a “digital use divide” (p. 21). In the digital use divide some students use technology passively through consumption of media or completion of digital worksheets, while other students actively engage in technology through peer collaboration, immersive simulations, media production, interactions
with experts, making global connections, design, and coding, or what has also been referred to as Web 2.0 and as participatory culture (Jenkins, 2006).

For example, literacy in the 21st century is visual, where the screen is the dominant site for text to be read, requiring new dispositions, strategies, and skills on the part of the student (Coiro & Dobler, 2007; Leu, Kinzer, Coiro, & Cammack, 2004; Tierney, 2009). Although traditional literacy has been understood to be a set of skills, processes, and understandings by which we comprehend printed, alphabetic text, within New Literacy Studies, literacy is perceived “as a capacity to utilize symbol systems (e.g. alphabet, musical notation, numbers, etc.) for the purpose of making meaning (Gee, 2008, The New London Group, 1996).” It is not enough to read and write text (Burmark, 2002). Luke (2000) states that “just to get into any basic computer program requires facility with both print rich literacy and any number of symbolic languages so that we know where to click in order to move through menued choices” (p 69-79). New technologies appear continuously and necessitate additional skills to effectively read, write, and learn (Leu et al., 2014).

Although some believe that students are already “digital natives” (Prensky, 2001), and there is very little to teach because most students have grown up with some level of proficiency with texting, video, photography, social networking, and gaming (Alvermann, Hutchins, & DeBlasio, 2012; Zickuhr, 2010), social proficiency does not translate to skilled school literacies. Students must be taught how to locate online information and how to critically analyze media sources and digital texts (Kozdras, Joseph, & Schneider, 2015; Leu, Zawilinski, Forzani, & Timbrell, 2014; Schneider, 2015).
Guideposts for Learning in the 21st Century

In an effort to delineate what is important for K-12 students to know and be able to do, the National Governor’s Association created the Common Core State Standards (National Governors Association Center for Best Practice, 2010). As a set of uniform standards, the CCSS are intended to function as the guideposts for preparing students for college and careers of the 21st century. The new standards contain multiple references to the changing nature of literacy and the need to be ready for a technological society. One such example is the following standard for research and media skills:

To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and create a high volume and extensive range of print and non-print texts in media forms old and new. The need to conduct research and to produce and consume media is embedded into every aspect of today’s curriculum. (NGACBP, 2010, p. 4)

In addition to the development of national standards, many educational organizations are redefining what it means to be literate in the 21st century as well. The International Society for Technology in Education (ISTE) developed standards as a “framework for students, educators, administrators, coaches and computer science educators to rethink education and create innovative learning environments… (and) re-engineer schools and classrooms for digital age learning, no matter where they are on the journey to effective edtech integration” (http://www.iste.org/standards).

With a specific focus on literacy, the International Literacy Association (formerly the International Reading Association) and the National Council of Teachers of English developed
the “NCTE Framework for 21st Century Curriculum and Assessment” and, through this framework, they adopted the following definition of 21st century literacies:

Because technology has increased the intensity and complexity of literate environments, the twenty-first century demands that a literate person possess a wide range of abilities and competencies, many literacies. These literacies—from reading online newspapers to participating in virtual classrooms—are multiple, dynamic and malleable. (NCTE, 2013, p. 1)

Even though education experts differ in the exact specifics, all recognize that what students need to know in the 21st century goes beyond the traditional “three R’s of Reading, ‘Riting, and ‘Rithmetic” (ISTE, 2015). Essential competencies such as critical thinking, problem solving, collaboration, and multimedia communication need to be woven into all of the content areas. The Office of Educational Technology suggests that technology be used to reach all learners, with special attention given to learners with disabilities (ConnectEd Initiative, 2013).

**Special Attention to Learners with Disabilities**

Although the Office of Education Technology suggests that special attention should be given to learners with disabilities, “struggling readers are frequently denied access to online experiences because their offline literacy skills are thought to be insufficient to permit success” (Castek, Zawilinski, McVerry, O’Byrne, & Leu, 2011). When technology is used in special education settings, the tools appear in the form of “‘assistive’ (devices that allow learners to access curriculum) or instructional (software programs designed to help learners acquire new skills) and seldom used to produce digital artifacts” (Pandya & Avila, 2017, p. 123). There is little overlap between research on productive technologies such as using iMovie to make digital
stories in mainstream classrooms and research on technology to support literacy learning in special education contexts (Pandya & Avila, 2017).

**Purpose of Study, Research Questions, and Theoretical Frames**

In this study, I sought to identify and describe how students with literacy-related learning difficulties engaged in productive technologies in the context of integrated digital literacy instruction. For the purpose of this study, *students with literacy-related learning difficulties* is a term I use to encompass students with documented disabilities as indicated in an Individualized Education Plan (IEP) or students who perform below grade level expectations as indicated on state-wide testing data. Also, for the purposes of this study, I am using Pandya and Avila’s definition of *productive technologies* as an act in which ‘textual production must happen via digital technologies, and that there must be a digital product created at some point in the process.” This term is based on work from Ito, Baumer, Bittanti, Body, Cody, Herr-Stephenson, and Tripp (2010) and Kafai and Peppler (2011) that describe a turn toward “technologies through which children and youth not only consume digital content but also produce it.” (Pandya & Avila, 2017, p. 124).

In this study, I observed the ways students with literacy-related learning difficulties navigated digital tools in a technology-infused environment created by a teacher who has experience using digital tools for instructional and student-learning purposes. Specifically, I asked the following questions:

1. What was the context, content, and structure of the teacher’s technology instruction in this classroom?

2. What were the benefits and barriers of the students’ engagement in productive technologies?
3. How did students with literacy-related learning difficulties compose during digital literacy events?

To address these questions, I observed students with literacy-related learning difficulties during their active creation of digital content across four units of study and their teacher’s solicitation of these products. I observed the students’ interactions and responses to digital literacies integration and carefully documented their production process through observation and interviews. Below, I further outline the theoretical frames that guided my decisions and my overarching framework for conducting this research.

**Literacy learning is social and cultural.** Sociocultural theories are defined as “a culturally focused analysis of participation in everyday life, in both formal and informal learning settings, that offers teachers and researchers a way to meaningfully use or analyze students’ practices in the classroom or research project” (Larson & Marsh, 2005, p. 101). An underlying premise of sociocultural theories is that the process of learning is determined by the interactions humans have with other people and society that surrounds them (Lave & Wenger, 1991). Thus, a person’s surrounding community plays a critical role in the development of a child’s way of knowing, understanding, and communication (Charlesworth, 2013). Although the theory of literacy as a social practice does not explain how people learn to read and write, it does help to describe the types of knowledge needed in order to engage in given literacy practices (Perry, 2012).

Sociocultural theory is relevant to my research due to my beliefs about the social nature of the classroom (Street, 1984) in which the teacher and students co-construct literacy practices through shared ideas and social identities and my deployment of corresponding methodologies to capture and interpret social interactions. Sociocultural theorists view the interrelatedness of
language, literacy, and learning to create meaning. This perspective implies that literacy is not an isolated skill (Vygotsky, 1978). Instead, literacy is influenced by cultural, social, linguistic, and historical processes (Gee, 1990; Vygotsky, 1978).

There are a number of research studies that provide evidence to support the assumption that literacy learning is more than learning to read, as well as encompasses a wide range of social practices (Larson & Marsh, 2005; Purcell-Gates, 2007; Edwards et al., 2001). From the perspective of sociocultural theory, learning is social in nature and is cultivated from participation with others in goal-directed activities (Gibbons, 2002). My study takes a sociocultural approach to the study of literacy, in which literacy is defined as a collection of social practices that are contextual and situational, tied to specific ways of knowing. The social nature of teaching and learning guided my close observation of classroom practices and how the teacher and students engaged in literacy practices.

**Literacy learning requires navigation of sign systems.** A way to share and make meaning in these social situations is through the use of sign systems. Sign systems are based in the philosophical theory of Saussure’s view of semiotics, which is concerned with how people make meaning through linguistic and non-linguistic ways (Kress, 2003). Sign systems are “all the ways in which humans share and make meaning, including music, art, mathematics, movement, drama, and oral and written language” (Short & Kauffman, 2010, p. 43). Sign systems are used to think about and make meaning for ourselves, as well as communicate with others (Harste, Short, & Burke, 1996). The various sign systems offer different possibilities for meaning making - each sign system making available different potentials for meaning (Eisner, 1994). While schools focus almost exclusively on language, children come to school with a multiplicity of available sign systems.
Literacy learning is a cognitive process. Acts of literacy, such as reading and writing, certainly require the capacity for mental processing (Kucer, 2009). For example, reading and writing requires the ability to process alphabetic codes (Clay, 1986), to plan, organize, and set goals (Bereiter & Scardamalia, 1987; Hayes & Flower, 1980), and in the specific context of writing, to create a message using the skills of transcribing, spelling, and constructing sentences (Graham, 2009).

These acts of communication require cognitive processing and thinking; yet they are acts that exist in the spaces between people. Vygotsky’s (1978) concepts of mediation and transmediation are helpful constructs for understanding how children are apprenticed into literacy and the ways in which literacy tools change children’s cognition (Vygotsky, 1980). Mediation refers to the shared activity between an adult and a child, which allows the adult to mentor the child’s use of cognitive and psychological tools in order to promote the child’s future independent performance of the shared activity. Vygotsky (1978) explored the role of sign systems during mediation making the claim that “differentiation between tools as a means of labor of mastering nature and language as a means of social interaction become dissolved in the general concept of artifacts or artificial adaptation” (p. 53). Or, communication is a means of communication and an artifact which facilitates the performance of an activity. “Mediation encompasses the use of signs and tools that are socially and culturally meaningful things” (Kozulin, 2005, p. 104). Vygotsky (1981) stated that these signs and tools can include “works of art; writing; schemas; diagrams; maps and mechanical drawings” (p. 137). Mediation is relevant for this study because of the role the teacher plays in guiding and instructing the students in the shared activities of the classroom and the ways they take up and the shared activity.
Transmediation is defined as “the process of taking understandings from one system and moving them into another sign system” (Short, Kauffman, & Kahn, 2000, p. 160). However, meaning is not a direct translation from one sign to another, since each sign system provides different meaning potentials and affordances. When learners transform their understanding between sign systems, they create a connection and map it onto another’s expression plane (Siegel, 1995). Therefore, transmediation allows children to transfer their knowledge from traditional forms of literacy to digital discourses (Cowan & Albers, 2006).

The application of transmediation in this particular study is important because I searched for evidence of the ways in which the students represented their knowledge in text and other forms including multimodal texts and those created with digital tools. When a student engages in transmediation, they demonstrate deeper understanding as they apply their newly acquired knowledge in other ways and beyond the limits of skills-based reading practices such as memorization and paraphrasing (Suhor, 1984).

**Literacy learning shifts in response to the development of “New Literacies.”** Literacy is defined as a series of social practices (Gee, Hull, & Lankshear, 1996, p.1). Street (1984) posits that literacy “is best understood as a shorthand for the social practices and conceptions of reading and writing.” Literacy is not solely comprised of encoding and decoding a particular script, but involves “applying this knowledge for specific purposes in specific contexts of use” (Scribner & Cole, 1981, p. 236)

The New Literacy Studies are a strand of sociocultural theories of literacy developed from the ethnographic work of Brian Street and focused on the ways in which people use literacy as a part of everyday life (1999). Street (1999) proposed two different theoretical models of literacy: autonomous and ideological. According to Street (1999), an autonomous model, which
is typically found in schools, considers literacy as “a set of neutral, decontextualized skills that can be applied to any situation” (Perry, 2012). For example, this might include skill-based instruction such as phonics, as a neutral skill that can be applied to any reading of text. In contrast, the ideological model proposes literacy as a set of practices that provide cultural structures and power relations to define the literacy practice contextualized in their social setting (Perry, 2012). Ideological literacies take into account the inclusion of students’ prior knowledge and skills in the context of the learning process.

Researchers who engage in New Literacy Studies (NLS) share a sociocultural lens, believing that literacy is something that people do within a society, as opposed to conceiving of literacy as a mental process. NLS moved the field of literacy studies beyond cognitive issues, to include social, cultural, historical aspects of literacy learning and use. Language, both written and spoken, develop in social contexts of an apprenticeship model, not in isolation (Gee, 2010; Lave, 1996; Lave & Wenger, 1991).

Means of communication in the 21st century are expansive and no longer exclusively rely on print-based activities. They also include signs and symbols to read and write. Students need to be both effective producers and consumers of print and digital technologies. The spread of new technologies require communication that is multimodal: sound, written language, moving images, images, etc. In spite of the shifts in ways people communicate outside of school, traditional print-based literacies continue to dominate in school-based activities. Reading and writing, however, should consist of both print and non-print materials. They both have the ability to convey meaning through various modes, each carrying a unique set of abilities and constraints to transmit knowledge (Jewitt, 2008).
Leu et. al. (2004) and his colleagues provided the principles that define new literacies as they felt mastering traditional print-based literacies were not sufficient to access the digital texts found online. Students needed to identify important questions, locate information, evaluate usefulness of the information, synthesize the information to effectively answer questions, and communicate the information to others (Coiro, 2003; Leu et al., 2004). As new technologies emerge, new composing and reading processes arise to exploit and accommodate the new technology. Mastering these online skills allows students to be competent in print-based and digital texts.

Digital literacies “enable the bridging of traditional print literacies with other media” (O’Brien & Sharber, 2008). Digitally literate people know how to plan and juxtapose multimodal texts to represent ideas, bridging and complementing print literacies with other media. O’Brien and Scharber (2008) described the definitional challenge related to digital literacies. Digital literacies have been known to be synonymous with any of the above descriptors found within NLS. He defines digital literacies as socially situated practice that is supported by skills, strategies, and a stance that enables the representation and understanding of ideas using a range of modalities enabled by digital tools.

**Literacy learning can create challenges and difficulties for students.** Because literacy demands shift over time and across contexts, some individuals may need specific interventions to learn how to engage in or navigate the cognitive and social components of productive literacy tasks. Within this dissertation I use the term *students with literacy-relate learning difficulties* to encompass students with identified learning disabilities and those who struggle with literacy-related tasks. Although there are a number of ways to define students with learning challenges, there are two major discourses on learning disabilities that stand in contradiction to one another:
the medical model and the socio-cultural model (Reid & Valle, 2004; Dudley-Marling, 2004). The medical model is rooted in a positivistic epistemology, or tradition related to medicine and mainstream psychology, which looks to label ‘children with learning disabilities’ by defining them by their statistical difference from ‘normality’ and views this difference as pathology (Kowalik-Olubinska, 2012).

In direct contrast, socio-cultural discourse is related to Vygotsky’s understanding of disability as a sociocultural and developmental phenomenon, as opposed to a biological one. Disability cannot be seen and interpreted outside the social and cultural context because it is a product of the social interaction (McDermott, Goldman, & Varenne, 2010). According to this line of thinking, diversity in the human population is naturally occurring, and is to be expected in all aspects of human development. As Dudley-Marling (2004, p. 4) states, “learning difficulties can only be understood within the school environment, because their manifestation requires an institutional framework, which enables one to assign certain meanings to pupils’ behavior.” In this sense, defining learning difficulties in areas such as reading and writing, only make sense in contexts where they are important and also isolated. “Without school and without school-based education, there would be no learning disability” (Dudley-Marling, 2004). From this perspective, instead of asking what is wrong with the student (pathology), the teacher analyzes the psychosocial situation of the learner and the learning context. Instead of focusing on learning deficits, educators concentrate on the educational context in order to correspond with the different needs and abilities of learnings. Individualized support is not lacking in this environment, however, contextual environment is also an important piece of understanding the difficulties the learner faces.
Summary

In this study I conceptualize learning difficulties as based in sociocultural epistemology. It is important to understand the environment in which the students are working and to consider how implementing additional sign systems within that environment allows students who have not consistently or fluidly navigated other forms of text processing can represent their knowledge of literacy practices with digital tools.

With the national calls for change in literacy practices to match 21st century requirements, research is necessary to understand what this means for classroom instruction and student learning. Using the lens of sociocultural theory and New Literacy Studies with an advocacy stance for students with literacy-related difficulties, the current study seeks to identify and describe how students with literacy-related learning difficulties engage in productive technologies in the context of integrated digital literacy instruction.

Definition of Terms

**Digital literacies:** Digital literacies are “socially situated practices supported by skills, strategies, and stances that enable the representation and understanding of ideas using a range of modalities enabled by digital tools. (O’Brien & Scharber, 2008).

**Digital tools:** For the purpose of this study, digital tools will refer to technological devices (e.g. computer, iPad), as well as technological apps, websites, and software (e.g. Animoto, YouTube, Evernote).

**Digital literacy practice:** Communication patterns used by participants to navigate and use digital tools and technologies within specific cultural contexts-- in this case, students and teachers in a classroom.

**Digital literacy events:** Rush (2003) described her process of notions of literacy events and practice to provide structure to her observations, interviews, and collection of artifacts.
Heath (1982) developed the idea of literacy events as a tool for examining the forms and functions of oral and written language and describes a literacy event “as any occasion in which a piece of writing is integral to the nature of the participants’ interactions and their interpretive processes” (p. 93). In this context, digital literacy events are activities in which digital literacies have a role, in order to understand literacy practices of the classroom community.

**Instructional strategies:** Instructional strategies are the approaches the teacher takes to engage students in learning. Strategies are also used to guide teacher’s instruction to meet learning objectives.

**Integrated digital literacies instruction:** Instruction that includes the incorporation of digital tools for teaching and learning.

**Literacy-related Learning Difficulties:** According to Alvermann (2001), the term struggling “can refer to youth with clinically diagnosed reading disabilities as well as to those who are unmotivated, in remediation, disenchanted, or generally unsuccessful in school literacy tasks” (p.679). Given Alvermann’s wide description, the term “struggling reader” has the potential to identify a diverse group of individuals. Triplett (2007) uses a narrower description when describing struggling readers as those students who are unsuccessful with reading tasks. While many descriptions exist of what constitutes a “struggling reader,” for the purpose of this study, students with literacy-related learning difficulties are broadly defined as those students who are not successful with school literacy tasks as determined by historical school performance and/or teacher evaluation. For inclusion in this study, students currently have an Individualized Education Plan (IEP) in reading and/or fall below grade level expectations on annual state-wide mandated testing.
**Individualized Education Plan (IEP):** The Education for All Handicapped Children Act (Public Law 94-142) gave opportunities to “formerly disenfranchised children with disabilities” by changing the nature of opportunities through the enactment of the Individualized Education Plan (IEP) (Goodman & Bond, 1993, p.408). An individualized education plan is a legal document written with the intent to meet the unique needs of every special education student. The IEP is a lengthy document, but the major goal of the IEP is to: assess students’ current educational levels, set short and long term goals to meet, and review those goals on a predetermined date in the future.

**Productive technologies:** In their review of research in technology, literacy studies, and special education, Pandya and Avila (2017) defined ‘productive technologies’ as ‘textual production must happen via digital technologies, and that there must be a digital product created at some point in the process.” This term is based on work from Ito et al. (2010) and Kafai ad Peppler (2011) that describe a turn toward productive technologies, which are “technologies through which children and youth not only consume digital content but also produce it. In this context, productive technologies provided a way of thinking about the types of product the students created and which literacy digital literacy events were closely examined.

**Replicative Technology:** Technology that directly replaces “paper-pencil” activities, but can be done without the use of technology. For example, completing a digital worksheet versus a physical worksheet. The use of technology to “fill in the blanks” does not change or provide affordances that paper-pencil can afford.
CHAPTER TWO:  
LITERATURE REVIEW

New information and communication technologies (ICTs), as well as the Internet, are redefining the necessary skills needed to effectively prepare students for active participation in a digital society (International Literacy Association, 2009). As the Internet and digital tools continue to evolve, new technologies will emerge and shape the nature of literacy as well as the purposes and practices of literacy (Coiro, Knobel, Lankshear, & Leu, 2008; Leu, Kinzer, Coiro, & Cammack, 2004; IRA, 2009). This shifting landscape will affect how students, in particular those with challenges, complications, or delays in learning to read and write, are prepared to engage in a digital world (International Reading Association, 2009). Given the evolving nature of literacy, it is important to understand the ways new technologies and digital tools are changing the content and structure of literacy teaching and learning, as well as student navigation, composition, and use of these new tools. Therefore, the purpose of this study is to identify and describe how students with reading difficulties engaged in digital literacy practices. The specific research questions are as follows:

1. What was the context, content, and structure of the teacher’s technology instruction in this classroom?

2. What are the benefits and barriers of the engagement in productive technologies for students with literacy-related learning difficulties?
3. How did students with literacy-related learning difficulties compose during digital literacy events?

In this chapter I review the characteristics of students who experience challenges, complications, or delays in learning literacy tasks. I analyze the pertinent literature related to digital literacies, then move specifically to the literature for students identified with learning disabilities. I also review frameworks for thinking about technology integration in the classroom in order to investigate how students with reading disabilities engaged in digital literacies in an elementary classroom.

**Literacy Learning**

Tierney and Pearson (1983) believe “that at the heart of understanding reading and writing connections, one must begin to view reading and writing as essentially similar processes of meaning construction. Both are acts of composing.” During my observations, much of the literacy tasks involved this reciprocal nature of reading and writing. The students would read, then write in response, or write, then read for more information. For this reason, the composing model of reading is an essential construct.

In a composing model, meaning is created as a reader uses his background of experiences together with the author’s cues to come to grips both with what the writer is getting him to do or think and what the reader decides and creates for himself. As a writer, the use of one’s own background and experience is used to generate ideas and, in order to produce a text which is considerate towards the idealized reader, filters drafts through judgments about what the reader’s background experience will be, what they want to say, and what they want to get the reader to think or do. In this sense, “both the reader and writer must adapt to their perceptions about their partner in negotiating what text means” (Tierney & Pearson, 1983, p. 568).
“Struggling” readers

What does it mean to be a struggling reader? There are a variety of characteristics used to
describe what represents a struggling reader. According to Alvermann (2001), the term “can
refer to youth with clinically diagnosed reading disabilities as well as to those who are
unmotivated, in remediation, disenchanted, or generally unsuccessful in school literacy tasks” (p.
679). Alvermann’s encompassing description has the potential to categorize a diverse group of
individuals. In contrast, Triplett (2007) uses a narrower description when describing struggling
readers as those students who are unsuccessful with reading tasks. Fawson (2006) identified
struggling readers as those students reading below grade level standards. Further, federal
legislation describes students with disabilities as “a student who has a physical or mental
impairment that substantially limits one or more major life activities, has a record of such an
impairment, or is regarded as having such an impairment.”

About 80% of students with learning disabilities have trouble learning to read (Feifer,
2011; Kavale & Reese, 1992). But what does it mean to “read?” There are a multitude of reasons
a child may receive the label of a struggling reader. A primary consideration are the various
components associated with reading that are common difficulties for struggling readers (Fletcher,
Lyon, Fuchs, & Barnes, 2007; Kucan & Palinscar, 2011).

Oral Language. Oral language includes both receptive and expressive language.
Receptive language is based on the listener’s ability to hear and comprehend spoken language
(Hallahan, Lloyd, Kauffman, Weiss, & Martinez, 2005). Expressive language refers to the
production of speech. It is the ability to create sounds in a specific order to create a word, then
phrases, then sentences (Hallahan, et al., 2005). Research indicates that although students with disabilities have difficulties with both expressive and receptive language, most difficulties exist with expressive language (Hessler & Kitchen, 1980).

Children enter school with a wide range of background knowledge and oral language ability as a result of variations in their home environments, their parents’ literacy levels, and their socioeconomic status (Fernald Marchman, & Weisleder, 2013; Hart & Risley, 1995; Neuman & Celano, 2001). Struggling readers often have less experience and interaction with language, resulting in a limited amount of word knowledge (Hallahan, et al, 2005). The resulting gap in academic ability tends to persist or grow throughout their school experience (Fielding, Kerr, & Rosier, 2007; Juel, Biancarosa, Coker & Deffes, 2003).

**Fluency.** A notable characteristic of children who have difficulty in reading is a lack of fluency. Specifically, students with reading disabilities struggle with the ability to read sight words, decode words, and read phrases and sentences automatically and rapidly (Chard, Vaughn, & Tyler, 2002). Fluency is defined as reading smoothly, without hesitation and with comprehension (Harris & Hodges, 1995). According to the National Reading Panel, it is a key aspect in successful reading instruction (National Institute of Child Health and Human Development, 2000). Ransinski (1990) describes a goal for reading instruction to develop decoding to where it becomes an automatic process that requires minimal attention.

Difficulty with fluency is marked by slow and laborious reading, slow or inaccurate decoding, no recognition of punctuation, and lack of voice or articulation while reading (Boardman, Roberts, Vaughn, Wexler, Murray, & Kosanovich, 2008). Nagy, Berninger, and Abbott (2006) note struggling readers may read single-syllable words effortlessly, but have difficulty decoding longer multisyllabic words, may lack knowledge of letter-sound
relationships, have difficulty with syllabication, and often do not use word analysis strategies to break words into syllables. The theory underlying the necessity for fluency is that the reader only has a specific amount of attention to focus on the meaning of text. If attention is diverted from comprehension as a result of poor fluency, comprehension can be impeded (LaBerge & Samuels, 1974). Students who read at delayed levels will experience problems, particularly in the area of comprehension (Hallahan, et al, 2005).

**Vocabulary.** Knowledge of word meaning is highly related to reading comprehension and academic success in general (Baumann, Kame’enui, & Ash, 2003; NRP, 2000). Stahl (1986) describes three degrees of word knowledge: *Associative-definitional knowledge* (students can make an association between a word and definition), *contextual-conceptual knowledge* (the students understands the core concept of the word and how it changes in different contexts), and *generative knowledge* (the student have the ability to apply it in speaking and reading appropriately). Nagy and Scott (2000) state that knowing a word is more than being able to provide a definition – it is “being able to do things with it…Knowing a word is more like being able to use a tool than it is like being able to state a fact” (.273).

When students have knowledge of words, they are likely to comprehend what they are reading. Although vocabulary is important in its own right, it is often taught as a way to increase comprehension (Gunning, 2010). Beck and McKeown (1991) state that if comprehension is to be improved “fluency of access to word meaning and richness of semantic network connections” are essential (p. 806). Struggling readers often have limited exposure and experiences to gain deep understanding of new words, lack word consciousness, and do not like reading in general and avoid reading as an independent activity (Boardman, et.al., 2008)
**Comprehension.** Reading is done for many reasons. Whether learning from nonfiction books or reading a novel for enjoyment, the goal of reading is to comprehend the words on the page – or screen. Comprehension is “seen as an active process in which the reader plays a very active role, constructing meaning based on his or her cultural and experiential background, purpose for reading, and the overall setting” (Gunning, 2010, p. 352). Part of the active process is the activation of our schema – a concept based on our knowledge filed and stored away – ready for use when reading (Rumelhart, 1980) Schemata are based on our prior life experiences and organized around concepts such as place, people, objects, and events. “The richer one’s life experiences (real and vicarious), the more developed and organized are our schema” (Gunning, 2010, p. 352). The ability to comprehend relies heavily on students’ schema for word knowledge and schema for texts. Alexander and Jetton (2000) posit that “existing knowledge serves the foundation of all future learning by guiding organization and representations” (p.291).

“The possibilities for comprehension failure seem to be endless. Comprehension, after all, is a word that we use to cover a range of complex processes involved in language, any of which can fail” (Perfetti, Marroni & Foltz, 1996). Most research on comprehension difficulties is limited to students in grades 3 and up, which poses a significant limitation in the research (Allington & McGill-Frazen, 2017). Difficulties with reading comprehension are usually noted by lack of metacognitive strategies and awareness of when understanding breaks down, failure to interact with the text during or after reading, limited knowledge and connections between what they know and are learning from the text, and lack of purpose while reading (Denton, et. al., 2007; Pressley, 2006) Another major characteristic of struggling readers is a lack of enjoyment and understanding of the utility of reading, which leads to less exposure to the act of reading in general (Pressley, 2006).
Operational definition of reading ability. The characteristics of effective reading include the fluent processing of text through swift decoding of letters and words, quick recognition and understanding of vocabulary through prior knowledge or context cues, and comprehension of content leading to advanced knowledge learning, intertextual connections, and critical thinking. Although many descriptions exist of what constitutes a “struggling reader,” for the purpose of this study, struggling readers are broadly defined as those students who experience challenges with cognitive processing, difficulties in understanding content due to restricted life experiences and limited content knowledge, or delays due to a slower developmental pathway, such as those at least one grade level below expectancy.

“Struggling” Writers

Writing permits us to gather, explore, refine, organize, extend, preserve, and transmit information and understandings; make ideas accessible for consideration, evaluation, and future discourse; and demonstrate our knowledge. Writing offers a powerful mechanism for communication, self-expression, and self-reflection and can be beneficial both psychologically and physiologically (Graham, Harris, & MacArthur, 2004; Smyth, 1998). Composing is a challenging task as it requires coordinating cognitive, linguistic, and physical processes. Some argue that writing instruction should be free of the mechanical aspects of writing, however, the fundamental aspect of writing instruction should not be overlooked as they are essential to competent, clear communication (Graham, 1997). There are common characteristics and behaviors struggling writers exhibit including: a lack of knowledge of the writing process, use of strategies during writing tasks, and difficulty with mechanics and transposition (Graham, 2006).

“Students who struggle with writing, including those with learning disabilities (LD), may not be able to draw on its power to support learning and development” (Harris & Graham, 2009,
Writing requires attention to factors that play a role in how effectively one communicates, such as audience and purpose (Troia, 2006). As with reading, there is no clear definition of the term “struggling writer.” According to Fearn and Farnan (2008), struggling writers have been described by the various challenges they have when writing, including limited content knowledge or transcription skills, a sense of frustration or incompetence, as well as a reluctance to engage in the act of writing. It is typical of struggling writers to have greater difficulty than their grade-level peers and they do not produce the quality of writing expected for age and grade level (Graham, 2009). A variety of students struggle with writing, including general education students, students with learning and language disabilities, and students with limited English proficiency. Holistically, compositions of struggling writers lack development of ideas, lack organization, and contain substantial mechanical and spelling errors (Tompkins, 2002).

**Planning.** Skilled writing largely depends on the author’s ability to plan and manage the process of composing (De La Paz & Graham, 1997). Graham (2006) states that writing knowledge, such as process, genre, topic, and audience shape the development of writing. The importance and self-regulation are evident in skilled and professional writers (De La Paz & Graham, 1997). Flower and Hayes (1980) found that adult writers develop a plan to guide their writing process and achieve their goal by managing a variety of strategies for what they plan to do and say.

Struggling writers tend to have less knowledge about the composing process than grade level peers (Saddler & Graham, 2007). Students with learning difficulties employ a “less sophisticated approach to composing – one that minimizes the role of planning and operates largely without metacognitive control” (McCutchen, 1988, p.168). While struggling writers may be able to name the components of the writing process, they lack understanding of the
components and how to effectively use them (Lin, Monroe, & Troia, 2007). In other words, many writers who struggle to produce high-quality texts often engage in non-strategic planning or no planning at all. In his examination of struggling writers, Thompkins (2002) discovered that struggling writers believed that writing is putting words on paper rather than communication and attention to audience, purpose, and form.

Struggling writers’ lack of understanding about writing suggests they do not effectively engage in the writing process. Students who struggle with writing have trouble organizing their texts, do not plan, or do not revise as well as typically achieving peers (McCutchen, 1995). In a study conducted by Saddler, et al (2004) struggling students wrote short, incomplete pieces of writing, planned for less than 24 seconds, and did not make any planning notes prior to the instruction of a planning strategy.

**Amount/Length of Text.** Writing allows us to gather, explore, refine, organize, extend, preserve, and transmit information and understandings (Harris & Graham, 2009). Skilled writers are able to use writing for writing and to show what they know (Harris & Graham, 2009). In contrast, the products of struggling writers are of lesser quality than their more skilled peers and contain about half as many words when scored holistically (Saddler & Graham, 2007). Struggling writers tend to stop writing too early, which also influences their quality of texts (Graham, 1990; Thomas, Englert, & Gregg, 1987). When asked to produce more text, the quality improved marginally (Graham, 1990).

**Sentence Construction.** Skilled writers carefully consider the writing task and engage in knowledge transformation rather than simple knowledge telling (Scardamalia & Bereiter, 1987). Knowledge telling is a more simplified process used by novice writers in which they first
consider the task at hand by defining the topic and function of the text to be produced (Harris & Graham, 2009).

When examining the sentence level of lower quality compositions, students often demonstrate difficulties with sentence construction. Their sentences are shorter, less syntactically complex, and lack varied vocabulary (Saddler, Asaro, & Behforooz, 2008).

**Impact of Genre.** Students are required to produce texts across a variety of disciplines. These texts include structural components relevant to different content areas and in keeping with rhetorical purposes. Disciplinary texts reflect the organizational principles of the relevant field (e.g., literary critique, science report, historical analysis) (Shanahan & Shanahan, 2008) and the language of the discipline (Shanahan & Shanahan, 2012). Experienced writers construct texts in keeping with expectations. Disciplinary literacy cuts across both the acts of reading and writing as it refers to the shared ways of reading, writing, thinking, and reasoning (Moje, 2007; Shanahan & Shanahan, 2008). The use of disciplinary literacy does not attempt to transform students into experts, rather disciplinary literacy helps students read, write, and think in ways that are aligned with experts in the field. (Greenleaf, Schoenbach, Cziko, & Mueller, 2001).

With a growing interest in disciplinary literacy, some worry what that will mean for students with literacy-related difficulties. For example, Faggella-Luby, Graner, Deschler, and Drew (2012) caution against replacing general strategy instruction with disciplinary literacy. While Drew and colleagues agree the disciplinary literacy could be a powerful tool, students who struggle with reading and writing need those basic, transferable strategies as the work to achieve proficiency.

More specifically, when examining struggling writers’ composition of narrative texts, the texts tended to include descriptions and lists, as opposed to showing understanding of story
structure (Graham, 1990) With expository writing, struggling writers relied on telling content rather than showing knowledge of expository text structure in order to form ideas (Thomas, et al, 1987).

**Revision.** High-quality writing is fully developed, requiring the author to engage in cognitive acts that require the expatiation of thought (Vygotsky, 1986). High-quality writing is also contextualized, allowing the reader to make connections and draw on their previous knowledge to make sense of the new composition. Creating a high-quality text rarely occurs in the first draft. Writers have been documented as using rounds of revision to refine their texts (Graham, MacArthur, & Schwartz, 1995). The process of revision is difficult for writers (McCutchen, 1995). In general, struggling writers spend little time on the process of revision. Graham et al. (1995) found that when struggling writers revise, they mainly focus on mechanical errors rather than making revisions to the content to improve the quality of the composition. One possible reason struggling writers are unable to make substantive revisions is their lack of ability to detect mismatches between what they wrote and what they intended to write (Graham, 1997). A strong emphasis on mechanics by teachers who work with students with disabilities also may serve to bias students’ views of writing, leading them to believe that text appearance is paramount, resulting in overlooking the importance of content (Englert & Raphael, 1988; Graham, et al., 1995)

**Transcription/Spelling.** Transcription is the act of transforming what the writer wants to say into written symbols on the page primarily accomplished through spelling or typing. Handwriting and spelling skills of students with writing difficulties are less developed than the transcription skills of their typically performing classmates (Graham & Weintraub, 1996). Mastery of transcription skills are considered important to writing development because the
execution of these skills consume considerable attentional resources if not carried out fluently and efficiently (Graham & Harris, 2000). In addition, the spelling of words contributes to the comprehensibility of a text. Accurate spelling increases the likelihood of comprehension. Students with learning disabilities often demonstrate difficulty with spelling. Spelling difficulty can result in several issues. Students will spend an excessive amount of time trying to figure out how to spell words and have little cognitive energy let to actually compose and deficiency in the lower-level process of text production can impede higher-level processes of composing a message or imaginative text (Gunning, 2010). Poor spelling can also lead the struggling writer to settle for words that he or she knows, instead of attempting to use more complex words (Moats, 1995)

**Handwriting.** Handwriting is a complex task of forming letters, numbers, and other characters, which requires the combination of cognitive functions, and fine and gross motor skills (Dinehart, 2015). Handwriting requires fluency and legibility. Fluency is the rate or speed at which letters are formed and legibility refers to accurate formation of letters or characters. Handwriting is positively associated with length and quality of written compositions (Graham et al., 1997). Handwriting fluency allows the writer to free up working memory to higher-level writing tasks such as composition (Graham et al., 2011).

“Writing makes heavy demands on memory, discrimination, perception, and fine motor skills – areas low-achieving readers are often weak” (Gunning, 2010). Handwriting is often overlooked because of limited amounts of time for classroom instruction, but attention to handwriting can improve students’ ability to write quickly and efficiently.

**Role of Keyboarding.** Keyboarding provides an additional tool for text transcription and with practice enables the writer to produce letters promptly and accurately (Feng, Linder, Ji, &
Joshi, 2017). With the increased use of technology, keyboarding is seen more often in the classroom. In their meta-analytic review of keyboarding, Feng et al. (2017) found that students with proficiency in handwriting also had increased keyboarding fluency. Additionally, students could write faster and produce larger quantities of writing under the keyboarding mode however, quality of texts did not improve based on writing mode.

**Operational definition of writing ability.** Although many descriptions exist of what constitutes a “struggling writer,” for the purpose of this study, struggling writers are broadly defined as those students who experience challenges with cognitive processing and production of text, difficulties in developing increasing content complexity due to restricted life experiences and limited exposure to disciplinary knowledge, or delays due to a slower developmental pathway, such as those at least one grade level below expectancy in producing writing traits.

**Multimodality, Digital Literacy and Digital Environments**

In the previous sections on struggling readers and writers, I detailed the research related to students’ abilities to navigate traditional, print-based texts. Given what we know about readers and writers in print-based environments, it is also important to consider their abilities to engage with 21st century literacies. “Digital tools and environments alter what it means to be literate” (Coiro, Knobel, Lankshear & Leu, 2008; Lankshear & Knobel, 2007). Therefore, does this alteration of literacy differentially impact students who struggle with literacy? According to the New London Group (1996) students must learn how to read and compose within varied semiotic systems in order to be prepared for a multicultural, globally connected society. Digital tools and environments combine multiple modes beyond the modalities of those within print-based texts.

**Multimodality.** Multimodal texts incorporate two or more modes to communicate meaning. Although each mode creates meaning individually, the combination of modes increases
the opportunity for deeper and more nuanced understandings (Kress, 2003). For examples, a print-based novel contains one pathway to construct meaning, a pathway in which the reader must comprehend words written on a page. On the other hand, a film-based adaptation or an e-book of the same book can communicate through various modes to include visual, aural, written (closed captions, definitions), and gestural modes. Not to lessen the importance of decoding print-based texts, increasing semiotic richness increases the possibility of enriched meaning making (Nelson, 2006).

Alvermann (2004) and Kress (2010) both argue the world of meaning has always been multimodal. Kalantzis and Cope (2012) state “no matter how hard we may try and separate out the written mode for the purposes of didactic literacy teaching- learning to read and write – all representation and communication is intrinsically multimodal” (p. 192). Multimodal texts require a different type of meaning making than previously considered in print-based text (Kress & Domingo, 2013). While the written word is foundational to literacy, it is but a singular manner in which individuals communicate and make meaning (Moore-Russo & Shanahan, 2014). Shanahan (2013) proposed signs other than language could also serve as tools to promote learning if teachers reconceptualize the notion of learning to incorporate writing with additional semiotic resources. Being literate means more than just the ability to read and write the printed word (Taylor, 2012). “Being literate today includes students comprehending and producing linguistic and visual representations. Just because readers in this generation are exposed to more visual representation than previous generations, does not mean they comprehend their meaning intuitively” (Moore-Russo & Shanahan, 2014, p. 531). Cope and Kalantzis (2009) state that meaning expressed in one mode does not directly or completely transfer to another mode. As I mentioned in the above example, a film adaptation is never identical to the book, as each
medium affords different meaning potential. “This paradoxical mix of parallelism and incommensurability between modalities is what makes addressing multimodality integral to the pedagogy of multiliteracies” (Cope & Kalantzis, 2009, p. 180). Privileging certain modes within the classroom, or even discounting different modes, restricts learners from the possibility of enhanced understanding.

Multimodality has become critical in educational research with the multimodal aspects of new media. Ho et. al. (2011) claim “the multimodal social and cultural practices of young people liberate youth to creatively fashion themselves in multiple modes as various kinds individuals in the New Times” (p. 2). While the rest of the world moves forward at lightning speed, education does not often maintain the same pace (Kress, 2003). Rowsell (2013) explained “while the world forges ahead using visuals, moving images, and haptic texts, teaching and learning in school remains anchored to words, often on printed pages” (p. 3). Written language is not in danger of becoming extinct, rather, written language is becoming more deeply intertwined with other modes (Cope & Kalantzis, 2009). Educational researchers have accepted the increasing influence of multimodality and the need for additional “nuanced empirically grounded understandings of the pedagogical implications and potentials of different semiotic modes in actual situated interaction” (Nelson & Johnson, 2014, p. 50). Radical adjustments are needed in the domain of language and literacy education to broadly conceptualize how meaning is made in and across developing forms of new text (Nelson, 2006). Cope and Kalantzis (2009) postulated, “of all the changes currently underway in the environment of meaning-design, one of the most significant challenges to the old literacy teaching is the increasing multimodality of meaning” (p. 179).

**Digital literacy.** Ever expanding and changing digital technologies provide new kinds of modal ensembles to a wide variety of users, which offer new types of meaning representation
(Bezemer & Kress, 2008). Children are situated as powerful when they are able to expand upon reading the modalities of texts to use modalities in the design of their own practices, activities, and texts (Leander & Boldt, 2012). Mills (2011) posited an important layer of complexity is added to text and knowledge creation when crossing from print to digital modes. Digital texts vary from linear, stand-alone, static products to fluid constantly changing, highly interlinked hybridized, and multimodal products (Martin & Lambert, 2015).

There are two types of definitions related to digital literacy: conceptual definitions and standardized sets of operations “intended to provide national and international normalizations of digital literacy” (Knobel & Lankshear, 2006). One conceptual definition by Lanham (1995, p. 198) describes the expansion of the semantic meaning of literacy from “the ability to read and write” to “the ability to understand information however presented.” He also emphasizes the multi-mediated nature of digital information and that “digitally literate” involves “being skilled at deciphering complex images and sounds as well as the syntactical subtleties of words” (Lanham, 1995, p. 200). Another conceptual definition of digital literacies provided by Gilster and Gilster (1997, p. 6) includes the ability to “understand and use information in multiple formats and from a variety of sources presented via computers,” particularly from the Internet. Digital literacies include “mastering ideas, not keystrokes” in order to assimilate, evaluate, and reintegrate information instead of simply copying and pasting information Internet (Glister, 1997, 8).

Standardized operalizations of digital literacy attempt to systematize what it means to be digitally literate in terms of tasks, performances, and skills (Lankshear & Knobel, 2006). One example operationalization developed by the US Educational Testing Service (ETS), concerned with the meaning end of the spectrum, describes digital literacy as “the ability to use digital
technology, communication tools and/or networks appropriately to solve information problems in order to function in an information society” (Youngren, Kirsch, Weiner, Woodyard, Smith, Rockman, & Throgmorton, 2004, p. 1006).

Although I have discussed some ways digital literacy is defined in both conceptual and operationalized ways, Lankshear & Knobel (2006) caution against mainstream approaches to conceptualizations and definitions of digital literacy. To define digital literacy purely or predominantly in terms of interacting with information distorts social practice and human intent (cf., Schrage 2001). One implication of digital literacies as social practices in reading and writing (in the sense of how to operate the hardware and software), is that it disregards the social practices involved. Secondly, what is practiced on the digisphere is not concerned with notions of ‘truth’ or outcomes, but more about participation and social interactions (Lankshear & Knobel, 2006; Jenkins, 2006). The International Literacy Association’s (ILA) position statement focuses on paradigmatic shifts in pedagogy and curriculum development to understand how digital tool use requires new social practices, skills, strategies, and dispositions for the tools’ effective use (Price-Dennis, Holmes, & Smith, 2015).

From the previous discussion, the term digital literacy or literacies indicates a multifaceted set of skills. Combes (2016) describes various levels of digital literacies and the range of competencies to navigate the digital environment to include:

- **Computer literacy** – How to use the computer hardware and software to download, organize, and store information, as well as presentation software and Web 2.0 utilities
- **ICT Literacy** – How to use communication software such as email and the Internet
- **Web 2.0 Literacy** – How to use utilities and applications
- **Network/Internet Literacy** – Knowing where you are in virtual spaces
- **Media/Multimedia Literacy** – Ability to make meaning from images, graphics, graphs, and multimedia
- **Information Management** – Ability to locate, select, and evaluate information based on needs

These skills are complex and ever-changing as new technologies are developed and not often taught in schools, resulting in the superficial use of technology (Combes, 2012). Beyond this basic set of competencies, is the need to locate trustworthy information and make meaning from it. This skill is often overlooked, partly due to the assumption that student have the skills (i.e. digital natives) and they don’t need to be taught (Combes, 2016). Another layer of digital literacy is associated with standards and values of participating in a digital environment beyond skills or competencies. Finally, digital literacy refers to what was previously impossible when working in a world dominated by print, exceeding boundaries of the local to that of a global society (Combes, 2016). While the definition of digital literacy is complex and varied, digital literacy is a multifaceted and multilayered set of skills enabled by the incorporation of digital tools and technologies.

**Digital environments.** In this study, I am interested in what affordances and constraints digital environments create for students, particularly students with learning difficulties. A review of related literature reveals several possibilities that digital literacies provide for students with learning difficulties.

**Increased Participation.** The inclusion of digital literacies in classrooms requires increased levels of student participation. As Kalantzis and Cope (2012) describe, students are no
longer the passive receivers of knowledge, as the pedagogy of multiliteracies allows for agency and meaning making in the process of learning. When presented with an authentic task, students are more willing to participate and contribute in classroom activities (Black, 2005; Mills, 2007). In the following examples, students took action in the classroom and moved from being passive recipients of knowledge to become active participants in the learning process.

Evidence from research studies, supports the inclusion of digital literacies in the classroom. For example, Faux (2005) explored how students use multimedia software to create stories. She found that when students with special needs used a technology as a scaffold to assist them with story creation, they were not required to conform to typical writing structures which supported them in producing a greater volume of high quality work with independence. A second finding was that while using the scaffold, students were able to offload some of the cognitive tasks such as spelling, which allowed them more access to their working memory. The students could focus more on the task of composing, instead of lower-level skills of text creation. In a second example multimodal composition, Lotherington and Chow (2006) taught narrative text structure when they asked students to rewrite their own versions of *Goldilocks* digitally. The students demonstrated understanding of narrative text structure and then transfer that knowledge to construct their own version from their individual cultural perspective.

Additionally, Vasudevan, Schultz, and Bateman (2010) found that by extending the composing process beyond print modalities, students’ composing shifted in significant ways to reflect the circulating nature of literacies and texts and increased the modes of participation and engagement within the classroom curriculum. Circulating literacy practices are defined as “the identities and socially situated ways of using texts that students carry with them as they move across the boundaries of home, community, and school” (Schultz, 2006).
In response to these new affordances and opportunities of using multimodal tools, the focus student within the study was willing to assert her identities (as a child of recent immigrants), instead of generically describing herself (as just a student) to complete an assignment. Her culture was appreciated in this setting. Children can bring in their knowledge of situated culture and share those in school when presented an opportunity.

In a final example of multimodal storytelling, Schultze and Coleman-King (2012) incorporated digital storytelling and student-produced drawing. The students were asked to create a variety of stories related to the mandated curriculum. Because of the structure of multimodal storytelling and their ability to respond with both drawing and text, the students who were not usually able to participate were no longer invisible in the classroom. Both Schultze and Coleman-King (2012) and Vansudevan, Schultz, and Bateman (2010) found that students who typically struggle (defined as students with disabilities and English Language Learners in this instance) were no longer “invisible” in the classroom when given additional tools to express their knowledge.

**Funds of Knowledge.** Moll (1992) describes funds of knowledge as the knowledge students bring with them from their home and community. He encourages looking at the knowledge, assets, and experiences that each student offers and bring with them to the classroom setting. Evidence from research studies indicates that when students were able to draw from their funds of knowledge, they had their background and contextual knowledge to bring to the literacy event.

For example, in a study by Black (2005), background knowledge, and the ability to draw from their own cultural knowledge, enhanced learners’ ability to create representations. The researcher conducted an ethnography to see the kinds of activities and practices ELL's engaged
in during the composition of fan fiction. Black (2005) found the creation of fan fiction gave the authentic writing practice necessary for performance. Also, the fan fiction site allowed for multiple modes of representation, as well as the integration of multimodality in composition. Interestingly, in this study emergent language learners are characterized as struggling, but they are encouraged to use digital tools; in broader conversations about students who struggle to process text or to produce quality texts on par with their peers are often discouraged from using alternate forms such as fan fiction.

Often the inclusion of digital literacies allowed students to bridge in and out of school literacies. Brass (2008) followed a student labeled at-risk for school failure based on his performance on school-based literacy tasks. Following the focal student through the process of movie making allowed the researcher to describe various aspects that make him a "capable" learner when allowed to bridge his out of school literacies with in school literacies. The student was able to compose a digital movie that showed both insight and multimodal sophistication.

In another instance, Mahiri (2006) observed as students created a multi-textual, digital project related to poverty and homelessness. The researcher found that aside from increased motivation to engage in the project, the students were able to bridge home and school practices by bringing in their knowledge of music and media to the task. She also found that students developed skills such as researching, reading multiple texts for information, and organizing the content coherently in spite of being "at risk."

**Affective Dimensions.** Elements of the affective dimension are often forgotten in school, especially with students labeled as struggling, at-risk, or learning disabled. Instead, the focus tends to be on skills and strategies (O'Brien, Beach, & Scharber, 2007). In many of the studies I
reviewed, students who traditionally struggled with traditional literacy tasks demonstrated motivation, self-esteem, and autonomy with digital literacy interventions.

For example, Rao (2009) examined the impact of multimedia software on three specific areas of written expression: ability to convey meaning, clarity of writing, and use of conventions. He found that multimedia allowed students to practice their writing skills in a nontraditional way in order to gain confidence and students exhibited an increased sense of independence, were self-directed, sought answers from each other rather than the teacher, and remained engaged in spite of difficulties. The students wanted to say more and wanted to participate, which was highly unusual outside of the intervention.

Additionally, McGrail and Davis (2011) explored the effects of blogging on writing and literacy development. They discovered that students began the year with a weak sense of audience. Over time, they developed personal relationships through blogs, which gave them a better sense of audience. Students felt more confident and motivated in this process. They were also willing to take chances with their writing. Similarly, Sylvester and Greenidge’s (2009) use of digital storytelling with struggling writers demonstrated students' willingness to persist in spite of difficulty when presented with an alternative to traditional forms of writing.

Finally, O'Brien, et al. (2007) discovered an increase in self-agency upon the integration of new literacy practices with students placed in a remedial classroom. A component of the study focused on motivation, since it is largely neglected in this context. The general focus is on skills and strategies in the remedial classroom and the adolescents are strictly defined by their competence with print. Along with the standard remedial program, READ 180, the researchers incorporated new literacy practices in the lessons by allowing the students to create PowerPoint presentations on video games, or other topics of interest. The authors saw an increase in both
achievement scores and motivation. They argue that the deficit thinking related to struggling readers should be removed and students should be allowed to work on authentic lessons aimed at increasing achievement, instead of the sole emphasis on prescribed curriculum. The authors also encourage more studies that marry the new literacies and school sanctioned traditional practices in future research.

“Struggling” Digital Navigators

In a recent review of research in technology, literacy studies, and special education Pandya and Avila (2017) found 14 studies in the last decade that use what they termed as ‘productive technologies’ in special education. Productive technologies can be defined as “technologies through which children and youth not only consume digital content but also produce it” (Pandya & Avila, 2017). The authors also found that while there is growing body of research in the ways new media and new technologies construct and interact with disability, this work is largely found outside the field of special education research. From my reading of studies involving productive technologies and students with difficulties, I noticed several concerns discussed in the following paragraphs.

**Defining the population.** In general, students with disabilities are largely missing from the literature related to digital literacies. Although many of the studies describe the research related to at-risk students, the population was not well described. Within the literature, there is often an assumed "at-riskness," for the reader. Many studies describe the research related to at-risk students, the population was not well described (e.g., race and ability intersections). For example, Blachowicz et al. (2009) describe the population in their study as students from at risk schools based historical performance and family income level. Brass (2008) described her focal participant in terms of race and label of “at risk,” but included nothing concrete in terms of
performance and ability level. In order to understand if digital tools are beneficial to different populations, a richer description of the participants should be described for the reader.

**Competing discourses.** In reviewing the literature on digital literacies and disabilities, I found that there are competing discourses as to what literacy is and what literacy is for. As described in detail by Flewitt, Nind, and Payler (2009), there are two broad approaches to literacy: skills-based and broader views of literacy that shares meaning through diverse symbol systems. According to Flewitt et al. (2009), the first (skills-based) views literacy as a curricular goal that focuses on developing skills-based reading and writing goals. This approach is reflected in No Child Left Behind (US DoE, 2002), which states that to be literate relies on complex skills that prove to be a challenge for certain students, particularly those with language difficulties. Teachers working with students with learning challenges have excluded these students from literacy activities due to a lack in cognitive ability (Kliwer, 1998, as cited by Flewitt et al., 2009), or rely on traditional literacy approaches, such as phonics, in spite of these approaches being found less successful than other nonconventional methods (Lacey, et al, 2007, as cited by Flewitt et al., 2009).

Flewitt et al. (2009) goes on to describe a second broader approach to literacy development as that of shared meaning through the use of diverse symbol systems within social contexts. This form of literacy can be described as intertwined with daily practice (Street, 1998). A view of literacy as part of social practice acknowledges that children "experience different kinds of literacy in different contexts, using a variety of symbol systems, and that literacy is learnt most effectively when it is used in meaningful ways in real life circumstances" (Flewitt et al., 2009, p. 3). For example, Flewitt (2010) share that literacy is “ranges from expression of everyday needs through words, gesture, and action to the human desire to participate in wider
social and cultural practices and to ‘fix’ ideas for distant or future audiences” (p. 387). These two views of literacy align with the use of computer assisted technology and classroom-based instruction.

Computer Assisted Instruction versus Classroom-based Instruction. Research related to digital tools for students with disabilities are most commonly found based in Computer Assisted Technology (CAT) or Computer Assisted Instruction (CAI). For example, in a study by Anderson, Anderson, and Cherup (2009), the researchers promote the use of technology to help meet the accountability goals of NCLB. To achieve these goals, the plan suggested that tech-savvy teachers and leaders must be trained and should be provided increased access to the Internet and e-learning. However, they suggest that if these technology goals are to be met, research-proven assistive technology for students with disabilities must also be included in teacher training. Upon investigating the studies included within the review, the majority listed are limited to Computer Assisted Technology (CAI) such as text-to-speech and word recognition, instead of meaningful engagement with technology. Another example from King-Sears, Swanson, and Mainzer (2011) discusses technology for adolescents with disabilities. While the authors suggest a useful framework for selecting and implementing technologies, the framework focuses more on the technology as a tool for gaining access to literacy events instead of the tool being the literacy event. What is lacking in the previous two studies is meaningful engagement with productive technologies as opposed to numerous replicative uses, which can be important for access to literacy, but don’t fundamentally change literacy learning.

Defining and measuring student success. Another concern related to the studies reviewed is that many described the perceived benefits for the participants due to the incorporation of digital literacies. However, the extent to which this occurred was minimally
discussed in terms of student growth, quality of products produced by the students, or gains made by the students as a result of using or incorporating digital literacies. It is important that teachers and researchers are ensuring that these new digital literacies are in fact benefiting the students through increased academic performance and that the student-created products are as valuable as print-based products.

**Digital Learning Environments and the Role of the Teacher**

Of primary importance to this study is the manner in which teachers create learning environments for digital literacies. In the field of teacher education, there are three major frameworks for technology integration in the classroom: Technological Pedagogical Content Knowledge (TPCK) framework designed by Mishra and Koehler (2006), the Technology Integration Matrix designed by Harmes, Welsh, & Winkelman (2016), and the SAMR Model developed by Puentedura (2006). These frameworks guide conceptions of technology integration using different philosophies and privileging different factors such as the teacher’s pedagogical/content/technical knowledge, student adaptation/use, or the teacher’s facility with the device. Below I describe these models and discuss the ways in which these frameworks guided my analysis of the learning context of this study.

**Technological Pedagogical Content Knowledge (TPACK).** The TPCK framework comes from the work of Shulman (1986) on Pedagogical Content Knowledge (PCK).
Figure 1.1 Shulman’s (1986) Pedagogical Content Knowledge (PCK) Framework

Shulman (1986) argued that the knowledge of subject matter and pedagogical strategies is not complex enough to understand the knowledge of good teachers. Rather, it is the interplay of these components that allow teachers to make content accessible for learners. The TPACK framework emphasizes the same interplay that facilitates teachers’ interpretation of standards and goals to make content accessible to learners through instruction with the added component of the integration of digital technology. The TPACK is a model used to explain the factors critical for teaching with technology and contains several components. TPACK “holds that content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK) are foundational and necessary for effective technology integration” (Courduff, Szapkiw, & Wendt, 2016, p. 27).
Technological Knowledge (TK) is the knowledge of standard technologies (e.g. books, blackboard) as well as advanced technologies (e.g. digital video, Internet) (Mishra & Koehler, 2006). Content Knowledge (CK) is the knowledge of the subject matter that contextualizes what will be selected for teaching. Finally, Pedagogical Knowledge (PK) is a depth of knowledge of the processes, practices, and methods of teaching and learning. At the center of the model is Technological Pedagogical Content Knowledge (TPACK) goes beyond the three components and
“is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones (Mishra & Koehler, 2006).

Mishra and Koeler (2006) suggest that the best way for teachers to integrate technology in the classroom is for them to draw on technological, pedagogical, and content knowledge simultaneously. Theoretical in nature, the TPACK framework “emphasizes the connections, interactions, affordances, and constraints between and among content, pedagogy, and technology” (Mishra & Koehler, 2006, p. 1025). The dotted line around the model includes the context in which the model is used. In summary, it is the teacher’s knowledge of when, where, and how to use technology while guiding students to increase their knowledge in particular content using appropriate pedagogical approaches (Brantley-Dias & Ertmer, 2013; Niess, 2011).

If a teacher has a rich and well-integrated understanding of how students learn the subject matter and technology, then the teacher is able to draw upon this knowledge to implement technology into everyday teaching practice (Courduff et al, 2016, p. 27).

With strong support in the extant literature, TPACK can be adopted into all levels and curricular areas (Koehler, 2011). TPACK is a conceptual framework for teachers to teach effectively with technology by thinking about teaching and learning (Padmavahti, 2013).

Although there is an abundance of literature related to TPACK in general education settings, few explore its application with teachers within special education contexts (Anderson,
Griffith, & Crawford, 2017). However, there are many studies in recent years, which show attention is being given to this framework within special education.

In one of the first studies to focus on special education teachers, Pace and Blue (2010) studied prospective special educators’ use of technology during an afterschool program for middle school students with disabilities. The participants worked with the students in literacy and math, choosing technology to represent content, make accommodations, provide additional practice, and assess understanding of the content. One third of special education teachers felt that the technology was a significant motivator for students but finding the right resources for instruction could prove challenging.

Although motivation is an important factor with technology integration, instructional decision-making is important to understand how and what makes instruction effective. Courduff et al. (2016) investigated the process by which exemplary technology-using special educators effectively implemented technology. The authors were interested in exemplary models for pedagogy and instruction in the integration of technology to assist students with special needs gain academic mastery. In this study, when teachers selected technology, they considered learning objectives, student preference, and academic needs. The teachers allowed the students to explore and play with technology so that they could develop confidence with the tools, and then supported their learning so that students could master the content and technology. Data analysis revealed the personal attributes, beliefs, dispositions, and opportunities set the stage for teachers to gradually weave technology into their teaching. Study findings are largely consistent with the extant literature which supports that teacher knowledge of technology, pedagogy, and content matter is critical to effective instructional practices (Koehler et al., 2013), especially in the special education classroom (Tournaki & Lyublinskaya, 2014). Ciampa (2017) describes the
outcomes and lessons learning from a professional development initiative geared towards three special education teachers with the goal of learning how to infuse technology in their content literacy instruction. The professional development (PD) increased the special education teachers’ self-efficacy and TPACK knowledge for content literacy teaching through the PD’s use of extensive modeling, one-on-one and collaborative planning, as well as technical support from colleagues and the researcher.

One way to address teacher knowledge of technology integration is to increase pedagogical knowledge within preservice teacher preparation programs. Anderson et. al. (2017) investigated how preservice teachers’ instructional decision-making reflected the use of TPACK components. They found that there are two primary kinds of teaching decisions: planning, and in-the-moment. Preservice teachers learned that technology integration needs to be intentional and supported. Their findings suggest that technology-integrated fieldwork in special education allowed the preservice teachers to experiment with technology and make important instructional decisions using the TPACK when planning and implementing lessons.

When making instructional decisions, teachers strategically combine knowledge from multiple subdomains (Niess, 2011). The TPACK model emphasizes the importance of complex interactions among three domains—technological (TK), pedagogical (PK), and content knowledge (CK)—needed by teachers to successfully integrate technology into instruction (Koehler et al., 2013). In my study, I used TPACK as a way to study Anna’s technological (TK), pedagogical (PK), content (CK) knowledge to see when, where, and how she used technology within her instruction. The TPACK framework provided me with the means to link students’ content learning needs with the learning goals and educational technology in my effort to “probe
the material workings” of day-to-day classroom practice in order to understand the phenomenon of digital literacies in practice (Dyson, 2008, p. 3)

**Technology Integration Matrix.** Another framework for guiding technology integration is the Technology Integration Matrix (TIM). The TIM is used to plan and evaluate technology-rich instruction and target teacher professional development (Harmes, et al., 2016). Differing from TPACK, “the TIM provides a framework for situating technology in instructional settings while maintaining a central focus on students” (Harmes, et al., 2016, p. 138). The TIM demonstrates how teachers can utilize technology to enhance student learning. The TIM is a “unique, research-based model for evaluating lessons, accompanied by a rich set of supporting materials” (Harmes, et al., 2016, p. 158). The matrix is comprised of five levels of technology integration: Entry, Adoption, Adaption, Infusion, and Transformation, as well as five levels of meaningful learning environments: Active, Collaborative, Constructive, Authentic, and Goal-Directed. Harmes et. al. (2016) describe these levels of technology as:

*Entry level:* The teacher is using the technology tools to deliver curriculum content.

*Adoption level:* The teacher is still the decision-maker about the specifics of technology use.

*Adaption level:* The technology tools become more integrated within a larger lesson. The teacher still maintains decision-making on when to use technology tools, and students may begin exploring on their own how to best use them.

*Infusion level:* At this level, a broad range, and sufficient number, of technology tools are available to students throughout their day, the focus of instruction using technology is clearly about learning, and not about the tools themselves, and student decision-making is supported by teacher guidance.
Transformation level: This level is marked by student self-direction in the use of technology tools in lessons that focus on higher learning outcomes not possible without technology. The teacher’s role is to be a guide or model in the use of technology.

The matrix is used to illustrate how teachers can use technology, as well as understand the characteristics of the learning environment. The levels of technology integration described in the TIM range from Entry level to Transformation level. At the entry level, the teacher uses technology tools to deliver content to the students. At the transformation level, the teacher “encourages the innovative use of technology tools which facilitate higher order learning activities that may not have been possible without the use of technology” (Teacher Descriptors Table, n.d). The learning environment ranges from active learning to goal-directed, where the students are using technology tools as opposed to passively receiving information, to students using technology tools to manage, create, and monitor their learning. The TIM can also be used as an evaluative tool to guide the task of evaluating technology integration in the classroom.

The TIM provided a way in which I was able to situate Anna’s tool use and instructional context. By using the TIM, I was able to isolate her technology use that went beyond “entry level” implementation of a tool and understand the characteristics of the learning environment. The TIM was useful in providing a framework for the description and discussion of productive technologies for students with literacy-related learning difficulties.
Figure 2.3. Technology Integration Matrix (TIM). Florida Center for Instructional Technology at the University of South Florida, College of Education (retrieved from: https://fcit.usf.edu/matrix/matrix/)
**SAMR (Substitution, Augmentation, Modification, and Redefinition) Model.** The SAMR model (Figure 2.4) is a four-level approach to select, use, evaluate technology in K-12 education. Puentedura (2006) intended the SAMR to be a tool to describe and categorize K-12 teachers’ use of classroom technology. The model encourages teachers to move from lower to higher (enriched) levels of teaching and learning (Hamilton, Rosenberg, & Akcaoglu, 2016). Puentedura shares his SAMR-related work—which largely consists of copies of presentation slides—via his website. Within these web-based materials, the details for how to understand, interpret, and apply the SAMR are limited. The lack of systematic evidence complicates how to interpret and apply the SAMR model accurately.

The SAMR is not relevant to my study because I am not examining device implementation or increases in degrees of technology. However, it does reflect a prevalent model in educational contexts and those who choose this frame are clearly focused on the tool rather than other factors (i.e. context, learner).

![Figure 2.4. Puentedura’s (2006) Substitution, Augmentation, Modification, and Redefinition (SAMR) model (retrieved from http://www.hippasus.com/rrpweblog/)](image-url)
Summary

Reading and writing are both acts of composing (Tierney & Pearson, 1983). Students with disabilities struggle with both reading and writing task in tradition “paper-pencil” formats. Although students are often viewed as struggling readers or writers in traditional literacy tasks, they are often portrayed differently when viewed through the lens of digital literacies. Digital tools and environments can prove beneficial by increasing students’ ability to participate in literacy tasks, drawing on their funds of knowledge, and tapping into affective dimensions such as motivation to learn. Evidence from research studies suggest that digital literacies offer learners with literacy-related difficulties some extended opportunities for engagement in literacy events. There is still much to be known about the context and instructional practices needed to foster an environment for learning for learners with literacy-related difficulties.

Frameworks such as the TPACK and the TIM are research-based tools to help understand the use of digital tools and environments. The TIM and the TPACK frameworks complement one another, first evaluating an instructional lesson with the TIM, and then within each cell, the TPACK framework can specify the content required to effectively use the lesson or change the level of integration for one or more characteristics (Harmes, et al., 2016, p. 158). This is in order to reach the ultimate purpose of effective technology integration in which pedagogy and instructional goals are central, not just increasing technology integration for the sale of the technology tools themselves (Ertmer & Ottenbreit-Leftwich, 2013).

Much is left to learn regarding the ways in which struggling readers engage in digital practices when provided the optimal environment. Even more is left to learn when these students encounter less than optimal environments. In the following chapter, I detail the methods I utilized in my examination of how learners with literacy-related reading difficulties engage in digital literacy practices in the context of integrated digital literacies instruction.
CHAPTER THREE: METHODS

The purpose of this study was to investigate how students with literacy-related learning difficulties engaged in digital literacies in an elementary classroom. In this study, I focused on students’ use of productive technologies in a classroom with a teacher who possessed digital literacy expertise and facility with tool use. Digital literacies are defined as “socially situated practices supported by skills, strategies, and stances that enable the representation and understanding of ideas using a range of modalities enabled by digital tools (O’Brien & Scharber, 2008). A range of modalities includes visual and auditory and digital tools include tools such as iPads and applications such as Comic Life.

Unfortunately, students with disabilities are largely absent from the research on productive technologies literature (Pandya & Avila, 2017). What little research exists tends to focus on assistive devices that allow learners to access the curriculum or instructional software programs that allow learners to practice skills. In order to extend the research to students with literacy-related learning difficulties, I asked the following questions:

1. What was the context, content, and structure of the teacher’s technology instruction in this class?
2. What are the benefits and barriers of the engagement in productive technologies for students with literacy-related learning difficulties?
3. How did students with literacy-related learning difficulties compose during digital literacy events?

**Study Design: Case Study**

Diverse perspectives and paradigms for research are derived from different notions of “truth” (Glesne, 2010; Guba & Lincoln, 2005; Merriam, 2009; Patton, 2002). This variation among the paradigms is a result of different interpretations of key constructs such as ontology, epistemology, methodology, and philosophy or values (Guba & Lincoln, 2005; Patton, 2002). The specific inquiry paradigm a researcher holds is important due to the role the researcher has in the research process. I developed this study with an ontology that recognizes constructed realities and an epistemology that embraces subjectivities in which findings are created, leading to an interpretive, naturalistic stance aligned with qualitative paradigms of research.

The purpose of the interpretivist approach was to contextualize and interpret, with the researcher as the primary instrument of inductive, descriptive study (Glesne, 2011; Schram, 2006). In this study, I draw upon a constructivist paradigm. Constructivism, an interpretive stance, involves people actively making meaning as a group (Lincoln, 2005). Within the constructivist framework, participants and the researcher construct knowledge and reality collaboratively (Hatch, 2002). This co-construction is unique, as it is based on how individuals (participants and researcher) experience and interpret the world in that moment of time and space (Hatch, 2002).

The research questions in this study reflect an interest in the ways in which the teachers and students experienced the integration of digital literacies. Therefore, my examination centered
on how the participants made meaning based on their use of, and experience with, digital literacies.

It is the messy complexity of human experience that leads researchers to case studies in the qualitative tradition (Erickson, 1986). Stake (1995) approaches case study from an interpretive stance, recognizing that the case is influenced by the surrounding environment, in line with the theoretical framework of this study. Merriam (1997) and Stake (2005) both assert that case study allows for examination of complex, historical, and contextual entities. Merriam (1997) purports the purpose of case study research is to provide a “thick” description through the presentation of “holistic description and explanation” (p. 29).

This interpretive work is concerned with the examination of a bounded case of one teacher’s use of digital literacies and the ways in which her students responded. In order to address the research questions, I conducted an instrumental qualitative case study (Stake, 1999). An instrumental case study allows for the researcher to study and explore a case “guided by his or her interest in the case itself rather than in extending theory or generalizing across cases” (Mills, Durepos, & Wiebe, 2010, p. 499–500.). A case study is suited for this study because I sought to understand “the local particulars of some abstract social phenomenon” (Dyson, 2008, p. 3). This constructivist approach allowed me to immerse myself in a classroom that presented a particular set of characteristics to “probe the material workings” of day-to-day classroom practice in order to understand the phenomenon of digital literacies in practice (Dyson, 2008, p. 3).

A case study is a naturalistic method of inquiry (Creswell, 2013) and allows for the collection of multiple sources of data to “tell the story” (Stake, 1999). The purpose of case study is to describe and explain a phenomenon within a bounded system (Stake, 2006), and various
methods can be used to understand the phenomenon. Regan-Smith (1992) used the term “variable led” to describe case study. Rather than examining individual variables across cases, the researcher can explore multiple variables in one case and how they interact within the case (Thomas, 2011). In this particular study, the bounded system was the teacher, Anna’s, classroom context of instruction focused on digital literacies. The variables that led my examination were her experience with technology, the technological tools she incorporated within her instruction, and the students with literacy-related learning difficulties situated within her classroom.

Case Selection

In case study research, the case is not selected as a representative sample, yet it provides a unique phenomenon to be explored (Thomas, 2011). Below, I describe the school context and teacher-selection process followed by an explanation of my decisions in selected focus students. Because I view learning as a socio-cultural (Larson & Marsh, 2005; Purcell-Gates, 2007) and socio-cognitive process (Kucer, 2009), the context of the study, the details of events, and the analysis of data take place with a social learning environment.

School Context. Nature Academy is a public charter school located in a large district in Southwest Florida serving 800 students in grades K-8. The school’s mission is to prepare students for academic excellence, environmental stewardship, and to be lifelong learners. The school’s motto suggests that nature is the best teacher and they have developed the academic program around integrating the environment into all aspects of the curriculum.

The physical environment of the school is surrounded by trees, wetlands and ponds, and a community garden, which supports its mission for an integrated environmental education. The school also values its sustainability features with extensive programming in recycling. They use a cistern, recycled carpets and carbon monoxide monitoring. They also have a no-garbage can
lunch room policy in which students are encouraged to pack lunches without waste or packaging beyond what can be placed in a compost bin.

In addition to their environmental focus, the school makes technology a priority and has equipment available for both teachers (i.e., iPad, laptop, document cameras) and students (i.e., computer lab, iPad cart, classroom computers). They have a computer lab with a technology teacher who also serves in to role of technology specialist.

**Participants.** Below I describe each of the participants in the study. I begin with information about the selected teacher, as her teaching sets the context for the study. Then I describe each of the focal students in depth as an examination of their engagement with productive technologies is the central purpose of this study. All participant names in this study are pseudonyms.

**Teacher.** Anna is a white 5th grade teacher who is proficient with technology as an instructional tool. I observed Anna as she entered the elementary classroom to teach 5th grade as a long term substitute teacher. Ana taught a class of 23 students, consisting of 9 boys and 13 girls. The classroom demographics were 18 White students, four Latina/o students, and one African-American student.

Anna located her desk at the front of the room near the Smartboard and Document Camera. She arranged students’ desks in small groups of 4-5 students and the groups centered around Anna and the Smartboard screen. The periphery of the space included school supplies, the classroom library, and student computers bordered along the exterior walls.

A technique widely used in qualitative research for identifying and selecting information-rich cases is through purposeful sampling (Patton, 2002). I selected Anna as the classroom teacher because she had extensive experience with digital literacy instruction and I wanted to
ensure that I would observe students engaged with technology. Coincidentally, Anna also had a background in special education, receiving her Bachelors in Special Education. At the time of the study, she had 8 years of teaching experience. Immediately after graduation she taught self-contained 6th grade in a public charter school, during which her students made movies and used laptops frequently in all subject areas. From a self-contained situation, she moved on to teach science, including movie making and computer-based instruction across the curriculum. In 2011, she taught middle school technology and she designed a course to teach students real world technology, research, and problem-solving skills, in addition to learning how to make movies and navigate digital resources on the computer. During this time, Anna also acted as technology specialist and supported other teachers who wanted to integrate technology into their classrooms. Outside of classroom instruction, Anna served as a member of a university professional development team that provided teachers with support for technology integration.

Figure 3.1. Classroom layout

As a current graduate student, Anna has also taught at the university level. In her work towards obtaining her doctorate, she has served as a tutor, taught workshops, and helped people
in one-on-one contexts with troubleshooting and course assignments. She also served as a Technology Coach, supporting the integration of interactive technologies in K-5 schools for pre-service and in-service teachers.

Anna is recognized as a teacher educator with knowledge in technology integration. She provides local, state, and national efforts to provide professional development in the area of technology integration. As the school’s former technology specialist/coach, Anna assisted the school in purchasing iPads, laptops, and digital cameras and she ensured the school had all necessary software, apps, and materials necessary for high levels of technology use.

The school did not require Anna to use particular tools and they did not adhere to a technology integration protocol; therefore, Anna’s instructional choices were not constrained by hardware, software, or the curriculum. Additionally, Anna had the freedom to select her instructional methods based on the lesson sequence she was provided (Figure 3.2)

![Figure 3.2. Example of basic lesson plan with room to interpret instructional teaching method](image)

**Students.** The central purpose of the study was to understand how students engaged with productive technologies within the context of integrated digital literacies instruction. The focal students served as nested cases within the larger classroom context. All students (n=24) within
Anna’s class used the tools of digital literacies. Specifically, students used iPads, laptops, and digital cameras to complete assignments. They also used the Internet and web 2.0 resources.

From this group of students, I selected three participants. A relatively small selection from the class of students for my sample allowed me to engage in deep analysis of individual students’ learning processes and digital tool use. I chose the children based on the following criteria. First, the students had reading difficulties as documented by their disability status (learning disabled as identified by school personnel/medical doctors) and/or classroom performance (underperforming as identified by performance at least one grade-level below expectations on state-wide literacy assessments). Second, the students had interpersonal characteristics conducive to the research process. For example, I selected students who were willing to have conversations with me and agreed to being closely observed. Third, the students had parent permission to participate in the research process.

Ariana. Ariana is a 12-year old Hispanic female. A self-proclaimed cat-lover, she is full of energy and likes to have fun, preferring to walk around the classroom chatting with peers, rather than sitting in her seat. Ariana enrolled in Nature Academy a couple of years previously and she mentioned the best things about the school were the garden and swimming. When I asked her about her favorite school subject, she sat thinking without a response. Ariana told me that she “feels good” about the novels she has to read in class, although during my observations I noticed that they were often challenging texts that were several grade-levels above her current reading level. She avoided my question specifically about reading, so I asked her directly if she liked reading. “I’m bad at reading. Terrible. I forget the words. I used to get stuck on words. And I can’t read fast.” Ariana mentioned that she loves using technology and was very excited to be
using it in class with Anna.

Ariana has a documented learning disability and struggles in reading, writing, and math as evidenced in her Individualized Instructional Program (IEP). I did not have permission to examine her IEP, but Anna confirmed that Ariana had instructional goals related to reading, writing, and math. She scored below proficient on annual assessments in reading and math. Additionally, Ariana received additional services by the special education teacher in a small group, pull-out setting in another part of the school.

Bella. Bella is an 11-year old white female. She loves music and fashion and has all the latest details on pop music stars. Bella is witty and likes to use sarcasm with her peers; particularly with her best friend Ariana. She has attended Nature Academy since Kindergarten and mentioned that she really loves her school because “they’re not allowed to pick the leaves or kill anything. Like the plants or animals.” Science is her favorite subject because of the experiments, and math is her least favorite subject of them all. Since she did not specifically mention reading or writing, I decided to ask her about those subjects. “I’m not good at it,” was her response. I asked her how she knew she wasn’t good and she replied with, “I’m not good at writing. Like every time I try and write something I forget the apostrophes or capitals or something.” Regarding reading, “Reading…I’m slow at.” Bella told me that she reads at home when she’s “in the mood” and prefers funny books like *Diary of a Wimpy Kid* (Kinney, 2007) or *Dork Diaries* (Russell, 2009).

Bella and Ariana were best friends and they worked together on all of the group projects during my classroom observations. The teacher identified Bella as a student who often struggled with classroom tasks. I included Bella in the study in this study because she struggled with
reading and writing. Although she did not have an IEP, she performed below grade-level expectations on annual assessments in the areas of reading, writing, and math. I did not have permission to review Bella’s specific test scores; however, the teacher confirmed her performance of at least one grade-level below expectations in reading and writing tasks.

**Devon.** Devon is an 11-year old white male. He is often quiet and reserved in his interactions with the teacher and the whole class. But he likes to laugh and play with his close friends. His favorite movie is *Star Wars* and he loves to play basketball and ride his bike when he is home. Devon attended Nature Academy since 2nd grade and really enjoys the environmental aspects of the school, with the garden being his favorite location. Devon mentioned that he does not like most school subjects, particularly reading and writing. “I have trouble reading,” he explained to me. “It’s just that I can’t find good books that I like.” Regarding writing, he says “I have trouble writing. I can’t think of stuff to write.”

Devon has a documented learning disability and struggles in reading and writing as documented in his Individualized Education Plant (IEP). Anna also confirmed Devon was at least one grade-level below expectations. Although I was not permitted to review the specifics of his IEP, the teacher confirmed instructional goals for reading and writing. He scored below proficient on annual assessments in reading and math. Additionally, Devon received additional services by the special education teacher in a pull-out setting.

**Data Collection**

The data collection process in case study research is adaptable and evolving (Stake, 1999). Case study designs allow for collecting data in multiple ways. Stake (1999) stressed the importance of examining the context and methods of data collection for practicality in order to be fully prepared for the process of data collection prior to entering the field. Such a detailed
plan facilitated the conceptualization of not just what was to be examined, but why it was central to the agenda. Over the course of multiple weeks, I immersed myself in daily observation of the teacher (to establish the instructional context) and students (to closely observe literacy practices) for sustained periods of time. In Table 3.1, I outlined the timeline for data generation, including a summary of the number of visits and the amount and type of data created.

Table 3.1
Data Collection Timeline

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATA COLLECTION</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEEK 1</td>
<td>Initial interview with teacher</td>
<td>1 hour</td>
</tr>
<tr>
<td></td>
<td>Classroom observation audio/field notes</td>
<td>22 hours</td>
</tr>
<tr>
<td>WEEK 2</td>
<td>Classroom observation audio/field notes</td>
<td>19 hours</td>
</tr>
<tr>
<td></td>
<td>Teacher interview</td>
<td>1 hour</td>
</tr>
<tr>
<td></td>
<td>Student interviews</td>
<td>1 hour</td>
</tr>
<tr>
<td>WEEK 3</td>
<td>Classroom observation audio/field notes</td>
<td>20 hours</td>
</tr>
<tr>
<td></td>
<td>Teacher interview</td>
<td>1 hour</td>
</tr>
<tr>
<td></td>
<td>Student interviews (focus group)</td>
<td>30 minutes</td>
</tr>
<tr>
<td>WEEK 4</td>
<td>Classroom observation audio/field notes</td>
<td>22 hours</td>
</tr>
<tr>
<td></td>
<td>Teacher Interview</td>
<td>1 hour</td>
</tr>
<tr>
<td></td>
<td>Student interviews</td>
<td>1 hour</td>
</tr>
<tr>
<td>WEEK 5</td>
<td>Classroom observation audio/field notes</td>
<td>16 hours</td>
</tr>
<tr>
<td></td>
<td>Teacher Interview</td>
<td>20 minutes</td>
</tr>
<tr>
<td></td>
<td>Student interviews</td>
<td>45 minutes</td>
</tr>
<tr>
<td>WEEK 6</td>
<td>Final interview with teacher</td>
<td>1 hour</td>
</tr>
<tr>
<td>TOTAL</td>
<td>Observations</td>
<td>99 hours</td>
</tr>
<tr>
<td></td>
<td>Teacher Interview</td>
<td>5 hours, 20 minutes</td>
</tr>
<tr>
<td></td>
<td>Student Interview</td>
<td>3 hours, 15 minutes</td>
</tr>
</tbody>
</table>

Data Sources

During my observations, I collected a variety of data types including field notes, interview responses, and work samples. In Table 3.2, I outline the type of data sources, including a summary of the data source and the amount of data generated by each source. Each data source
is described below.

**Table 3.2**
Data Generation

<table>
<thead>
<tr>
<th>DATA SOURCES</th>
<th>FREQUENCY COUNTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLASSROOM OBSERVATIONS</td>
<td>20 visits, 2-5 hours per visit, various subject areas</td>
</tr>
<tr>
<td>FIELD NOTES</td>
<td>20 sets that correspond to daily observation</td>
</tr>
<tr>
<td>INTERVIEWS</td>
<td>6 Teacher interviews</td>
</tr>
<tr>
<td></td>
<td>1 Student interview (focus group)</td>
</tr>
<tr>
<td></td>
<td>2 Individual student interviews, 1 per participant</td>
</tr>
<tr>
<td>WORK SAMPLES</td>
<td>5 sets of work samples, capturing any evidence of digital production</td>
</tr>
<tr>
<td>LESSON PLANS</td>
<td>6 week of plans that correspond to each week of observation</td>
</tr>
</tbody>
</table>

**Observations.** I immersed myself in the classroom in order to observe both teachers and students. Based on the teacher’s schedule, I observed the classroom for a period of six weeks at the end of the school year (See Table 3.2). My focus was not on tool fluency or extended tool use over time by teacher and students; rather, my focus was to document practices as they existed within the instructional context of integrated instruction. I was interested in the students’ technology use and the opportunity to see students apply strategies in the creation of digital products.

To observe the students, I sat amongst them while they worked on independent activities, as well as during group projects, and centers. While the teacher addressed the whole class, I placed myself in a location that allowed me to view the teacher’s instruction as well as student responses.

I used observational field notes to describe the ways the teacher incorporated and used digital literacies. I also described what the students did and any interactions between teachers.
and students and well as amongst the students. For example, in Figure 3.3, the field notes include a description of the setting, participants within the setting, the activities and interactions occurring within the setting, and my thoughts, reactions, and wonderings of my first engagement with the data.

I recorded all observational field notes on my iPad using the *Evernote* application as it allowed me to create the data records and maintain them chronologically (Figure 3.3). I sorted data chronologically for ease of analysis since I was collecting multiple data types per day. Additionally, sorting the data chronologically allowed me to examine how Anna incorporated technology from start (first day in class) to finish (last day of school) and to investigate changes in her instructional strategies for introducing new tools.

![Field Note Template](image)

*Figure 3.3. Field Note Template*
Field Notes

Bogdan and Biklen (2007) describe two types of field notes: descriptive and reflective. Descriptive field notes are detailed records of what the researcher sees, hears, and experiences, and they “transform witnessed events into words on paper” (Emerson et al., 2011). Along with detailed descriptions of the people and interactions observed (both verbal and non-verbal), physical and historical settings that include maps, photographs, and video recordings can be important contextual information. Reflective field notes build on descriptive field notes to include a personal reflection of researcher learning. These notes go beyond the description of detail to include feelings, impressions, connections, and ideas about what was learned (Emerson et al., 2011). Details regarding the data I generated are below.

**Descriptive field notes.** Descriptive field notes reflect an account of what I observed in the field (Bogdan & Biklen, 2007). I took pictures of who was working in the space of the classroom in order to facilitate my recall of the students’ positions in relation to each other and in relation to the teacher, the Smartboard, etc. I inserted these photos into Evernote and described the photographs with details such as the participants’ names, activities, and specific details to describe the events that occurred during the observation. I labeled each field note by date, time, and classroom activity observed (i.e. Science, writing, etc.) and sorted chronologically (Figure 3.4).

After leaving the field each day, I expanded upon the notes in order to provide a “thick, rich description” (Emerson et. al., 2011). For example, in second column of Figure 3.4, I wrote the text during classroom observations. I wrote the text in the third column, *Thoughts and Wonderings*, after the field observation.
Reflective field notes. Reflective field notes "go beyond the descriptions presented (in descriptive field notes)," to include "speculations, feelings, problems, ideas, hunches, impressions, prejudices, analyses, plans for future inquiry, clarifications, syntheses, connections, and other ideas" about what the researcher is learning in the field (Emerson, Fretz, & Shaw, 2011, p. 11). I took notes during my observations, as well as completed a reflective journal after each departure from the scheduled classroom visits within a field diary after each visit by end of the day or before the next visit. I maintained the reflective journal in an electronic format alongside the descriptive field notes in a separate column in Evernote and sorted by date (Figure 3.4). The act of writing and reflecting on a daily basis provided an opportunity for deep
reflection. For example, although I selected this teacher because she demonstrated high levels of technology use and facility with tools as witnessed in professional development contexts at the university, in the classroom, she did not explicitly implement tool use for the purpose of increasing student agency. Rather, she often assumed student knowledge of tool use and she integrated technology that replicated paper/pencil tasks. In other words, I noticed that some assignments were not enhanced or altered by the inclusion of technology. The teacher’s lack of focus on student use (e.g., TIM and TPACK goals) created a crisis of credibility for me because I wished to observe more authentic, deeply engaging integration of technology versus the reality of numerous replicative uses. Therefore, I used my reflective notes to monitor my desires, my expectations based on best practices, and the reality of the classroom in which I conducted the study.

**Video/audio recording.** Throughout the data collection process, I used video and audio recordings during my classroom observations. The recording served two purposes. I wanted to be “in the moment” and pay attention to the context of learning. The recordings also allowed me to capture the specifics of the dialogue for later transcribing, as well as other semiotics that indicate student engagement and the process of creating their digital products. For example, after listening to the recordings and transcribing dialogue, I was able to track a student moving between data sources to write text. I could also see a student playing a video game when she was supposed to write a report. Once leaving the field, I enhanced my field notes as I had the ability to revisit my classroom observations via the video/audio recordings. I used my iPhone and iPad to capture the video and audio recordings.
I transcribed the video and audio data within MAXQDA for analysis. I selected MAXQDA because the software allowed me to upload the audio and video recordings, organize the data sources chronologically by literacy event, and code the data directly within the video.

![Figure 3.5. MAXQDA Data Analysis Software.](image)

As demonstrated in Figure 3.5, MAXQDA creates spaces where I could review the original data record on the upper right side of the screen, review my coding system along the bottom left of the screen, and view the video or listen to the audio on the bottom right of the screen simultaneously.
Interviews

Stake (1999) describes the interview process as one in which the researcher creates descriptions and makes interpretations about the individuals involved in the case study. In my study, I used "informal conversational interviews" (Patton, 1990, p. 281) and scheduled interviews (preplanned interviews with guiding questions) for the purpose of understanding both the teacher’s and the students’ perspectives related to the incorporation and use of digital literacies in the classroom. I recorded all interviews as part of the data collection process using AudioNote on my iPhone or iPad. By video recording the interviews, I focused on the conversation at hand instead of taking notes. Recording also ensured that I captured every statement along with tone and phrasing, and any nonverbal interactions as well.

After leaving the research site, I listened to the recorded interviews each day. I transcribed the interviews as soon as possible after the interview and I categorized and sorted the interviews by date and made note of my initial impressions in my reflective journal. These notes were recorded within two days from the interviews.

During classroom observations, I used "informal conversational interviews" (Patton, 1990, p. 281) to ask questions that helped me understand the teacher’s and students’ thinking as well as gain insight into their actions within the classroom. My questions were based on the context and circumstances of the observations. Some sample questions for the students included: “Can you tell me what you are working on?” “How did you decide to select this app/program for your project?” Sample questions for the teacher included: “How did you decide to introduce this concept to the class?” “What does that mean?” Responses were recorded using AudioNote, an audio recording application, and documented in my field notes. All notes and audio files were placed into Evernote for storage.
Additionally, I used an "interview guide approach" (Patton, 1990, p. 288) to guide formal questioning. These interviews happened at two points during data collection. Questions were generated based on a series of observations of classroom instances. A sample question for the students included: “Can you tell me more about this (name of product created)?” Some sample questions for the teacher included: “During my observation I noticed…Can you tell me more about…?” A list of interview questions is located in Appendix A.

By using the interview guide approach, I ensured that I asked each student similar questions with regard to the same general topics, but also allowed for flexibility depending on the uniqueness of each conversation. I conducted the scheduled interviews with the focus students gathered in a small group. Having the interview guide I asked each student to elaborate on the questions I posed.

I also conducted interviews with individual students. I developed the questions based on my initial observations and in connection to my guiding research questions. Specifically, I sought deeper information about the literacy strategies they used, and I sought their insight on how they used digital tools. Depending on the noise and activity level within the classroom, I conducted the interviews within the classroom setting or in a nearby location (e.g., hallway). I documented my initial reactions in my reflective field notes. I transcribed all interviews as soon as possible in order to capture close details.

Documents and Documentation Review

Stake (1999) suggests that document review is similar to interviews and observations in that it provides another source of information for the researcher. During my time in the field, I gathered and retained a variety of documents including lesson plans and student work samples. I used the work samples as reference points to ask the students to articulate their meaning making
processes using digital literacies. I asked them to discuss what their products were, what they “meant” and how their products demonstrated learning in relation to the given assignments. I recorded the responses in my field notes and uploaded them into Evernote for storage (Fig. 3.6)

<table>
<thead>
<tr>
<th>Date: 6/2/15</th>
<th>Location: classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity Being Observed: Country research</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Observed Activities</th>
<th>Thoughts and Wonderings</th>
</tr>
</thead>
<tbody>
<tr>
<td>I wonder happy about having to write everything and is doing all the hands on activities. Ask she feels about doing all the writing. A strategy is so start typing in spite of it being wrong, google offers suggestions. How do you keep up with helping with newer technology while keeping everyone on track. Behavior management again. I wonder why she doesn’t use her resources? Maybe this is an issue for SWD?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>pair</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activities and Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The students are wrapping up their landmarks and presentations. looking for the final information and adry is working on the landmark. they have divided and conquered. Daydreams making stonehenge. She has the website as a reference, but isn’t really following it for accuracy despite prompting. Works hard writing and Adryana just sits and plays once she finishes. She plays for a while and then I ask her about what she’s doing. She then starts working on the Clinic Life continues to work. helping with the Promethean table. Many of the other students are playing and or semi working. dismisses and decides to start the essay. says he’s working on the presentation, but includes and few things and plays with emojis. comes over and tells them to work on the presentation. She’s look up information again instead of looking at notes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional Data:</th>
</tr>
</thead>
</table>

**Figure 3.6. Sample Evernote Page.**
Lesson plans. In order to examine the ways in which Anna incorporated and used digital literacy practices in the classroom, I reviewed her lesson plans. Lesson plans capture her instructional intentions for meeting curricular and pedagogical goals and also capture the scope and sequence of the subject areas. Lesson plans were required at the selected school site and I was able to obtain copies. I looked for evidence of planning for digital instruction across the curriculum. I also looked for whether her intentions met her observed actions. We discussed her inclusion or lack of inclusion of digital tools in lesson planning during our scheduled interviews.

Digital work samples. During the course of data collection, I acquired student-produced digital work samples (Figure 3.7). The student-produced work samples provided the evidence of which tools were used and evidence of student composition. By examining the students’ products in combination with their processes, as well as their reflection and insight, I was able to better understand how students with reading difficulties engaged in digital literacy practices and composition in the context of integrated digital literacy instruction.

Figure 3.7. Digital Work Sample
Data Organization

Multiple sources of data are useful for understanding the elements occurring simultaneously within the case study, as well as facilitate the process needed to make meaning in the complex environment of the classroom. However, an abundance of data types can lead to confusion. Once I completed data collection, I placed all interview transcripts, audio and video transcripts, observational field notes, photographs, lesson plans, and digital work samples in folders by data type in *Evernote* in chronological order (Figure 3.8). The folder system served as a method to facilitate data sorting by participant and type of data source since they were tagged accordingly. In other words, if I wanted to find all data for Bella, I could search for the word “Bella” and have access to data related to her. If I wanted to examine all transcripts of video, I could open the folder labeled “videos.” Finally, I imported all of my files into MAXQDA, a data analysis program, for continued analysis.

MAXQDA provided the tools for analysis once I had all of my data sources organized within Evernote. Unlike *Evernote*, MAXQDA is data analysis software. MAXQDA allowed me to combine the data into chronological groupings for the purpose of examining the teacher’s and students’ behaviors related to the literacy events, as well as provided analytical tools for my analysis (e.g. coding, highlighting, tagging, combining codes, creating spreadsheets). By sorting and storing the data record chronologically, I could review the data pertaining to both the teacher and the students across time. I could also isolate patterns of behavior over time.

In qualitative case studies, Dyson (2003) reminds us that "the researcher's purpose is not merely to organize data but to try to identify and gain analytic insight into the dimensions and dynamics of the phenomenon being studied" (p.81). However, in order to gain proper insight, careful organization allowed me to ensure that I captured the development of technology use over time and across individuals as they engaged in productive technologies.
Study Design and Data Analysis

My analysis of the data closely followed the design of the study in that I focused on student productive technologies situated in the context of the teacher’s instruction. I began my analysis by broadly analyzing the classroom context and the teacher’s use of technology. Then I moved in closer to focus on the benefits and barriers the technology presented for my focal students. Finally, I took an in-depth look at the composing behavior of students within the creation of productive technologies. My nested process is presented in Figure 3.9.

Phase I. In this case study, I needed to understand the larger environment as the context for student literacy learning. In the first phase of data analysis, I addressed two aspects related to my first research question: the context and content of instruction. I reviewed my data to understand the context the teacher created and the content of her instruction. Although my initial research plan was to find a teacher with transformative uses of technology, I found a teacher who used technology with limited individual interactions with students related to use. Although my expectations were high, this teacher actually represents a more typical view of classrooms in
which teachers are making efforts to integrate technology. Therefore, I looked more broadly at Anna’s work in connection to her curriculum and how her instruction resulted in student use of tools as documented by the Technology Integration Matrix (TIM).

![Diagram](image)

**Figure 3.9. Three phases of analysis moving from teacher-created context to student composing behavior**

The TIM can be used as an evaluative tool to guide the task of evaluating technology integration in the classroom. The matrix is used to illustrate how teachers can use technology, as well as understand the characteristics of the learning environment. The levels of technology integration described in the TIM range from Entry level to Transformation level. At the entry level, the teacher uses technology tools to deliver content to the students. At the transformation level, the teacher “encourages the innovative use of technology tools which facilitate higher
order learning activities that may not have been possible without the use of technology” (Teacher Descriptors Table, n.d)

The TIM provides a framework for situating technology in instructional settings while maintaining a central focus on students (Harmes, et. al., 2015). Harmes et. al. (2016) describe these levels of technology as:

*Entry level:* The teacher is using the technology tools to deliver curriculum content.

*Adoption level:* The teacher is still the decision-maker about the specifics of technology use.

*Adaption level:* The technology tools become more integrated within a larger lesson. The teacher still maintains decision-making on when to use technology tools, and students may begin exploring on their own how to best use them.

*Infusion level:* At this level, a broad range, and sufficient number, of technology tools are available to students throughout their day, the focus of instruction using technology is clearly about learning, and not about the tools themselves, and student decision-making is supported by teacher guidance.

*Transformation level:* This level is marked by student self-direction in the use of technology tools in lessons that focus on higher learning outcomes not possible without technology. The teacher’s role is to be a guide or model in the use of technology.

I used the TIM descriptions; Entry, Adoption, Adaption, Infusion, and Transformation to categorize Anna’s technology integration after each observation in an effort to distinguish which instructional events included rudimentary (Entry-level) use of technological tools and which instructional events that allowed students to engage in productive technologies (Table 3.4 and Table 3.5).
Digital Tools in the Classroom

During the time period of study, I observed core subject areas including reading, writing, math, and social studies. During my observations, I observed Anna use 5 tools and 6 different types of apps/software. For the purpose of this study, digital tools are the technological devices (e.g. computer, iPad, printers), as well as technological apps, websites, and software (e.g. Animoto, YouTube, Evernote) used to achieve curricular goals. Anna used a variety of different devices, apps, websites, and software programs. The types of devices (Table 3.4) and software (Table 3.5) are described below and how they fit within the TIM.

Devices. The International Society for Technology in Education (2015) describes the “robust and reliable access to current and emerging technologies and digital resources, with connectivity for all students, including those with special needs” as an essential condition for technology integration (p. 5). The school’s commitment to technology is evident in that they have reliable tools (i.e., computers) and sufficient bandwidth to connect to the Internet. Anna also demonstrated her commitment to technology by bringing a set of iPads she borrowed from the local university.

Document Camera. A document camera is a digital overhead projector that allows the user to project objects for an audience to see. In this classroom, the teacher placed the document camera at the front of the room and adjacent to the whiteboard. The teacher used the document camera most often during my classroom observations. She used the camera to project read aloud materials, to complete science and math workbook pages as a whole class, and to review worksheets and other materials such as notes for the students to see as a class.

Smart Board. A smart board is an interactive whiteboard that uses touch for user input. The Smart Board was permanently affixed to the wall of the classroom at the front of the room. Whereas a Smart Board is promoted as a tool for interactive learning, in this space,
Anna most often used the Smart Board as a projector screen for various activities taking place in the classroom. However, on two separate observations Anna used the Smart Board to conduct a science review and to model a math lesson. During the science review, Anna used Promethean Clickers (described below) to project the answers to various questions during the science review. During the math lesson Anna used the Smart Pens to work through problems on the Smart Board to show the students how to solve questions from their workbooks.

*Laptop Computer.* Anna’s placed her laptop computer at the front of the room. Anna used the laptop to demonstrate how to open and use a Macintosh computer. In addition to the demonstration, the teacher showed the students how to use the iMovie video editing program for one of the assigned tasks. Additionally, Anna used the laptop to review and manage the quiz questions for the math and science review when using Promethean Clickers. The students did not have laptops in the classroom. They did have access to laptop computers in the computer lab. They used these laptops during their All About Me project to access Microsoft PowerPoint, Microsoft Word, and Safari for web-based activities.

*Promethean Clickers.* Clickers are a handheld device that allows the students to actively participate via question and answer activities. Students type in a response to a teachers’ question and data is collected in real time to assess student understanding. Anna incorporated Promethean ActiveExpression® clickers to monitor student comprehension during whole class read-alouds. She stopped at various points during the reading and asked the students to answer multiple choice and short response comprehension questions. She also used the clicker in math and science reviews to assess the students’ understanding of the material being taught.

*iPad.* An iPad is a touchscreen tablet made by Apple. Anna used the iPad to show video clips on YouTube during the science review to demonstrate a concept they had studied. She also used the iPad to demonstrate how to use applications such as Comic Life. The students used the iPads an on number of occasions and for most of the classroom events.
that are featured in this dissertation. They used them to look for information on the internet, take photographs and record videos, use applications such as Comic Life, and view videos, among other activities.

**Projector.** A digital projector is a computer display that projects an enlarged image onto a screen. A projector can be attached to a computer or other electronic device in order to allow the screen to be shared.

In Table 3.4, I list each of the tools Anna used during the period of data collection. I describe the purpose of the tool, as she used it in different situations. Then I categorize her tool use based on the TIM categories.

**Table. 3.4**
Description of Teacher’s Tool Use

<table>
<thead>
<tr>
<th>Tool</th>
<th>Purpose/Use</th>
<th>Teachers Use</th>
<th>Student Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Laptop</strong></td>
<td>Demonstrate computer usage</td>
<td>X</td>
<td>Observation</td>
</tr>
<tr>
<td></td>
<td>Model: Movie and Wordie tools</td>
<td>X</td>
<td>Observation</td>
</tr>
<tr>
<td><strong>Document Camera</strong></td>
<td>Project worksheets onto the Smart Board</td>
<td>X</td>
<td>Observation</td>
</tr>
<tr>
<td><strong>Smart Board</strong></td>
<td>Project read aloud for the students to see</td>
<td>X</td>
<td>Observation / Read Along</td>
</tr>
<tr>
<td></td>
<td>Projector screen</td>
<td>X</td>
<td>Observation</td>
</tr>
<tr>
<td></td>
<td>Demonstrate math problems</td>
<td></td>
<td>Observation</td>
</tr>
<tr>
<td><strong>Clickers</strong></td>
<td>Answer multiple choice questions to gauge student understanding</td>
<td>X</td>
<td>Observation / Respond with Clicker</td>
</tr>
<tr>
<td><strong>iPad</strong></td>
<td>Model iPad camera and Comic Life use</td>
<td>X</td>
<td>Observation / Follow along</td>
</tr>
<tr>
<td></td>
<td>Show video clip from YouTube</td>
<td>X</td>
<td>Observation</td>
</tr>
</tbody>
</table>

**Applications, websites, and software.** Anna used a variety of applications, websites, and software across her instruction with the various tools.
**iMovie.** Anna utilized iMovie as an application to compose the movies they made in the “All About Me” project. She showed the students basic functions of iMovie, such as how to insert images. The students then inserted their images and music as part of the assignment.

**Word.** Anna used Word as a place to type her descriptors before inserting them into **Wordle.**

**Wordle.** Anna used **Wordle** to show the students how to make a word cloud. She demonstrated how to adjust the font size and color in order for the students to personalize their word clouds.

**Safari.** Safari served as the Internet browser when searching for information, playing a YouTube videos, finding images, and accessing websites such as YouTube and Wordle.

**YouTube.** Anna used YouTube to show the students video clips for educational purposes. One example was a video demonstrating the science concept of force.

**Camera App.** Anna utilized the camera app to show the students how to take pictures with the iPad. This allowed the students to take pictures of things in the environment or work that they drew within applications such as **Comic Life.**

**Comic Life.** **Comic Life** is an application that allows users to create comics from their own images. Anna used this application during her lesson on math vocabulary.

**PowerPoint/Keynote.** Keynote served as a place to insert images that were found on the Internet. Anna showed the students how to place images into a blank PowerPoint to later insert them into their iMovie.
In Table 3.5, I list each software application Anna used during the period of data collection. I describe the purpose of the software, as she used it in different situations. Then I categorize her instruction based on the TIM categories.

For each instance of Anna’s technology integration, I situated her use of technology along the Technology Integration Matrix. This analysis enabled me to understand the range of technology use, as well as isolate the times when she asked the students to engage in productive technology use. Using the TIM to determine the teacher’s level of technology integration, I categorized most of Anna’s technology integration as “Entry level,” (Table 3.8 and 3.9). An example of entry level integration was her use of YouTube to show a short clip related to a lesson. Additionally, Anna used replicative technology on many occasions. In other words, I am defining the situations in which the lesson could have just as easily been done without technology as “replicative” technology use.

There were several instances within the data that Anna moved beyond “Entry level” in at least one aspect of the TIM. An example was when she used iMovie to have the students create a movie about themselves. By isolating the instances in which students gained more control and flexibility with the tool or software, I was able to identify four main literacy events that served as the site of productive technologies (Table 3.6):
Table 3.5.
Description of Teacher’s Software Use

<table>
<thead>
<tr>
<th>Software</th>
<th>Purpose/Use</th>
<th>Teachers Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>iMovie</td>
<td>Model movie creation.</td>
<td>X</td>
</tr>
<tr>
<td>Word</td>
<td>Type Wordle example.</td>
<td>X</td>
</tr>
<tr>
<td>Wordle</td>
<td>Demonstrate how to make word cloud.</td>
<td>X</td>
</tr>
<tr>
<td>Safari</td>
<td>Find / Show information</td>
<td>X</td>
</tr>
<tr>
<td>YouTube</td>
<td>Show demonstrations (e.g., Science topic).</td>
<td>X</td>
</tr>
<tr>
<td>Camera App</td>
<td>Demonstrate how to take pictures.</td>
<td>X</td>
</tr>
<tr>
<td>Comic Life</td>
<td>Show students how to take and insert images and text.</td>
<td>X</td>
</tr>
<tr>
<td>Keynote / PowerPoint</td>
<td>Compile information / Present information</td>
<td>X</td>
</tr>
</tbody>
</table>

Each of these events moved beyond what the TIM describes as Entry Level, where the teacher used the technology tools to do more than deliver curriculum content. I present a detailed description of each event within the first section of chapter four, detailing the context she created and the content of her instruction. This allows for a rich understanding of the context for instruction.
Phase II. Once I isolated the four literacy events, I moved in for a closer look at the teacher’s instructional strategies and the students’ engagement in productive technologies within the digital literacy events. Given that “there is no single way to analyze qualitative data” (Coffey & Atkinson, 1996, p.2), I decided to code the student data for emergent themes. Coffey and Atkinson (1996) claimed, “the process of coding is about asking oneself questions about the data” (p. 49). In particular, I focused on reading and writing processes such as locating and reading information or writing a response to literature, and the role of digital tools within those activities.
I made analytical memos as I attempted to answer my research question, identify initial themes and make sense of my wonderings. Saldana (2009) wrote, “codes and categories are found not only in the margins or headings of transcripts or field notes – they are also embedded within analytic memos” (p. 41). I used what Saldana (2013) refers to as first and second cycle coding. Saldana (2009) writes, coding “is the transitional process between data collection and more extensive data analysis” (p. 4). He defined a code as “most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” (p. 3). Below, I describe my first and second cycle coding methods in more detail. I used this process in order to categorize and refine my data to find salient themes from the data.

First Cycle Coding

Based on the variety of interviews, observations, audio and video transcripts, and products created from the four isolated events, I completed first cycle coding using: description, process, and InVivo codes within MAXQDA. I identified codes from the literature in the field, emergent understanding of the data, and the research questions.

Saldana (2009) defines descriptive codes as a “word or short phrase – most often as a noun – the basic topic of a passage of qualitative data” (p. 70). One example of this type of code was peer as resource. A process code “uses gerunds (‘-ing’ words) exclusively to connote action in the data” (p. 77). For example, avoiding technology and hiding with technology demonstrates this type of code. Finally, InVivo code “refers to a word or short phrase from the actual language found in the qualitative data record” (Saldana, 2009, p. 74). Technology is hard is one example of this type of code. A full list of codes can be found in Appendix B. The previous examples
from the data that I mentioned above were all related to the focal students. I engaged in a parallel process with the data related to the teacher’s use of digital literacies.

**Second Cycle Coding**

“The primary goal during Second Cycle coding, if needed, is to develop a sense of categorical, thematic, conceptual, and/or theoretical organization from First Cycle code” (Saldana, 2009, p. 148). For the next step in the process, I moved from open codes into a process of determining how those initial codes related to one another in connection to the literature in fields of special education and literacy. I made analytical memos and notes to identify categories. Corbin and Strauss (1990) state, “axial coding puts those data back together in new ways by making connections between a category and its subcategories” (p. 97). It is important to understand, “though open and axial coding are distinct analytic procedures, when the researcher is actually engaged in analysis he or she alternates between the two modes” (Strauss & Corbin, 1990, p. 98). Ongoing analysis with the data led to various changes to the names, types, and number of codes.

The final set of codes shown in Table 3.7 are the major codes and related subcodes, which address my inquiry into the teacher’s instructional strategies.

The final set of codes shown in Table 3.8 and 3.9 are the major codes and related subcodes, which address my inquiry into students with literacy-related learning difficulties engaged in productive technologies.
## Table 3.7

**Second Cycle: Teacher’s Instructional Strategies**

<table>
<thead>
<tr>
<th>Major Codes</th>
<th>Description</th>
<th>Sub Codes and Number of Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model with Mentor Text</strong></td>
<td>Instances in which Anna modeled how to use a tool by creating her own product. For example, in creating the Wordle, she made a sample list of words about herself on the board.</td>
<td>Model Care (2) Model Use (2) Demonstration (3) Model Tell (2)</td>
</tr>
<tr>
<td><strong>Commingling Directions for Successive Navigation</strong></td>
<td>Instances in which Anna provided a series of directions that required students’ procedural adherence for successful navigation.</td>
<td>List of directions (5)</td>
</tr>
<tr>
<td><strong>Check-in</strong></td>
<td>Instances in which Anna provided individual instruction by serving as a point of check in for the students.</td>
<td>Anna circulated (3) I’ll be at my desk (2)</td>
</tr>
<tr>
<td><strong>Telling – Not Touching</strong></td>
<td>Instances in which Anna provided verbal instructions about tool use but students were not allowed to touch.</td>
<td>Presents to do list (1) No example – just description (1) Telling (2)</td>
</tr>
<tr>
<td><strong>Paper/Pencil Support for Tool Use</strong></td>
<td>Instances in which Anna used paper/pencil tasks as the “thinking” space for literacy skills necessary in tool use.</td>
<td>Worksheet (1) Keep tally marks (1) Write list (1) Write information (1) Write essay (1) Extra step (5)</td>
</tr>
<tr>
<td><strong>Bells &amp; Whistles</strong></td>
<td>Instances in which Anna focused on advanced features of a tool.</td>
<td></td>
</tr>
<tr>
<td><strong>Tool Vocabulary</strong></td>
<td>Instances in which Anna used digital vocabulary.</td>
<td>Tool vocab (11)</td>
</tr>
</tbody>
</table>

86
Table 3.7 (continued)

<table>
<thead>
<tr>
<th>Major Codes</th>
<th>Description</th>
<th>Sub Codes and Number of Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Go explore”</td>
<td>Instances in which Anna allowed students to select a tool of choice.</td>
<td>“Can’t help all at the same time” (1) Go Explore (3)</td>
</tr>
<tr>
<td>Technology as a Tool for Behavior Modification</td>
<td>Instances in which Anna rewarded or punished students for behaviors associated with learning to use technology.</td>
<td>Listen (2) Hold it (2) Not going to work (1) I’m waiting (2) Lose a shell (4)</td>
</tr>
</tbody>
</table>

Table 3.8

Second Cycle: Perceived Benefits of Digital Literacies Instruction for Students with Literacy-Related Learning Difficulties

<table>
<thead>
<tr>
<th>Major Codes</th>
<th>Description</th>
<th>Sub Codes and Number of Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistence and Motivation</td>
<td>Instances when students continued to work, even when it was difficult, despite previous challenges with the material</td>
<td>Does work when required to (1) Technology isn't considered work (1) Technology is motivating (2) Persistence (2) Peer encouragement (1) Demonstrate topic knowledge/competence (7) Demonstrates competence / isn't recognized by peer (5) Division of labor / playing to strength (1) Turns into expert (3)</td>
</tr>
<tr>
<td>Turns into Expert</td>
<td>Opportunities for students to serve as the knowledgeable other with the infusion of technology</td>
<td>Knows how to use resources (2) Knowledge of content (2) Technology knowledge (2)</td>
</tr>
</tbody>
</table>
Table 3.8 (continued)

<table>
<thead>
<tr>
<th>MAJOR CODES</th>
<th>Description</th>
<th>Sub Codes and Number of Instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROVIDES ADDITIONAL RESOURCES</td>
<td>Technological tools served to provide additional resources</td>
<td>Technology as resource (1) Using a resource (2)</td>
</tr>
</tbody>
</table>

Table 3.9
Second Cycle: Perceived Barriers of Digital Literacies Instruction for Students with Literacy-Related Learning Difficulties

<table>
<thead>
<tr>
<th>MAJOR CODES</th>
<th>DESCRIPTION</th>
<th>SUB CODES AND NUMBER OF INSTANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDIVIDUAL ACCOUNTABILITY</td>
<td>Inability to accurately measure a participant’s contribution to the task; particularly with partner work.</td>
<td>Equal Partnership (1) Overshadowed by higher achieving peer (6) Seeks peer reassurance (1) Defers to &quot;knowledgeable other&quot; (3) Peer as resource (8) Peer as reference (1) Task completion (2) Relinquishes control (1)</td>
</tr>
<tr>
<td>HIDING WITH TECHNOLOGY</td>
<td>Times when students were able to appear on task or on target with assigned tasks</td>
<td>Lets higher achieving peer do the work (4) Relies on higher achieving student (8) Hiding with technology (1) avoiding writing (6) Off task behavior (9)</td>
</tr>
<tr>
<td>TECHNOLOGY IS HARD</td>
<td>Aspects that make working with technology more difficult than more traditional literacies.</td>
<td>Pictures are ok, typing is not Technology is hard Avoiding technology (3) Writing is overwhelming (2) Technology is overwhelming (2) frustrated with technology (4)</td>
</tr>
<tr>
<td>INACCURACY OF INFORMATION</td>
<td>Information that does not accurately reflect what is needed for the required task.</td>
<td>Accuracy of information (4) Accuracy (5) Trouble spelling (1) Inaccuracy (3)</td>
</tr>
</tbody>
</table>
Phase III. During the third phase of analysis, I addressed my final research question: How did students with literacy-related reading difficulties compose during digital literacy events? After the second phase of data analysis, in which I began to notice patterns within the data that signal both benefits and barriers to integrated digital literacies instruction, students also exhibited difficulty with composing tasks.

Troia (2006) described the characteristics of students with learning disabilities writing products and processes. The four characteristics he describes are planning, content generation, revising, and text transcription. Although Troia’s work was not within a digital environment, the characteristic he described were similar to those my focal participants experienced with composing with technological tools. In order to move in to take a close look at their composing behaviors, I used Troia’s (2006) characteristics of writing products created by students with learning disabilities (planning, content generation, revising, and text transcription) as a priori codes. I revisited my transcripts and observational notes to look for evidence of these characteristics in order to describe them within a digital literacies environment. Based on Troia’s description of those four characteristics, I reread and coded my data for instances of students “struggling” with composing as described by Troia (2006) within the context of integrated digital literacy instruction. The characteristic, description, and number of instances these occurred within my data can be found in Table 3.10. Within chapter 4 I discuss each characteristic and provide examples from the data of struggling to compose with productive technologies within the digital environment.
Table 3.10
Description of Troia’s (2006) Characteristic and Instances of Occurrence within the Data

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>DESCRIPTION</th>
<th>NUMBER OF INSTANCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANNING</td>
<td>Instances of time spent planning for writing</td>
<td>11</td>
</tr>
<tr>
<td>CONSTRAINED CONTENT GENERATION</td>
<td>Content contained within student writing</td>
<td>35</td>
</tr>
<tr>
<td>LIMITED REVISION</td>
<td>Evidence of revision during the process of writing</td>
<td>16</td>
</tr>
<tr>
<td>POOR TRANSCRIPTION</td>
<td>Mechanics of turning content into written text</td>
<td>22</td>
</tr>
</tbody>
</table>

Trustworthiness and Credibility

Issues of trustworthiness and credibility within the qualitative research paradigm are related to the rigor in the methods, data collection, and researcher quality (Patton, 2002). Lincoln and Guba (1985) suggest that trustworthiness of a study is important to evaluating its worth by establishing credibility, transferability, dependability, and confirmability. Efforts to enhance the trustworthiness of this research study are detailed below.

Credibility pertains to the issue of the researcher providing a match between the respondents’ view of their life and the researcher’s reconstruction and representation of that reality (Schwandt, Lincoln, & Guba, 2007).

Extended Engagement. It is important to spend adequate time in the field in order for the research to address all of the outlined research questions (Stake, 1999). I spent 6 weeks in the field and had over 100 hours in the field between observations and interviews. I observed all instances of classroom instruction in order to appreciate and understand the context of the research study and draw accurate conclusions.
**Persistent Observation.** Lincoln and Guba (1985) suggest persistent observation in order to identify characteristics that are most relevant to issues being pursued and concentrating on them in detail. “If prolonged engagement provides scope, persistent observation provides depth” (Lincoln & Guba, 1985, p. 304). In combination with extended engagement, I was able to spend time enough time in the classroom setting to hone in on aspects of interest to the study and collect rich data for analysis. My extended engagement mirrored the amount of time Anna served as these students’ teacher. By observing her from the beginning to the end of her teaching contract allowed me to recognize information-rich participants and observe them at length.

**Peer Debriefing.** Triangulation involves the process of confirmation, and Stake (1999) suggests that an outside source can be consulted in order to confirm meaning (Figure 3.7). Through the process of peer review, I solicited two colleagues who are familiar with my area of research and interested in my research topic to discuss interpretations as I worked through my layers of data analysis. The purpose is “not to seek consensus, but to understand multiple ways of seeing the data” (Patton, 1999). I shared samples of my transcripts, codes, and meaning making, and they questioned my insights and facilitated deeper meaning through conversations about my data (Figure 3.10). One example from the figure below demonstrates the types of questions they asked and feedback I received during the peer debriefing process. This discussion occurred using WordPress, an online blogging platform. The blog was private and password protected.
Figure 3.10. Example of peer debriefing

**Member-checking.** Another process to enhance the trustworthiness of the research study will be through the process of member checking (Mcmillan & Schmacher, 2014). When discussing member checking, Stake (1999) describes the process as “the actor is requested to examine rough drafts of writing where the actions or words of the actors are featured, sometimes when first written up but usually when no further data will be collected from him or her” (p.115). In this study, I involved the teacher and students in the process of interpretation. For the students, this occurred at school site visits during scheduled interviews towards the end of my time in the field. I shared my initial understanding and asked the participants to provide their insight. Specifically, I shared my emerging answers to each research question and asked the participants to confirm or disconfirm my interpretations of their digital literacy practices.
With the teacher, I utilized an electronic means of member checking. I set up a blog that allowed us to communicate (Figure 3.11). I would post my reflection of the day in the field, ask clarifying questions, and share my initial thoughts about the data. My blog posts would allow her to respond with the answers to my questions and clarifying information. There were times when the teacher did not respond to my blog, but I made every effort to encourage her to engage in the process. The blog is private and password protected.

Figure 3.11. Example of member checking
Transferability

Transferability deals with the issue of generalization in terms of case-to-case transfer (Schwandt, 2007). The researcher must provide the reader with enough information on the case studied in a way that readers can establish the degree of similarity between the case studied and the case to which the findings might be transferred.

**Thick description.** Guba (1984) suggests a full description of all the contextual factors impinging on the inquiry, providing a thick description of the context. Although case study research is not concerned with generalizations, a thick description can help readers understand the context of the current study in order understand “something else” (Stake, 1995, p.3).

Dependability

Dependability is the process of the inquiry and the inquirer's responsibility for ensuring that the process was logical, traceable, and documented.

**Inquiry Audit.** From the interpretive tradition, there is no objective reality to be known. I did not feel that an external audit would be important to my current work, as it relies on the assumption that there is a fixed notion of “truth.” However, I did consult with a colleague informally to summarize my preliminary findings and received feedback regarding my initial interpretations.

Confirmability

Confirmability is concerned with establishing the fact that the data and interpretations of an inquiry were not made up in the inquirer’s mind (Schwandt, 2014). The research must link assertions, findings, interpretations, and so on to the data themselves in evident ways.

**Triangulation.** One aspect of triangulation is the process of collecting data from multiple sources in order to have a more accurate picture of what is occurring in the data and thus to
remain less biased (Lichtman, 2013). The process of triangulation supports the researcher in a deeper understanding of the case. Stake (1999) discusses that commonsense does not take us far enough in our search for accuracy in our explanations. The multiple data sources (e.g. observations, interviews, and documents) and their examination provided a variety of points upon which to confirm my interpretation (Figure 3.12).

![Figure 3.12. Triangulation of methods](image)

**Reflexivity.** Stake (1995) suggests a reflective process be employed throughout the development of the study. In an effort to document and ensure rigor, a chronological log of the research process was carefully documented to provide transparency of findings and a clear audit trail (Merriam, 2009). The reflexive journal also served as a resource to document responses to conversations and observations (thoughts, ideas, questions) and helped process preliminary analyses through reflective field notes (Figure 3.13). For example, time spent documenting in my reflexive journal led me to refine my research questions and focus for the following observation. In addition, I used the reflexive journal to document researcher subjectivity, as well as my presence in the research (Cole, & Knowles, 2001). I wrote in the journal after every day spent in the field. The process of daily writing while involved in the process of research provided an
opportunity for reflection, leading to deeper understanding of the research being conducted. I used the data from my journal to discuss the things I have learned and how this process has shaped me as a researcher. The blog was private and password protected.

Figure 3.13. Example of reflective journal

Ethical Considerations

Ethical concerns related to the participants in my study were scrutinized and addressed according to the Human Research Protection Program and the University of South Florida. I respected the privacy of all participants and all identifiable information was kept confidential in a secured location. I included a statement of confidentiality du
ring my initial interviews to convey an “an ethical commitment not to release results in a way that any individual’s responses can be identified as their own” (Dillman, 2014, p. 163).

Summary

To summarize, I investigated how students with literacy-related learning difficulties engaged with productive technologies in an elementary classroom. This study is set within the environment and context the teacher created, with a focus on the close investigation of student responses to her use of integrated digital literacies for instruction. I collected multiple data types to increase confidence and reliability of the research. Through multiple phases of analysis, I gained an understanding of the classroom context, the digital literacies the teacher used, and the students’ response to that instruction. Based on this analysis, in chapter 4, I first present a contextual analysis of the classroom environment the teacher created, as well as an analysis of her instructional strategies. I then present an in depth look at the perceived benefits and barriers with the use of productive technologies, as well as the challenges to composing students with literacy-related difficulties experienced.
CHAPTER FOUR:

FINDINGS

In this study I examined how students with literacy-related learning difficulties engaged in digital literacy practices in the context of integrated digital literacy instruction. Specifically, I observed the ways students with literacy-related learning difficulties engage with productive technologies.

The following questions guided my observations:

1. What was the context, content, and structure of the teacher’s technology instruction in this class?

2. What are the benefits and barriers of the engagement in productive technologies for students with literacy-related learning difficulties?

3. How did students with literacy-related learning difficulties compose during digital literacy events?

I begin this chapter with the presentation of data that represents my analysis of the teacher’s classroom context, the content of her instruction, and the structure of her technology integration. Then I focus on the students who experienced literacy-related learning difficulties. After identifying the situations in which they engaged in productive technologies, I examined the benefits and barriers of such engagement. Finally, I end the chapter with a close examination of the ways in which students composed digital products.
Four Digital Literacy Events as Sites of Student Enactment

A literacy event is “any occasion in which a piece of writing is integral to the nature of the participants’ interactions and their interpretive processes” (Heath, 1982, p. 93). I used the term digital literacy events as a categorical structure for examining the forms and functions of oral and written language used during activities designated as literacy events in which digital tools have a role. Because the purpose of the study was to investigate how students with reading difficulties engaged in digital literacy practices in the context of integrated digital literacy instruction, I used the construct of digital literacy events as the site of student enactment in response to instruction.

The digital literacy events I identified (See Table 3.6) and present below are the classroom literacy events in which the students were engaged with digital tools that required the use of ‘productive technologies.’ These events allowed me to view the student’s interactions and their processes with the digital tools within the context that the teacher created. In the following sections, I provide a narrative of the instructional context framing these events, a description Anna’s instructional strategies, and then a discussion of my interpretations of the instructional context across the highlighted event.

As I described in Chapter Three, I wanted to understand the context that the teacher created through her integration of technological tools in productive ways. Using the Technology Integration Matrix (TIM) to organize the data I collected on the classroom events that took place during my period of observation, I constructed four literacy events in which the teacher integrated technology into classroom learning that moved beyond “entry level” experiences. The four literacy events are titled: 1.) Categorizing Math Shapes to Reinforce Vocabulary Using
Storytelling Tools; 2.) All About Me Autobiographies as Genre Study Using Multimodal Composing Tools; 3.) Literary Analysis and Novel Study of Stowaway Using Storytelling Tools; and 4.) Country Research. In the following section, I will provide a narrative of the instructional context within these events, describe Anna’s instructional strategies, and then I provide my interpretation of the instructional environment across the four highlighted events.

**Instructional Context**

Important to the instructional context is the physical environment of Anna’s classroom and the available tools within it. The TIM provided a way to view the instructional context created by the teacher and in which the instruction took place. Each cell represents the interdependent characteristics of the learning environment, with the underlying attributes demonstrating a “progression of pedagogical change across the levels of technology” (Harmes et. al., 2016, p. 144). I present the physical environment and the grouping structures Anna used during her instruction. The upper left portion of the table (Fig. 4.1) is characterized by teacher ownership of learning, procedural understandings, and instructional focus on the tool, whereas the bottom right portion of the table is characterized by student ownership of learning, conceptual understanding, and instructional focus on the content (Harmes et. al., 2016).

**Classroom Space and Setting Descriptors.** The classroom was set up with the students sitting together in small groups of 4 to 5 students in the center of the room (Figure 4.2). The students were in these small groups for lesson presentations, and most teacher instruction, and (as shown) for testing situations. The TIM provides a table of instructional setting descriptors. The majority of the time the students were in what the TIM (2009) describes as a setting that allows for the possibility of group work, and at least some collaborative technology tools are available. (see Figure 4.1)
### TIM: Table of Instructional Setting Descriptors

This table contains the instructional setting descriptors for each cell of the Technology Integration Matrix (TIM).

<table>
<thead>
<tr>
<th>ENTRY</th>
<th>ADOPTION</th>
<th>ADAPTATION</th>
<th>INFUSION</th>
<th>TRANSFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVE</td>
<td>The setting is arranged for direct instruction and individual seat work. The students may have very limited and regulated access to the technology resources.</td>
<td>The setting is arranged for direct instruction and individual seat work.</td>
<td>Technology tools are available on a regular basis.</td>
<td>The arrangement of the setting is flexible and varied, allowing different kinds of self-directed learning activities supported by various technologies, including robust access to online resources for all students simultaneously.</td>
</tr>
<tr>
<td>COLLABORATIVE</td>
<td>The setting is arranged for direct instruction and individual seat work.</td>
<td>The setting allows for the possibility of group work, and at least some collaborative technology tools are available.</td>
<td>Desks and workstations are arranged so that multiple students can access technology tools simultaneously.</td>
<td>Technology tools that allow for collaboration are permanently located in the setting and are available in sufficient quantities to meet the needs of all students.</td>
</tr>
<tr>
<td>CONSTRUCTIVE</td>
<td>The setting is arranged so that all students can view the teacher’s presentation.</td>
<td>Technology tools that allow for building knowledge are available to students for conventional uses on a limited basis.</td>
<td>Technology tools that facilitate the construction of meaning are available to students for conventional uses.</td>
<td>Technology tools in this setting connect to text, voice, and video chat applications and network access has sufficient bandwidth to support the use of these technologies for all students simultaneously.</td>
</tr>
<tr>
<td>AUTHENTIC</td>
<td>Resources available via technology in the instructional setting include primarily textbook supplementary material and reference books or websites, such as encyclopedias.</td>
<td>The setting includes access to information about community and world events and primary source materials.</td>
<td>The setting includes access to information outside of school and primary source materials.</td>
<td>The setting includes technology tools and online resources that allow for student engagement with the local or global communities. A variety of technology tools are available with robust access for all students simultaneously to information outside of the school and primary source materials.</td>
</tr>
<tr>
<td>GOAL-DIRECTED</td>
<td>The setting includes access to skills building websites and applications, including the ability to track student progress across levels.</td>
<td>The setting includes access to technology tools that allow students to plan, monitor, and evaluate their work.</td>
<td>The setting includes access to technology tools such as graphic organizers, calendars, spreadsheet software, and timeline software for planning, monitoring progress, and evaluating outcomes.</td>
<td>The setting includes access to a wide variety of technology tools and robust access to online resources for all students simultaneously.</td>
</tr>
</tbody>
</table>

---

**Figure 4.1. TIM Instructional Setting Descriptors.**
On occasion, when Anna instructed the students to work on their group tasks, the instructional environment shifted to *collaborative infusion*, defined by the TIM as a situation inclusive of “technology tools that allow for collaboration [and] are permanently located in the setting and are available in sufficient quantities to meet the needs of all students” (TIM, 2009). In these instances, the teacher allowed the students to move around to work together and passed out iPads for the students to use, as well as use the classroom computers.

**Digital Literacy Event One: Categorizing Math Shapes to Reinforce Vocabulary Using Storytelling Tools**

Anna introduced Geometric shapes as part of a lesson on angles (See Lesson Plan in Appendix C). During this event, Anna wanted the students to create posters in which they categorized shapes and identified geometric features using disciplinary vocabulary. As described in excerpts of her instructions (see below), Anna intended for the students to create the posters using an app called *Comic Life*. She selected *Comic Life* because it allowed the students to insert
images of shapes found in their environment. Anna wanted them to label the shapes using disciplinary vocabulary (e.g., hexagon, decagon) learned the previous day.

**Learning environment.** At this point in the lesson, the students were seated in their assigned seats in groups of 4 to 5 students. The iPads were in the teacher’s possession and the students were waiting for her instruction. Once she described the intended activity and how to use the iPads, Anna asked the students to line up to go outside with their iPad. After a designated amount of time, the students returned to the classroom to compose their images and their math vocabulary with *Comic Life*.

**Situating the lesson within the TIM.** I categorized the Math Shapes event at the *Adaption level* for technology integration in a collaborative learning environment. The TIM (Harmes, 2016) describes the Adaption level as when “the teacher provides opportunities for students to use technology to work with others. The teacher selected and provided technology tools for students to use in collaborative ways and encourages students to begin exploring the use of these tools.” (p. 153). Once Anna explained how to use the program, the students set to work with their partners to complete a comic of their math vocabulary. While the students worked with their partners, Anna was available to them to help them with any aspect of the project and check their work for accuracy and completeness.

**Digital literacy instruction and content integration.** Since this particular lesson was one of the first instances of Anna introducing technology to the class, she spent some time with the rules and expectations of appropriate handling of the equipment. Anna began the lesson by telling the students she was going to give each pair an iPad for a math lesson. She gave the students instruction of how to hold the iPad, rules for using the iPad, and how to access various features of the programs she wanted the students to use.
Anna: *(standing in the front of the room giving a demonstration at the white board, with a stack of iPads sitting in front of her)* I need you to make sure you are not running. You cannot run with the iPad. And I need to make sure you are holding the iPad with two hands *(demonstrating how to hold the iPad)* because I don’t want you to be throwing it around with one and drop it and get broken. Do we know how to take pictures or do you want me to show you? *(Various students respond at the same time.)*

Devon: I think I know how.

Another Student: No, we don’t.

Anna asked the students if they knew how to use the camera on the iPad. She assumes that students are going to be honest in front of their classmates about their lack of knowledge by posing the question instead of having them demonstrate their knowledge. The students’ responses demonstrate various levels of experience; some say yes, while others respond that they do not know. In response, Anna quickly shows them how to open up the app and take a picture.

Anna: *(picks up an iPad and holds it up for the students to see)* You go to the picture app and there is a circular button on the bottom. When you get to the right area then you click the button. *(several students are chatting while she is demonstrating how to open the camera app)* I need you to listen. On this iPad right here there is a folder called Photography. Inside Photography is the camera. Then if I want to take a picture...

Student: *(interrupting)* Are we allowed to use selfies?

Anna: No. *(student moaning as she continues her explanation)* You know you can tap it to make it focus. Pops up a little box and you can take a picture *(The students make ohhhs and ahhhs and begin to chat amongst themselves)* Okay, so.... Are we listening? Yellow table are we listening?

In an instance of Telling – And Showing, Anna’s quick demonstration of the camera app relies on students’ skills of observation and memory. She also assumes the students have familiarity with iPad navigation buttons and screens since the students were not in possession of the iPad yet. After discussing how to properly care for the iPad, Anna continued to explain they would be going outside to take pictures.
Anna: So, the things you are going to be looking for outside are triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons, nonagons, and decagons - those are the things you are taking pictures of. You are gonna get one of these *(holds up a worksheet to show the students)* and one iPad per group. So, one person is going to be taking a pencil and you need to do tallies underneath as you find each one. I want no more than 5 of each. No more than five triangles. No more than five quadrilaterals. But you are trying to find some to go in each category. As you are taking pictures, maybe even talking with your partner, mark [on your worksheet] if they [the shapes] are regular or not regular. Okay? You remember that from yesterday? What is regular and what is not regular? Bella?

Bella: *(responding to the question)* Regular is when all sides are the same. Irregular is when they are not.

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**Figure 4.3 Worksheet used to keep track of the math shapes.**

Anna verbally reviewed the disciplinary terms, with minimal elaboration about the regularity of the shapes. She required the students to use a worksheet (Figure 4.3) to keep track of what they
would find outside, using a digital device for taking the pictures and a corresponding paper/pencil task for accountability.

Anna: (she continues with her instructions) Each group [of two] needs a pencil. I will give you an iPad. (the students start to partner up and begin to chat.) This is not going to work. Cause I asked you to find a partner silently and there was talking. And then everyone had a partner and I was trying to give directions again and now there is still talking. (The students quiet down as they can see that Anna is irritated with the talking) I need one person from each group to come get one of these (referring to the worksheet). And another person to come get an iPad. (using her hands to show them where to stand) Two lines. If you are a group of three, then one person doesn’t need to be in line. (The students begin to line up. She looks at the first person in line.) Where’s your partner? Nope, find your partner and get in line.

Student: We have to be in line together?

Anna: Yep. (starts passing out papers and iPads)

Anna: If you can hear me say shush. (the students respond with SHHHH) We’re going to go outside. We’re not going to run. You have to be able to see me. I have to be able to see you. We’re going to walk to the court and we’re going to walk back. Okay, let’s go. [Directions iPad and Math Shapes 5.7.15]

When the students went outside, I took turns observing my focal participants as they searched for shapes around the school to complete the assignment. Bella and Ariana walked around outside looking for shapes. They would argue at times related to which shapes they needed and which shapes were regular or irregular. Both girls wanted to control the iPad, so the compromised by taking turns. After the students came back into the classroom, they switched which partner controlled the iPad as instructed.
Figure 4.4. Ariana and Bella recording notes on paper

Figure 4.5. Regular shape example page from Comic Life
Once they were all seated, Anna connected her iPad to the projector and showed the students the app *Comic Life*. She asked the students to put down their iPads and follow along. In the following excerpt, she explained the process for completing the assignment. Specifically, the students went outside to gather data and now they needed to categorize the images using an app which would enable them to separate the images based on regularity (See Figure 4.5) or irregularity (See Figure 4.6).

![Figure 4.6. “Not regular” shape example page from Comic Life.](image)

Anna: *(sitting at the front of the room with the iPad projected onto the board, the students are all seated individually)* Okay so once you open *Comic Life*, it brings you to this right here *(the students can see the iPad screens as she makes choices)* where you are choosing your template. I don’t care which one you chose. You can choose whichever one you want. I’m going to pick this one right here *(she touches one of the templates in the app)*. So, if I click on the plus it brings me where you can add photos. All of those boxes you can put photos in *(referring to...*
the boxes in the template). If I click on the page and click template, I can add a new template. You need to decide how many regular shapes you found and how many not regular shapes you found and make one comic page for regular shapes and one comic page for not regular shapes. So, if you have a lot of regular shapes maybe you want to use this one that has six.

Student 1: (student raises his hand to ask a question) So what if we have more than six?

Student 2: Which one do we choose?

Anna: (Continuing on with her instructions) You choose. You don’t even have to use this template. You choose. (The students begin to chatter amongst themselves)

To show the students how to use the app, Anna plugged in her iPad to the projector for all students to see the screen. For those unfamiliar with how iPads project, it is important to recognize that the students could not see which buttons Anna selected or how her fingers touched the screen. Unlike a document camera, in which the audience can see what the teacher’s hands are doing, when Anna used the iPad, her hand motions were not visible. Therefore, when she told the students to choose a template and select the plus, she comingled directions for successive navigations that accomplish different purposes. As a result, the students are confused, and they begin to consult with each other, but Anna continues to provide additional directions.

Anna: I need you to be listening. I didn’t tell you to get started so your iPad should be on the desk and your eyes on the board. Ariana we are waiting. iPad down. Eyes up. (She gets their attention once again and directs their attention to her demonstration) If you look down at the bottom of the iPad. My iPad. You can drag lettering up here. So, you’re going to use lettering to tell me if it’s a triangle
or a quadrilateral (she shows the students how to add a label). Or maybe at the top of the page you’re going to label it regular or not regular. If you need to add more pages, if you have more regular shapes than just six, then you can add more than one page. Make sure you are labeling so I know what everything is. You can use the call up boxes or letters or a text box. However, you want to do it. (She notices a student with his hand in the air.) John?

Student 3: Something weird is happening with our iPad.

Anna: Okay, I can come look at it. Any questions about what we are doing? Noah?

Student 4: How do you add text to the comic page?

Anna: You open Comic Life and then you click on the extra paper right there. The extra page. And then you choose template and then you choose the page that you want.

Student 5: How do we, mine is so far…

Anna: (She interrupts the student.) You have to continue to the next slide, but you shouldn’t be doing that yet because we are doing directions. I need the iPad to stay flat on the table, not flat on your lap, flat on the table. Okay, you can get started. (Directions Comic Life Math Shapes 5.7.15)

Based on the students’ questions about navigation, it is clear that they were not familiar with the app. In addition, Anna’s directions-without-touching did not provide the scaffolding they needed to use the app. Again, Anna expected the students to rely on their memory of her directions because she did not allow the students to emulate her modeling as she navigated the screens “iPad down. Eyes up.”
Digital Literacy Event Two: All About Me Autobiographies as Genre Study Using Multimodal Composing Tools

Anna designed a series of lessons to teach the genre of autobiography as she introduced the students to a variety of technology within one project. This project was segmented into various phases across several days to include a Wordle, a collage, and an iMovie.

Learning environment. The learning environment varied during this project since the assignments occurred over the course of several weeks. To begin, Anna introduced the students to the concept of a Wordle in the classroom (Fig 4.8). Anna demonstrated how to create a Wordle while the students observed from their assigned seats. Once she described the process, Anna took the students to the computer lab to make their Wordle on the school’s laptops. Each
student worked individually on a school assigned laptop. The remainder of the sessions for this event occurred in the computer lab.

**Situating the lesson within the TIM.** Over the course of time spent on this literacy project, Anna demonstrated how to use the various tools and applications for the students. Then, she provided the students with the tools and time for them to create. She let them “go play” in order to complete their assignment. The students used Anna, as well as their peers, as sources of help during their project completion. The TIM (Harmes, et al., 2016) describes this as the Adaptation level in which the teacher provides an “opportunity for students to use technology to work with others” and that “the teacher selects and provides technology tools for students to use in collaborative ways and encourages students to begin exploring the use of these tools” (p. 153).

Ariana, Bella, and Devon sat next to each other in the computer lab. The students worked independently through the steps in creating their iMovie. Anna answered questions the students had during this time. She walked around the computer lab to check in or positioned herself in the front of the room to answer questions.

**Digital literacy instruction and content integration.** The purpose of this series of events was for students to learn how to create an autobiography in combination with learning a variety of multimodal composing tools. Anna introduced the topic by explaining that the students were going to create an autobiography within iMovie. She laid out specific elements the students needed to include. She then began the process by introducing Wordle (Fig. 4.9).

Anna: *(posing a question to the class)* Do you know what a Wordle is?
Morgan: *(raises her hand in response to the question)* When I turned 10 my parents made me one.
Anna: *(responding to Morgan)* Have you ever made one?
Morgan: No
Mara: *(acting shocked)* You haven’t?
Bella: I haven’t ever heard of one.
Student: *(from somewhere in the back of the class a student shouts out)* What’s a Wordle?
Anna: I’m going to show you, but I’m waiting for everyone to listen. I know this is exciting, but I need you to listen now so when we get to the computer lab you’ll know what we are supposed to be doing. *(The students begin to quiet, and Anna continues her explanation. She starts to type in the web address on her computer that is projected onto the white board.)* So, we are going to Wordle.net

Student behavior was an important element of Anna’s pedagogical process. She continually monitored students to determine if they were paying attention by looking at her and watching her demonstration. Anna also used the iPad as an incentive to listen and follow instructions.

*Figure 4.8. Wordle instructions*
Student: *(shouts out excitedly)* Are we going to make ourselves one?
Anna: We’re going to make ourselves one. And that’s why you are making words on your paper
Student: *(seemingly confused)* What, but, are we going to do for what we look like?
Anna: You don’t even have to do that one. But I thought maybe you would want to put your hair color or your eye color. It can be anything you want it to be. If you decide the words you started with are not words that you want, if you want to take something off or add something you can, but you don’t have to.
Student: *(shouting out with some confusion and holding up his list of words he had written)* What do we need these words for?
Anna: Those are going to be your Wordle words. *(Demonstrating what she is saying on her computer while she talks)* So when you get to wordle.net, you are going to advanced and it gives you this box right here. *(she points to the box on the projection of the screen)* If you want this box to be bigger you can click on this bottom corner and drag it bigger you can see what you are typing. So, these are the examples they are giving you. For each word you have to put the word, and this is like the font size - how big you want it to be. So, if I’m doing blue eyes maybe I want that to be pretty small. If 100 is my biggest, maybe I want it to be 50. *(She notices a student has a question)* Morgan?
Morgan: Are we doing this today?
Anna: If we have time. *(Another student mentions the poem is first)*. Yep, your poem first. The Wordle is second. *(continues on with her explanation)* Maybe I’m going to do…. blonde hair, and maybe I want it to be 60.
Student: *(A student calls out)* I’m confused. I don’t get it. I don’t get the numbers.
Anna: The number is the size it’s going to be. So how much you like it. 100 is love it love it love it. Can’t live without it. Like loves technology. Loves technology is going to be 100.
Student: *(understanding what she means now)* Oh!
Anna: The more sizes you have the more sizes you are going to have in your words.
Student: Oh! The more you like it the bigger it is?
Anna: The more you like it the bigger it’s going to be. Right. Let 100 be your biggest. Don’t go bigger than 100.

Student: (Confused by why he has to write and then type, another student seeks clarification.) I don’t get why we have to write down the 25 words.

The students again demonstrate various levels of familiarity with tool Anna presented. Anna demonstrates how to use the technology by standing at the front of the room and modeling. Having the students write down the list of words and then put it into Wordle is the most expedient use of the tool, but she is met with resistance by the comment “I don’t get why we have to write down” the words. In this instance, Anna is using paper/pencil literacy to support or supply text for the digital tool. Anna asks for students to think outside of the digital space and to use the app for enhanced visual presentation.

Anna: So, it’s easier to type up when we get there and you’re not thinking.

Student: This is what you’re going to write down.

Anna: Yeah. So, I have so far blue-eyed is a 50, blonde hair is a 60, loves technology is 100, and sisters, I kinda like them a little bit, so 75. Once you have all 25 in there. (She notices that someone else has a hand raised.) You have a question now or can it wait?

Student: Uhm, it can wait.

Anna: I need you to listen. It’s time for us to be going but we aren’t done with directions. So, we can’t go yet. (She waits for the students to quiet down.) So, once you have all 25 words in there and their size, remember we said 100 is the biggest and 20 is the smallest so it’s not teeny and you can’t see it. And then you are going to go. And then hopefully it’s going to work. (There is a slight pause. The students start to chat quietly.) Maybe we need to not use Chrome? (Her current browser doesn’t seem to be work and she is trying to fix the problem. It seems as if it going to show up but doesn’t completely).

Students: Yay! There we go!

Anna again demonstrates her knowledge of technology by showing the students advanced features of the tool. For example, Wordle does not require users to select the font size of the word to function, but this selection process does allow the students to emphasize what is
important about themselves. However, in the excerpt below, Anna has difficulty getting the features to work and she continues to rely on paper/pencil supplements for literacy processes.

Anna: It’s trying to work but it’s not. If we can’t actually make it into Wordle today, then we can type them in Word today. That will be even more practice with Word and then we can save it so then it will be ready to copy and paste it into Wordle on Friday. But if Wordle works in the computer lab, which it might, then maybe we can get it to work later.

Student: (a student calls out) We tried to do Wordle before with Miss Alex but for some reason it doesn’t work on her computer.

Anna: It doesn’t work on her computer? Ok. It didn’t work. We can try in the computer lab. If it doesn’t work in there, then maybe it will work on Friday. I’ve done it here before with kids. So, I know it works. (She starts to shut down her computer and transition the students to the computer lab.) I’m going to tell you what you need to bring with you. And then if you have questions you can raise your hand and ask, but I need you to be listening. You need your USB drive if you have one. If you don’t you can use mine. You need your "Love You Mom" poem.

Student: (student interrupts her and other students start to talk as well) I can’t find it. I didn’t do mine.

Anna: (Irritated that they are talking again.) We’re going to lose another shell (discipline system) because I’m trying to talk and you aren’t listening. (The students quiet down and she then restates list of things to bring. Then the students gather their things and line up.) [1.1 Directions Computer Lab About Me 5.6.15]

Once again, Anna used the technology tool as a reward for behavioral modification in which literacy learning or content-knowledge development are on the periphery.
In the next portion of the lesson, Anna moved the students to the computer lab where she asks them to browse the Internet to create a collage of selected images and quotes that describe them.

Anna: (She is standing at the front of the room at her computer that is being projected onto the Smart Board waiting for the students to quiet down. Once they are looking at her and sitting quietly, she begins her instructions). Today, once you finish your Wordle, the next part is that you need to make a collage of images that represent you and the things you like. We did words the last time, [now] it’s going to be pictures. You need to use the Internet to search for pictures, you can search in Google for pictures. So maybe if I want a picture of a dog, I can search for dog in Google.

Students: (The students demonstrate their excitement with Ooohs and Ahhhs. Some students are excited and start talking to each other)

Anna: Right now, I need you to be listening. You can choose the picture you want to use. (She scrolls through Google results for dog and the students are chatting) If you find a picture that you want, you can two-finger click and save image as (she demonstrates how this is done using her laptop) and you can save it to your flash drive or save it to the computer, wherever you want to put it. If it’s on your flash
drive you will have it if you want to use it later in the project. (She closes the page and students are chatting. She appears to be annoyed by their off-task behavior)

Okay, we are losing another shell. (Ariana interrupts her with something off topic Another student asks which program they should use to put their images in.) You can either do your collage in Keynote or in PowerPoint. It’s up to you. You can use PowerPoint or Keynote. (She then demonstrates by opening up a blank document in PowerPoint) You are going to open whichever one you choose, and you need a blank white slide. We are not doing words today; we are only doing pictures.

The students were excited to be in the computer lab and were talkative. Anna reminded them to quiet down or they would have a consequence—the indeterminate consequence of losing a shell from their behavior management system. Anna demonstrated the procedural use of the tool so that students could create their collage from images they found on the Internet. She also embedded several disciplinary vocabulary terms with the assumption students understood the corresponding functions for the terms (e.g., Google, flash drive, Keynote/PowerPoint, two-finger click, save-as). Unlike most disciplinary vocabulary words that carry content information (e.g., rectangle, quadrilateral), Anna’s digital terms are associated with physical navigation and procedural expectations necessary for execution of assigned tasks. As such, Anna deploys the terms to solicit specific outcomes and she expects students to both understand her intentions without a model and to emulate her navigational practices without touching the tools or teaching the tool vocabulary.

Student: Can we do it different?

Anna: Nope, I want a blank white slide because you are going to do pictures all over the whole thing. You don’t even need words. (She refers back to her blank PowerPoint presentation slide projected on the board) You can delete these boxes (selecting a couple of text boxes on the slide) we are just doing pictures. You’re going to put your pictures in. But then you need to change the size. So, you have room to add the other pictures. (She inserts a picture of the dog into the PowerPoint they found previously.) Maybe this puppy is really cute you want him big but then you are going to put something next to him. It’s a collage.

Student: (clarifying her instructions) So not one on the whole thing?
Anna: It’s a collage. *(she pauses her explanation)* It’s too loud, take away another shell please. *(A student goes over to remove a shell from the jar. She notices a student with a raised hand.)* Bella?

Bella: How do you put this *(an image)* on there?

Anna: *(Showing her how it’s done while she is talking)* It saves on the desktop, so I can drag it and drop it in.

Student: *(Interrupting)* Wait, what if it’s on your flash drive?

Anna: If it’s on your flash drive you need to have your flash drive open. And then you can drag it from your flash drive. It’s so easy. *(She goes back to her sample PowerPoint and starts to describe the process)* So, you can change the size, you can overlap them. This is a collage. So, you can add them differently to make it look like however you want to make it look. But, you’re going to fill in as much as the white space as you can. You have lots of pictures and hardly any white space. John?

John: What if we finish early? Add more?

Anna: Yep, you can make it more complicated if you want. If you don’t have enough space on one slide you can add another slide and keep going. These pictures need to be school appropriate things that you like or enjoy that tell me about you. Pictures of things that tell me about you. What you like. What you like to do.

Student: *(A student volunteers an example)* Marvel superheroes?

Anna: Yep, that’s fine. Yep. We have any questions about what we are doing? *(no one raises their hand)* Okay, all you need is your flash drive because we are going to come back. *[Directions All About Me 5.8.15]*

Anna told the students how to create a collage, but their questions indicate that some of them did not understand the purpose of the task (Figure 4.10). Those who understood, wanted to approach the composition differently. However, Anna insisted they all do it the same way – her way. This allowed her more control over the final product.
The final step in the process was to compile all of the information they had gathered (Wordle, images, quotes, pictures, songs) and make an iMovie that described their lives from birth to the present. Several of the students were familiar with iMovie, but a number of them had never worked with the program. Anna walked the students through the basics of iMovie using her laptop and projector to demonstrate - enough to get started with the program. She also provided reassurance that she would help them as much as possible once they started working with the program in the computer lab.

Anna: (She is standing at the front of the classroom with her computer and the program iMovie open.) If you have your five songs, then the next step is to put it all together in iMovie. (She describes the order the students are to follow in their presentation) It will be you little, then some quotes, then you a little bigger, and then some quotes, and then you a little bigger and some quotes. (Students then
begin to call out. They didn’t have the required photographs they needed to make their iMovie.)

Anna: (in response to not having the required pictures for their iMovie) So maybe this weekend that’s what you are going to do. (Some students start chatting in the class, Anna appears frustrated) I’m waiting. Right here, where it says save pictures to USB. Joey and anyone else who is in this position. These are the pictures of you or your family, or your pets, of your bedroom, or anything you want to be included in this movie project that shows you from birth through now.

Student: From birth?
Anna: From birth. If you don’t [have them], that’s what you need to get this weekend.

Student: (singing) Baby, baby.

Ariana: (calling out) I don’t have my baby pictures (Other students talk aloud, as well, and the class gets noisy)

Anna: (Talking loudly in order to get their attention) Morgan has asked me a question and you aren’t going to hear because you aren’t listening.

Morgan: I have one slide that has all my favorite things and another slide that has my pictures in a collage.

Anna: My recommendation to you so that your movie is longer is that you don’t use the exact collage, just use those pictures in iMovie.

Morgan: Okay

Anna: We’ll print those collages separate and we’ll still use those.

Morgan: Yes, I have those images separate.

Anna: That’s why I was telling you to save your collage pictures to your flash drive also. Cause then it can be a picture of you and a picture of Pokémon. And then a quote and then another picture of you. And maybe not Pokémon but…

Jeff: Miss Anna, how are we supposed to do iMovie? I had asked you that.

Anna: Jeff just asked another really good question. He doesn’t know how to do iMovie, which is what I’m showing you now. So, we know if we don’t have pictures on our flash drive, we are doing that tonight?

Students: Yeah.
The students were asked to create a collage previously, and then Anna asked them to deconstruct their collages in order to “make their movie longer.” The students demonstrated their frustration by asking for clarification on the instructions. Anna’s curricular purpose is unclear; however, because she asked the students to basically complete a template as they composed the stories of their lives.

Anna: *(now that they have settled down she begins her description of how to use iMovie)*

Okay, you need to open iMovie *(she clicks on iMovie and it opens on the projected screen)*, this is what iMovie looks like. Start a new project. I would choose no theme, because you don’t want it to come with transitions in it. If you want one of these other themes that it looks fancier that’s okay. But I want you to choose your own music.

Student: What if you like the music?

Anna: I want you to use the five songs that mean something to your life

Student: What if that’s on the computer?

Anna: I doubt it. Although anything is possible. So, then you are going to put your picture in. *(Some chatter while she is uploading images related to iMovie. She is moving through the process of inserting the picture, but many of the students aren’t watching the process and she isn’t talking through the steps either)* So then I have my picture in and it automatically puts it in for four seconds. It automatically zooms out. If you want *(she pauses because they are chatting)* I’m waiting…. If you want it to change how it zooms, then you can click on this little square *(draws attention to the little square)*. The green frame is where it starts. And the red frame is where it stops. So, you can actually change - so maybe I’m going to start down here with what they are doing and end all the way zoomed out so it changes what you see.

Students: *(excitedly responds)* Cool!!!

Anna: So, you can change how it zooms in or out however you want it to be. You can do the same things with quotes. If the quote doesn’t fit - if you can’t read the quotes, then maybe you come over here to this and hit fit or crop and it will be a still picture the whole time.

Student: I think most people would like that.
Anna: Probably. Do we have any questions of how to change a picture in iMovie? (*Some talking, no questions related to iMovie were asked*) Okay, if you need help with iMovie, I can help you, but I can’t help everyone at the same time. There are 22 of you and 1 of me. And Mr. Ryan (the technology instructor) is not in there. So, I will get to you, I will help you, but I can’t help everyone at the same time. You need to bring with you your flash drive and whatever else you need for computer lab and for lunch. We won’t come back to the classroom before lunch.

Noah: I was going to ask if iMovie already downloaded onto the computer or do you have to download it.

Anna: It’s already downloaded. If you don’t have pictures you are going to work on quotes or music today and you can bring your pictures next week or your movies are gonna be all pictures and quotes from the Internet.

Student: (calling out) What quotes? What do you mean by quotes? (*Anna doesn’t answer him, so he is seeking an answer from his peers. She is talking to another student. He is very confused and looks around at his tablemates who don’t answer him and looks back at Anna.*) But what are quotes?

Anna: (she is gathering her materials and begins to get the students ready to go.) You need to get together whatever you need for the computer lab. [*Directions iMovie All About Me 5.29.15]*

iMovie is a fairly complex tool that requires multiple steps in order to create a movie (Fig. 4.11). Anna provided a limited description and the students did not manipulate the tool during this instructional demonstration. Anna focused on the technological aspects such as zooming in, but the content was secondary. There was a question related to the content she wanted them to create, but she did not address it. Finding quotes was an important aspect to successfully creating the iMovie, but similar to the concept of collage, she did not share what the word meant.
Digital Literacy Event Three: Literary Analysis and Novel Study of *Stowaway* Using Storytelling Tools

As part of the literacy curriculum, Anna and the students read the novel *Stowaway* together as a class. The students or the teacher took turns reading aloud and then plotted coordinates on a map to follow the path of the main characters. Once they finished the novel, Anna had the students work in small groups of their choosing to complete a *Comic Life* with the task of retelling the main events of the story. This process occurred over several class periods during the week.

**Learning environment.** While the class read together, the students were seated in their assigned groups of 4 to 5 students. When the students were asked to create within Comic Life,
they worked. They self-selected small groups to complete a *Comic Life* with the task of retelling the main events of the story.

**Situating the lesson within the TIM.** According to the TIM (FCIT, n.d.), the *Stowaway* project most closely aligned with Active Adaptation where “the teacher chooses which technology tools to use and when to use them. Because the students are developing a conceptual and procedural knowledge of the technology tools, the teacher does not need to guide students step by step through activities. Instead, “the teacher acts as a facilitator toward learning, allowing for greater student engagement with technology tools” (FCIT, n.d).

For this assignment, the students were given the iPads to create a summarization of the main ideas of *Stowaway* using the program *Comic Life* (Fig. 4.12). After a brief explanation of the assignment, the students paired up to work. The students, including my focal participants, were left alone to create while Anna served as a troubleshooter.

**Digital literacy instruction and content generation.** As part of literature study, the whole class participated in reading a historical fiction novel, *Stowaway*, by Karen Hesse. The novel details Captain James Cook’s voyage around the world to discover an unknown continent during the 1700’s. *Stowaway* is intended for an audience in grades 5-9. The class spent several weeks reading the novel aloud and plotting coordinates on a map to follow Cook’s voyage. After finishing the book with the class, Anna instructed the students to recreate the story line from the book using the app *Comic Life* to detail the main events from the novel as a summarizing activity. The students had to decide which events were the most important to include from the entire novel and use those in their *Comic Life*. As the students were already familiar with the app *Comic Life*, Anna’s directions were brief.
Anna: *(Standing at the front of the room, Anna waited for the class to quiet down so she can provide instructions. She is holding an iPad in her hands.)* We learned an app called *Comic Life*. I want you to use *Comic Life* to make a comic to go with *Stowaway*. So, you’re going to do the main points, not the whole book, just the main points in a comic. You can either draw the pictures and then take photos or you can find pictures online to help you tell the story. Do you have questions?

Student: *(Looking a little confused and raises his hand.)* It’s not going to be an essay?

Anna: It’s a comic, but you are telling a story with pictures and words.

Student: Can it be funny?

Anna: As long as it’s accurate, it can be funny. *(The students chatter amongst themselves.)*

Anna hands out the iPads to the class and they begin to work on their project.

*Directions for Comic Life Stowaway 5.11.15 – 1*

While the students had used *Comic Life* previously, they were not clear on what they needed to do for this assignment. Anna may have believed that she was explicit in her instructions, but she did not provide any detail regarding what the contents of the *Comic Life* needed to include beyond “doing the main points.” This is a challenging task, but an even harder challenge for students with reading disabilities to condense an entire novel into ten main points.

Figure 4.12. Devon takes a picture to accompany his text within Comic Life.
Digital Literacy Event Four: Country Research

Each year, Learning Garden School held a Science and Social Studies celebration called Biome. Each grade level presented a project and the other classes across the school came to tour the classrooms to see students’ products. Each classroom teacher developed a project related to a specific science or social studies topic. Anna created the Country Research Project as her contribution to the school-wide science and social studies fair. As an extension to their work with the novel *Stowaway*, Anna instructed the students to research one of the places that James Cook, the main character of the book, visited during his travels. During this event, Anna provided a list of activities for the students: (1) research and write up a report on their selected country, (2) create a digital presentation, (3) create a physical landmark to accompany their work to display for the rest of the school to view.

**Learning environment.** This project occurred over several class periods over the course of two weeks. The students worked in pairs to conduct research of their selected country from the predetermined region. The pairs worked in the spaces around the classroom, lying on the floor, sitting at desks, or using the classroom computers as needed. Anna either walked around the class to monitor or assist the students with their projects or she sat at her desk at the front of the room and fielded questions from students who lined up to talk to her.

**Situating the lesson within the TIM.** This lesson falls within the *constructive infusion* portion of the TIM Matrix. *Constructive Infusion* is described as an environment in which “students consistently have opportunities to select technology tools and use them in the way that best facilitates their construction of understanding. And one in which “the teacher consistently allows students to select technology tools to use in building an understanding of a concept. The teacher provides a context in which technology tools are seamlessly integrated into a lesson and
is supportive of student autonomy in choosing the tools and when they can best be used to accomplish the desired outcomes” (TIM, 2009).

Ariana, Bella, and Devon were mostly left on their own to engage with the requirements of the project using the tool of the iPad to find information, transcribe that information onto paper, and turn it into both a written essay and a digital product to share with their classmates. Bella remained engaged in the tasks throughout the independent work time seeking help from the teacher with a couple of websites or information she was not able to locate. Devon also remained mostly engaged in the task but sought reassurance from his peers and occasionally asked the teacher for information. Other times he sat and waited to be prodded into working by his partner. Ariana was often disengaged with the required tasks. She played on the iPad and look occupied, but close observation of her search process revealed that she located unrelated information while her partner completed the required tasks.

**Digital literacy instruction and content generation.** The students were paired up and instructed to research a selected geographic location discussed during their novel study. Anna assigned them the tasks of writing a five-paragraph essay about their selected place, developing a physical landmark, and designing a digital product to represent the location of study.

Anna: (She is waiting for them to clean up their areas. They had already been assigned partners and were waiting for further instruction.) Okay, are we listening? So, you already know which location you are researching, and you already know who your partner is. (She points to a handwritten list on the whiteboard.) The things that I need you to be finding are what was it like in the 1700’s; which is when Stowaway took place. What is it like now; including the people, the culture, the currency? What is it? Is it a country or a continent, or a city? And then describe its geography. Where is it located? What oceans are near it? Is it mountainous? What’s the climate like?

You’re going to work with a partner to find answers to this information. You’re going to write it in your own words on a piece of paper. Later this week you’re going to
work with your partner to create a presentation on this information, which can be however you want to present this information. But, you also independently need to write a 5-paragraph report on your location. So, you’re going to do the writing part alone and the presentation together. Which means that everybody needs to be participating in doing the research and taking notes. You’re going to need to write independently. Are there any questions about the things you need to include?

Anna read through the required list things to do and encouraged them to “go explore” as they worked through the assignments (Fig. 4.13). The way she structured the tasks allowed for flexibility in the product (both digitally and physically). The students sought clarification before they began their work.

Figure. 4.13. List of required information for the Country Research Project.

Student: Why can’t we do the writing together?
Anna: Nope, writing is independently.
Student: Why not (others whine)?
Anna: (She ignores the questions and continues on) If you have a question you need to raise your hand. I’m going to call on Bella right now.
Bella: Are we researching stuff today?
Anna: Yep, today.

Bella: Are we going to use the iPad?
Anna: Yep, iPads and computers.

Student: Should we bring in trifold boards?
Anna: It could be a board. It could be a PowerPoint. It could be a *Comic Life*. It could be a movie. It could be anything you want it to be that’s gonna give me that information (*pointing to the board*).

Student: So, we could do it on the iPads?
Anna: You can do it on the iPads.

Student: Can we make a funny iMovie?
Anna: As long as you’re giving me the information. If it’s going to be more like a funny travel announcement or travel commercial.

Student: Like we can pretend we are in Africa.
Anna: As long as you are giving me the information.

Student: For the currency you can be like “I need 5,000 whatever.”
Anna: Yes, we can talk about your ideas.

Bella: Are we researching together?
Anna: Yes, you are researching together and take notes independently because you’re going to need them to do the writing.

Student: Okay, can we bring food. Like food from the country? (*students start to talk amongst themselves excitedly*)
Anna: Probably not. (*the students start whining*) We’ll see. Probably not, but we will see.

Student: Why can’t we do the writing thing together? (*others giggle*)
Anna: Because I need to be able to give you a group grade and an individual grade. This counts as two grades. The presentation is a group grade and the writing is an independent grade.

Student: Why don’t you grade the map as (*his voice trails off and he is interrupted by another student*)
Anna: When are we going to do the writing? We need time to do the research and the presentation first.
Student: You grade the maps as our social studies work?
Anna: What do you mean?
Student: The graph thing. (*There is an interruption by the janitor*) Okay, do we have any other questions.
Students: No!
Anna: Okay, if you would like to use an iPad you can have one person from each group come get an iPad. There are two computers over there to use. (*They don’t go back to any questions. Students get up and start moving around to get iPads and get together to work. Anna begins passing out the iPads.*) [Directions Country Research Anna 5.18.15]

*Figure 4.14.* Bella writing notes by copying information from on the Internet.

The previous transcript captures the entirety of the directions Anna provided the students before she set them off to work on their projects. Largely, the focal students worked independently with their selected partner to accomplish the tasks associated with the project. The
students’ questions about the products signal two things: they aren’t sure what to do with the freedom to create whatever they want, and they aren’t sure why they are allowed to work together to find information together but write the essay separately and on paper.

In this event, the students wrote down notes on paper and then chose to create a Keynote presentation on the iPad with the information they found during their Internet searches. Then, they created their 5-paragraph essay. Bella and Devon worked during this time to make notes and create the essay, but Ariana was often off-task. She skipped the essay writing to make the digital presentation while Bella copied down information for the duration of time designated to the project. When she finished making the digital presentation, she continued on to make the physical presentation of the landmark. Bella wanted to help her, but she kept taking more notes and then finished her essay. Ariana never completed the writing portion of the assignment. Devon worked with his partner to complete all aspects of the project. He agreed to make the physical product, which he did at home with the help of his mom.

**Interpretations of the Instructional Environment Across the Four Highlighted Events.**

After observing Anna’s instructional environment, I identified extensive examples of replicative technology, or, in other words, instances in which technology functioned to replicate paper/pencil tasks. These included projecting read-alouds, clicker quiz answers, and worksheets onto the Smartboard. These examples also include working through the math workbook as a whole group and using the document camera to demonstrate math examples. While this technology might seem to change the learning environment, it doesn’t provide students with the means to engage with the information in new, purposeful ways.

Given that the purpose of this study was to examine productive technologies, I isolated the four events described above in which the students used technology to produce digital
products that required some form of composition. Below, I summarize key trends across the four events.

**Modeling with Text, Telling Without Touching, and Commingling Directions for Successive Navigation.** Modeling with text includes the instances in which Anna modeled how to use a tool by creating her own product for the students to see. For example, in creating the Wordle, she made a sample list of words about herself on the board. She had the students watch her process in order for them to replicate it when they were on their own. Or, in another instance, Anna walked through how to open and use the program *Comic Life*. She showed them the features they could use by connecting the device to the project. Although they could see what she was doing on the projector, they couldn’t see what she was doing with her fingers on the touchscreen. Once she was done with her demonstration, she sent them off to work.

Modeling is an important part of teaching, particularly since some of them were unfamiliar with both the technology and the application. During these instances in which Anna provided verbal instructions about tool use, the students were not allowed to touch the device in order to follow along. The students weren’t able to apply what they were learning in a step-by-step manner and instead needed to a verbal description and remember what they had been told. The gradual release of responsibility model stipulates that the teacher moves from assuming “all the responsibility for performing a task…to a situation in which the students assume all of the responsibility” (Pearson & Gallagher, 1983, p. 211). The gradual release model changed from “I Do, We Do, You Do,” and was replaced with “I Do, You Watch, You Guess.”

According to the ISTE standards (2017), teachers should “collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.” Although student autonomy is a desired outcome within the realm of technology
integration, these students’ reactions to autonomy indicated that student choice must be
predicated on instructional modeling that focuses on tool selection and navigation, but also
literacy outcomes. In other words, if the teacher provides a context in which technology tools are
seamlessly integrated into a lesson, and is supportive of student autonomy, the support must also
extend to the content of the lesson.

During my observations, Anna was often “working the room” to help the students that
needed assistance with the tools she had them use and troubleshoot problems they had due to
lack of familiarity. Since most of the students were on a learning curve with the new tools, Anna
would struggle to keep up at times with the student need, particularly with my focal students who
may have needed extra support with the tool.

Use of instructional strategies were missing from teaching in general, not just for literacy.
ISTE (2017) standards suggest that teachers use technology to create, adapt and personalize
learning experiences that foster independent learning and accommodate learner differences and
needs. While the teacher did allow for them to use the technology independently, she did not take
the opportunity to scaffold their use of the digital tools and the content she was teaching using a
gradual release of responsibility

Technology integration allows a number of different opportunities for instruction, as well
as the opportunity for individualization of learning goals. The Council for Exceptional Children
(CEC) suggests that teachers “systematically individualize instructional variables to maximize
the learning outcomes of individuals with exceptionalities” (Standards for Professional Practice,
2015, p. 1). None of the assignments were differentiated for any of the students with learning
disabilities. From my observations, I do not have record of how any of the assignments were
modified for students with exceptionalities; either students that struggle with reading tasks or for gifted students.

In contrast, the ISTE standards (2017, p. 2) also mention the need to “foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.” When Anna was not able to get to the students that needed help as quickly as the desired, they sought help from their peers or problem-solved on their own. Bella figured out several options she needed to use on her own when she couldn't rely on the teacher to tell her. Also, Devon quickly learned how to insert images, and then shared how to do so with his classmates that also needed help with the task. I agree that while they were able to figure out difficulties they encountered on their own at times, Anna had the knowledge of both technology and content – which could have been taught. Prior to sending the students off to work independently on their Country Research project, the students needed to be taught how to search for relevant information across sources. Anna asked the students to write a 5-paragraph essay. The students must learn criteria for self-evaluation but won’t do so if the teacher does not discuss writing quality. Anna expected the students to perform these literacy tasks on their own, as she did not model the structure of the essay or show students how to pull information from sources. Therefore, students relied upon patterns of behaviour that may or may not have supported their literacy learning. Appropriate instructional supports were not put in place to maximize student learning.

The Expectations for Tool Vocabulary. The use of digital tools brings with it a set of genre specific vocabulary. In reviewing the instructional context Anna created, I observed instances in which she used digital vocabulary. Such instances include phrases such as “double-click,” “copy and paste,” or “drag and drop.” Some of these terms were demonstrated, but others
were used in conversation or within her instruction without definition. It might be an assumption that this generation (that of the students) are immersed in technology, or are “digital natives” (Prensky, 2001) and are “fluent in the language of computers, video games, and the Internet” (Prensky, 2005, p.8). However, educators should not assume the proficiency of the student’s technological knowledge.

The instance of “copy and paste” could look different on the computer or mobile platform the students are familiar with. To add another layer of difficulty, the students must understand the definition of the word, along with its associated action on the device. The TPACK framework provides an important consideration for this matter. This framework recognizes that teachers should integrate technological knowledge with subject matter learning, not just focusing on technological knowledge at the expense of appropriate pedagogy or the content (Koehler & Mishra, 2009). This integration of technology needs to be carefully considered in all aspects; technology, pedagogy, and content, in preparation for student use.

**Paper/Pencil Supports in Contrast to Bells and Whistles.** ISTE (2017) standards recommend that teachers “design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.” This raises several questions from my observations of Anna’s instruction. When creating the Wordle, the students were asked to write down the list of words on paper, type up the words into a Word document, and then cut and paste from the word processing program instead a text box on the Wordle site.

Additionally, the students were instructed to write their essay on paper. They were already using the iPad to find information on their assigned country and could have used one of the word processing tools to copy and paste information or write their essay on the same tool.
they were using to find the information. From my observations, Bella spent a lot of time copying down information from Internet sources in order to have information to write from – that time might have been maximized by utilizing the tool in a different way. Does this use of paper demonstrate an inefficient use of the expedience of the tool? She is met with resistance from the students on having to do additional work by using paper and pencil. Statements such as “I don’t get why we have to write down” and “Why can’t we do the writing together?” indicate that the students question her instructions. They didn’t need to write down the list of 25 words and they had worked on the entire project together, including take the notes needed to write the essay.

On other occasions, Anna used additional features that were not necessary to using the tool. Typing out the font size in Wordle wasn’t necessary to using the tool, but it did provide the students an opportunity to give more information about themselves. It also allowed Anna to demonstrate her advanced knowledge of the tools she incorporated for the students. This type inclusion of do not enhance content knowledge and isn’t necessary for using the technological tools.

Traditional print, digital, and online reading and writing experiences that incorporate multiple genres, multiple perspectives, and media and communication technologies are necessary to prepare learners for literacy tasks of the 21st century (ILA Standards, 2010) The goal of literacy is to communicate. During my observations, I noticed times when the assigned tasks lacked authentic application, or a means to communicate authentically. The ISTE standards (2017, p. 2) suggest that teachers “provide alternative ways for students to demonstrate competency and reflect on their learning using technology.” Anna allowed for the students to use alternative ways for the students to respond, but the alternative way was in the specific way she suggested for most of the assigned tasks. Learning environments continue to evolve in relation to
technological tools and access, so must pedagogy. Therefore, teachers need to think beyond using technology, focusing on how their literacy instruction can be enhanced (Pope & Golub, 2000; Young & Bush, 2004) and considering how to integrate technology into instruction so students can learn to access, evaluate, synthesize, and contribute to information (National Council of Teachers of English, 2007). She had no rationale for her decisions and she didn’t operate with goals for authentic literacy communication. This fact was masked by the “bells and whistles” of technology.

**Go Explore, But Also Check In.** Once Anna finished her introductory instructions, she would release them to go work on the assignments she had given. During the Country Research project, that spanned a number of days, she encouraged them to “go explore.” In these instances, the students would select a tool of choice to complete the assignment and she would serve as a point of check in. In the other events, even though she assigned the technology tools, she would also serve as a point of check in to provide assistance after she had given directions.

During these check-in’s the students would ask for help with the tool or seek her advice on work they had done. ISTE Standards are designed to inspire a vision for pedagogy-driven digital learning and teaching. The standards state that teachers should “use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction” (ISTE, 2017, p. 2). Anna reviewed the projects they created as the students finished, though I did not observe that Anna reviewed the students’ products in order to provide them with feedback on how to improve their work. The projects remained on the iPads and the students moved forward with the next task.

**Technology as a Tool for Behavior Modification.** Across my observations, there were a number of instances in which Anna rewarded or punished students for behaviors associated with
learning to use technology. Since she typically introduced the tools by standing at the front of the room and demonstrating, she needed them to look and listen to what she was doing. In one instance Anna appeared frustrated and said, “I need you to be listening. I didn’t tell you to get started so your iPad should be on the desk and your eyes on the board. Ariana we are waiting. iPad down. Eyes up.”

The students wanted to use the technology, so they usually stopped talking and would listen attentively as she gave directions or explained a task. Technology served as a tool for behavior modification across my observations and encouraged them to behave appropriately and to remain on task.

However, this was not always the case. Ariana often took advantage of Anna being occupied with the other students. Ariana was totally disengaged, and the tool hid this fact from the casual observer—or from the teacher who is monitoring 18 others—except for when she came to check in with her specifically. Ariana spent a significant amount of time off-task playing with the iPad to search the Internet. It is important that teachers remain cognizant and ensure that students are using digital tools as intended. ISTE standards (2017, p. XX) also suggests that teachers “explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.” From my observations, Anna created an environment that engaged students with the novelty of technology integration, but it did not always support learning.

Summary

From my observations of Anna’s instruction, I learned that technology adds a layer of complexity to the learning environment. I don’t mean complexity in the sense that technology makes it harder, it just makes it different. Teaching is a complicated act that develops over time
and with intention. Adding an additional teaching tool (technology) necessitates that teachers rethink what they are doing and how they do it in order to ensure this new tool enhances the teaching and learning environment. It is easy to teach technology, but it is entirely different to teach with technology.

At one point, Anna says “It’s so easy” in response to a student’s question related to technology. I believe that this assumption, that it is easy, is an oversight many educators make when it comes to technology. Whether it is based in their own knowledge of technology or the assumption that “digital natives” already have knowledge of technology, it is vital not to miss opportunities to provide instruction in the areas of student need.

**Student Use of Digital Tools**

I chose three children with literacy-related learning difficulties as focal students for detailed observation and analysis of their response within integrated digital literacy instruction. Below, I grouped the key findings based on perceived benefits and barriers to student success in the areas of social performance and academic learning of digital literacies and disciplinary content based on my understandings from the data.

**Benefit: Persistence and Motivation.** During my classroom observations, I documented patterns of behavior from the students that I describe as *persistence and motivation* towards completing the instructional goal. Motivation is described as “the presence of internal incentives to learn or perform, influenced by previous success or failure” (Guthrie & Humenick, 2004, p. 24). Lack of motivation can be the result of frequent failure experienced with more traditional forms of reading and writing (Shunck, 2003). During classroom observations, there were several instances in which the assigned task was too difficult, or the procedures were unfamiliar and commingled, making it challenging for students to perform. Despite the issues, the focal
participants revealed a willingness to give the tasks a try and continued to work on their projects until completion.

In one such instance, Devon worked with his partner, Morgan, to create a movie. Devon was unfamiliar with iMovie. He did not know how to insert a picture into his iMovie project. He first needed help locating his images on his flash drive and then he attempted to pull them up but did not see any of his images in the iMovie media area.

Devon: (Loudly to the class) Do I pull it out?
Morgan: No! It will delete it (referring to the computer).
Devon: Delete what?
Morgan: All your pictures. Did you pull it out?
Devon: No, it’s in there.
Morgan: Well then it won’t delete (reaches over to help him).
Devon: Dammit, I’m giving it.
Morgan: Now, eject. Now it won’t.
Devon: Are you sure?
Morgan: I’m sure.
Devon: How do I pull up all my pictures (puts flash drive in.) Just to make sure it isn’t ruined and gone forever. (Morgan shows him how. They check out the contents and eject it again.)

After watching Morgan’s process, Devon was able to insert the flash drive and see the images he had saved (See Figure 4.15).
Figure 4.15. Devon attempting to remove flash drive.

The next task was to place images into iMovie. Devon attempted to receive help from the teacher, but she was busy with other students in the class. While he waited on the teacher, I moved to observe my other focal students nearby. When I returned to Devon, I noticed that he successfully placed images in his movie.

Aimee: Looks like you figured out how to add pictures. How did you figure it out?
Devon: Hmmm? I just clicked on it two times.
Aimee: Clicked what?
Devon: Uhm, the line and it just says here (pointing to the screen and the word insert).
Aimee: You figured it out better than me.

Instead of complacently waiting for the teacher or someone else to help him, and rather than giving up entirely, Devon took the risk to click around the program and figure it out for himself. Devon was determined to complete the task and he persisted even without support.
Another such instance is in the case of Bella. During the creation of her iMovie, she was visibly frustrated that she could not add the images from her flash drive into her project. Rather than clicking around, she literally looked around the classroom, strumming her fingers in frustration, and asking her peers how to complete the task. At one point she sought the help of Ariana directly.

Bella: (frustrated) Ariana, how do you use this? How do you do this?
Ariana: I don’t know!
Bella: You were just… (stops talking)
Ariana: I’m doing a movie.
Bella: So am I!!!! (Annoyed) How do you do this?
Ariana: Huh? (not helping her and currently has one image in her movie while listening to sound effects instead of helping her.)

Ariana was too busy with her own project; therefore, she was not able to offer help to Bella, even though she has already figured out how to add images into her movie. Bella turned her attention to the program and she tried clicking several buttons. During this time, Anna warned the students that time was up and Bella saved her project. The students returned to the computer lab the next day. When I sat next to Bella to observe her work session, she has made substantial progress.

Bella: Okay! I think I’m done! (dragging the last of her images into her movie.)
Aimee: You got it all figured out?
Bella: Yep!

From my observation of Bella, I was most certain that she would give up or become distracted due to her frustration with the task. However, she continued to struggle through the process until she achieved her goal of making her movie independently according to the required
specifications by the teacher. Her persistence and motivation to figure our the unknown computer program and finish her project allowed Bella to demonstrate her capability (Fig. 4.16).

Figure 4.16. Bella making adjustments to her iMovie

**Benefit: Turns into expert.** I selected the participants for my study based on their struggles with reading and writing. Struggling readers in the older grades often lack foundational skills in reading, in addition to difficulties with comprehension (Vaughn, Swanson, & Solis, 2013). As such, it is not likely that my participants would serve as an expert in projects that involve complex tasks with reading and writing. However, with the infusion of technology into the assignments, I documented the opportunities my participants found to serve as experts within their assigned tasks.

For example, during the math shapes assignment, the students needed to take pictures of math shapes, insert various pictures of math shapes in *Comic Life*, label the shapes with the appropriate vocabulary, and describe each shape. Devon had previously worked with the program and was able to guide his partner through the process of completing the task.
Devon: Can I show you something? You go here.
James: And then you press the one you want?
Devon: Yeah, template.

James soon had the program open and template ready. The boys then completed the task of labeling each photograph, inserting the vocabulary, and writing in the description. Devon and James worked together often. James would be considered the higher achieving peer in this pair, based on classroom assessments and teacher evaluation, and he frequently dominated Devon because of his academic advantage. While he didn’t like listening to Devon’s suggestions, as demonstrated by his facial expressions and his attempts to do it on his own, he quickly realized that Devon was more knowledgeable and came to value his insight.

Figure 4.17. Devon showing James how to use the program on the iPad.
In another instance, Bella figured out some additional features within iMovie when composing her *All About Me* Project that drew the attention of her peer.

Ariana: How did you get the bubbles?
Bella: I don’t know, watch! (they continue to watch and read the quotes)
Ariana: How did you get the bubbly things?
Bella: What do you mean? You mean like this? The ripple?
Ariana: No.
Bella: You mean this?
Ariana: Yeah.
Bella: That’s called a ripple.
Ariana: How do you do a ripple?
Bella: (Bella leans over and walks her through it.) You go here to transitions. Scroll down. Scroll, scroll, scroll.

Typically, students with documented disabilities write shorter, less-detailed pieces (Sadler, 2004). Adding the transitions to her iMovie enhanced Bella’s project by adding details to her work. Bella was able to share her knowledge of additional features with her classmate, which allowed her peer to more detailed as well. During a subsequent observation I noticed that Devon was not at his computer. After a short while, he returned to his laptop and I asked him what he was doing. It was my assumption that he had wandered off to avoid the task of finding quotes for his iMovie, a task that involved reading the web pages and transferring that information by typing the quotes into his project.

Aimee: Devon where did you go?
Devon: Over there.
Aimee: To hang out with your friends?
Devon: Yeah.
Aimee: You helping them?
Devon: Yeah.
Aimee: What are you helping them with?
Devon: With their quotes and stuff.
Devon finished the required tasks for the day and went over to help his friends find the required material. He served as both the content expert with finding the required quotes and technological expert with guiding his peers on the creation of iMovie.

**Benefit: Provides Additional Resources.** I identified additional benefits to the inclusion of technology based on the resources the tools provided for the participants. Some examples of the observed resources are features that are available in the programs the students used to complete their project. The students received help with spelling (autocorrect and speech to text), locating information, and reading pages to the students (text to speech) with no additional support needed from the teacher or peers.

In one instance, the students were asked to locate information using information found online for their research Country Research Project. As part of their Country Research Project, the students needed to create a landmark representative of their assigned country. In the following instance, Bella and Ariana decided to use the iPad to search for images of landmarks.

Aimee: What do you want to present about Great Britain?
Bella: Uhm, let me look. What’s it called? A landmark? (typing a landmark into Google)
Ariana: What is a landmark (typing in the question, spells several words wrong and is autocorrected) Really?? (criticizing her search results)
Bella: No, what is Great Britain landmark (types in the additional search terms).
Ariana: Images (pointing to the Images option in Google).
Bella: Yeah images. (scrolling through the images they found) That! But they are already making one (referring to Big Ben) What is that (looking at an unfamiliar image)?
Ariana: Let’s ask.
Bella: Miss Anna!!

The initial search terms that the pair typed into the search engine were spelled incorrectly but were autocorrected by the iPad. Autocorrect enabled the pair to receive accurate images from
the search engine related to their landmark. The autocorrect function assisted their quest for information on various occasions during my observations, each time facilitating access to appropriate information, regardless of their spelling proficiency.

In another instance, James and Devon were in the process of composing their *Comic Life* associated with the novel study *Stowaway*. As they worked, James asked Devon about one of the characters from the book.

James: How did Lady Gray look like?
Devon: A greyhound. Hound like. Lady Gray like…(pausing…)  
James: How does a greyhound look? Hmm. Probably just search a picture of a greyhound. (Some trouble typing it in and finding it. Devon has an iPad)
James: Those are hounds. Look (spelling) hound
Devon: Here.

Even though both students had knowledge of the minor novel character, a greyhound named Lady Gray, neither student knew exactly what a greyhound was, even after reading the novel. The students had a tool at their disposal to quickly, and accurately, find the information needed. The iPad served as a tool to extend the students vocabulary and accuracy of the information they would provide the teacher in their project.

**Barriers: Individual Accountability.** One barrier to having students work with technology, particularly when the project involves partner work, is a lack of individual accountability. Collaborative work can be an effective teaching strategy, but it is difficult to know the extent to which each student contributed to the project outcomes. During my observations, the students worked collaboratively on most of the assigned tasks. I was able to record the process of collaboration and contributions made by each participant. However, individual achievement was more difficult to document.
Devon and Morgan worked together over the course of several days on their Country Research Project. Morgan, a high-achieving student, often seemed to dominate the conversation and ignore Devon’s comments and suggestions for their joint project. The projects were intended to be a collaboration between the pair, reflecting their joint knowledge of the subject. In the following excerpt, Devon was attempting to share information related to their project that his partner was struggling to find.

Devon: I just wrote this here. (Pointing to his paper and the information he found earlier.) Morgan: (ignoring his suggestion) I’m going to ask her (the teacher). (Reading from the screen) Lies between 14 degrees to 30 degrees southeast. Wait, wait! (she continues to look) It’s doesn’t say anything about the weather. Doesn’t say! It doesn’t say what the temperature is. We can’t find the weather, like average.
Devon: I wrote this. I wrote… (trying to show them what he had written down regarding the weather.)

Anna: (the teacher overhears and approaches the pair) How about search New Zealand climate and see what you get?

Morgan: See, this comes up. I don’t want to use Wikipedia.

Anna: No, I don’t want you to use Wikipedia.

In the previous exchange, Devon offered content suggestions several times, but no one listened, Devon found information that was suitable for the required task by using the iPad in a previous class period. Although I do not know the source or if the information was accurate, clearly, he deserves an opportunity to be heard. On another occasion, I documented a similar incident in which Devon had already found the necessary information, but his partner, Morgan, ignored his suggestions and relied on the teacher to validate the information found.

Morgan: I need to find the culture! I can’t find the culture!

Devon: It’s right here (pointing to the screen). It says people and culture.

Morgan: But it doesn’t say, Miss Powell, what’s culture. I can’t find culture.

Devon: (reading) Today, most kiwis are known… (fades out as Morgan begins to talk over him).

Morgan: Like it says people and culture but I don’t know what part is culture.

Anna: (reading her page) What part are you on?

Morgan: Like what is life like there.

Anna: That is what you need to find out. Read people and culture. Right in here I see the word culture. (Morgan and Devon reread).

Neither Morgan, nor the teacher, listened to what Devon had to say and continued to search the Internet for a reliable source of information regarding the weather. Morgan ignored Devon’s contribution in an effort to find it for herself and Devon’s attempts to participate were disregarded. On another occasion, it appears that Morgan solicited advice from Devon on their joint project.
Morgan: Wait, which one do you think we should do? (looking through images) I need one with a picture too.
Devon: What about that one?
Morgan: I just need a picture, oh I got a picture.
Devon: And the currency and a kiwi.
Morgan: This picture is blurry, oh whatever. (they chat with neighbors while she continues to look. They chat about music.)

Although Morgan asked Devon for his opinion, she ultimately decided what to include in the project. Her selection of the material and information always overruled what Devon had to offer, without exception. On a number of occasions, while Morgan worked on their project, Devon spent time chatting with his friends nearby.

(Morgan and Devon are working on their project as the teacher approaches. Devon has been chatting with a friend of his seated nearby and the teacher takes notice.)
Anna: I don’t think I can fairly give points to you and you if you’re not helping with this. Right now, what I’m looking at is Morgan doing all the work and you are chatting with your friends behind you. (She walks off and Morgan gives Devon the iPad and begins directing him on what to do.)
Morgan: Okay, type in. (but reaching over him to touch it) Now, type in, A. Wait, ok, you have a, o r a k i. Then press the 1-2-3- button. Back to the letters. Then press that. Then type in o-u-n-t space, c-o-o. And then let me do the next one and then you can do the next one. (he turns away while she takes over again) Watch what I’m doing! (he kind of pays attention)
Devon: Where’s our notes?
Morgan: Eva come here. I want to show you something.
Devon: (Devon looks at the PP and starts to write.) Yeah, come here.
Morgan: Yes, look how they transition.
Devon: It crumpled up. It’s pixelated.
Friend: That’s cool.
Aimee: Are you editing your PP? Who decided to do all that?
Devon: She did.

As the teacher made her rounds to check on the students, she noticed that Devon was not actively participating in the group project. She reminded him that this is for a grade and that it needs to be done fairly. Morgan then gives Devon a chance to help once Anna walks off but grows frustrated with Devon and takes the iPad back to continue working on their project. It might appear that Devon lacked in participation, however Devon’s contributions were not valued, and he left his partner to do the work. Figure 4.19 is an example of the ways in which Devon felt marginalized in the collaborative technology projects,

Figure 4.19. Devon waits while his partner reviews his work.

**Barrier: Hiding with Technology.** With the implementation of technological tools, students often appeared to be busily working on the assigned projects. They exhibited behaviors such as clicking around on their iPad or chatting with their partners. As I approached Bella and Ariana during one of my observation times, both students appeared to be working diligently on
their Country Research Project. After several minutes of observation, I asked Ariana to explain her process on the iPad since I could not view the screen from my seat.

Aimee: Ariana what are you working on? (No answer. Lifts her iPad up slightly so I can’t see the screen.) You’re over there playing on the iPad, aren’t you? (I look over at her screen and she is searching through Google images of cats.)

Bella: Ariana!

Aimee: Why don’t you go ahead and work on your essay?

Bella: Work on your essay young lady!

Ariana: Tomorrow.

Aimee: Why tomorrow? You don’t have anything to do right now.

Bella: If I finish my clim-out we can work on it together?

Ariana: Clim-out? You said clim-out.

Bella: When I finish the climate, I can start you off. I can help you start the beginning of the essay and you can finish it. Then I’ll start mine. (She returns to her iPad to look up information.)

Aimee: Why don’t you use your time to write the essay instead of skipping it?

Bella: You can ask the teacher for help.

Aimee: But why aren’t you doing it right now?

Ariana: I can’t. (She doesn’t want to complete the task. She goes back to whatever is on her iPad.)

Aimee: Don’t you still have 5 minutes?

In this excerpt, I had built enough rapport with Ariana that she was not afraid to let me see she was playing around on Google images. At first glance she looked busy, or “on task,” but I recognized her attempts to avoid the task of finalizing her essay.

During a separate observation, Devon was looking through a PowerPoint. It was my assumption that he was adding information to his group’s presentation for the following day.

Morgan: Devon, seriously you need to do the essay.

Devon: I already did.
Morgan: (looking at his written portion of the project) Three paragraphs - that are really short. Like one paragraph each. You have to put all the facts in it.

Devon: I don’t have the facts.

Morgan: Well work on it. Biome’s tomorrow and you want to type it.

Devon: (Looking over their PowerPoint) I don’t want to type any of it.

Morgan: Well tell your mom to type it. I was only saying that your mom can do half and you do half. But you write it down and your mom will type it up for you tonight. Or do you want to write it at home and type it up?

Devon: I don’t want to do neither. Ah! I’m not lazy, but whatever. (starts chatting with friends).

Devon appeared to be working because he had an iPad in his hands and a PowerPoint on display.

Figure 4.20. Ariana is coloring (off the teacher’s task) while her partner searches for the required information.
**Barrier: Technology is Hard.** Goldberg, Russel, and Cook (2003) suggest that students write longer, and with higher quality texts when able to use technology. Technological tools often proved to be beneficial, but many times technology was also hard for my participants. They struggled with the unfamiliar aspects of the tools and deciphering the information they were able to access. Consequently, the use of technology added another layer of difficulty to literacy tasks.

During the course of my study, students were often given the task to research information needed for their assignments. This was a struggle because they had a hard time accessing information. The websites were often too difficult to read, and the students were not sure how to search for the needed information. The students were not taught the skill of searching for reliable information. During one of my interviews, I wanted to know how Devon accessed the information on his selected country.

Aimee: How did you find that out? (referring to the information he has written down)
Devon: Mara
Aimee: How does Mara know?
Devon: She likes science and I asked her. She likes New Zealand.
Aimee: Mara, how did you know New Zealand is a country?
Mara: Because Australia is my favorite continent.
Aimee: So, it’s one of the countries in that continent. So, you use your friends? You don’t use Google, you use your friends? Is that what you recommend?
Morgan: Yeah, for some things.
Devon: This takes longer!
Aimee: What’s longer?
Devon: That. (looking down at the iPad to his Google search)
Aimee: The Internet?
Devon: Yeah.
Devon relied on his friend to determine facts about his selected country. It was easier for him to use a peer as a resource than to find the necessary information using the available technological tools. In using this workaround he did not learn how to use the tool.

A short while later, Morgan and Devon tried to find pictures and information for their PowerPoint presentation. They were seated together with a shared iPad.

Morgan: We need to find one that actually shows the ocean.
Devon: (taking the iPad) What we need to do is...
Morgan: (takes it back) Wait!
Devon: I can’t do anything.
Morgan: I find the pictures, you type.
Anna: Is he taking a turn typing?
Morgan: Yeah, he did some of this.
Devon: I did all of it. (giggling)
Anna: Okay, when I’m walking around I want to see him using the iPad some of the time.
Morgan: Okay.
Devon: This is quite complicated!

In this instance, Devon felt more comfortable searching for images than he did searching for information on their selected country. Although the transcript indicates he was not participating in the work, in actuality, he often relinquished the task to Morgan due to his discomfort and level of proficiency with the assignment.

Devon was not the only participant that felt the technological tools made the tasks more challenging. As Bella conducted research on the iPad for information on her project, she grew tired of looking for and writing down information.

Aimee: Look at that website. What do you notice that is has?
Bella: Uhm, people places… AHHH (noticing what she missed) Because I missed the people.
Aimee: Why did you do your head like that?
Bella: Because I could have done this for the people and culture. And...I don’t think it has that stuff. It’s the *National Geographic* one.

Aimee: History
Bella: Do we have to do history?
Aimee: You did it already. Remember? What is it like in the 1700’s? (Ariana interrupts)
Ariana: But Bella, Devon is already doing the London Bridge!
Aimee: What is it like now? Look at this! (pointing to the titles on the page) Government and Economy. It talks about the currency.
Bella: AHHHHH
Aimee: Why do you get upset? Cause it’s all on one page?
Bella: Yeah!
Ariana: (interrupting) Devon’s already doing the London Bridge
Bella: No, he’s not! (looking back at me)
Aimee: So, what does that mean? What helped you find this website?
Bella: Uh, You.
Aimee: Well me, not me! But what did I tell you would have helped? To search what?
Aimee: Yeah, kids! That will filter out a lot of the harder websites and get you to information directed for students. I mean it’s good to fact check to make sure it’s good information, but you think you can trust *National Geographic Kids*?
Bella: Yeah.
Aimee: *National Geographic* is known for this stuff. Right? It’s not like I wrote the website, so you don’t know if it’s true. Geography is my worst subject by the way (Bella giggles). I can never remember where anything is. (Ariana is not paying attention to this conversation. She’s looking around the room. Probably at other people’s projects.)

Bella was one of the last students in the class to be on the research stage of the project. A quick survey of the class revealed that most pairs had completed the research and writing portion
of the project and had moved on to the “fun” part of the assignment: making a display to accompany their research projects. Bella continued to search for information, largely due to her difficulty with the abundance of information available on the Internet and inability to find appropriate resources.

**Figure 4.21. Bella found an appropriate website with information for kids.**

**Barrier: Inaccuracy of information.** The Internet offered boundless information for the students as they investigated their assigned projects. A quick search yielded information to be incorporated; which was often used without questioning the source or verifying the information. My participants struggled with reading disciplinary texts and much of what they found appeared to be difficult to read, based on my observations.
For instance, Bella and Ariana needed a landmark to accompany their selected country. While Bella worked on her writing portion, Ariana conducted a number of Internet searches in order to find the perfect landmark. She found one that she liked and saved a copy of the image on the iPad.

Bella: Look it’s so pretty (showing off her image on the iPad. She keeps looking through the images. Ariana walks off.)
Aimee: What is it she wants to make?
Bella: The, uhm, this (grabs her iPad to show me a picture for reference)
Aimee: What is that called?
Bella: I have no idea. (hands me the iPad. It’s a picture of Stonehenge.) It says the love wall?! I guess. It’s off of Brave (the Disney movie). I know that.
Aimee: (Ariana returns to the table) Ariana what is that? What is that you want to do?
Ariana: It’s like the landmark.
Aimee: Where is it? And what is it called?
Ariana: I don’t know yet.
Aimee: Well you gotta find out. Here, find out where it is and what it’s called (handing her the iPad).

Ariana then spent some time researching the correct name of Stonehenge. After a little while, I asked her again what she had found. She insisted that is was called “The Love Wall” based on the information she read. I asked her to show me her source, and it indeed said Love Wall, however it was referring to the name of the website, not the landmark, Stonehenge. When I pointed this out to Ariana, she was slightly embarrassed by her misunderstanding, but shrugged it off and corrected herself.

During a subsequent observation, I wanted to follow up with Ariana and Bella’s progress on their landmark. As I sat down beside Ariana, I noticed she was looking through Google images. She flipped through what appeared to be images of Stonehenge underwater.
Aimee: What are you doing?
Ariana: Looking up stuff
Aimee: What are you looking up?
Ariana: Stonehenge Great Lakes
Aimee: Why Stonehenge Great Lakes? What do those things have to do with each other?
(She just gives me a blank stare.) No, I’m not criticizing. I just want to know what you are doing. Why did you look up Stonehenge Great Lakes?
Ariana: Cause I wanted to see how they looked like underwater.
Aimee: They aren’t underwater.
Ariana: (looking puzzled) They’re not?
Aimee: No. What Google does is when you put in search terms, it brings up whatever is closest to it. What people say about it or what people type. So, if you put in Stonehenge underwater, it will bring up something that looks like Stonehenge that’s underwater. Somebody made a comment, “Oh it looks like Stonehenge under the ocean.” That’s not really what it means. Okay? That’s not the real thing. That’s why I say you have to look at the actual site and see if that’s it – ‘cause Stonehenge isn’t under water. You just saw it. It’s like on a grassy knoll. You just saw it. It’s pretty awesome.

Figure 4.22. Example of inaccuracies found in the students’ products. The student selected this image to represent Stonehenge.
After I spent a few minutes explaining how search engines work, she seemed to understand how she was able to find images of Stonehenge underwater - even though it is not located there. Her lack of knowledge of geography compounded with her inability to discriminate information on the Internet led her to significant misunderstanding of the information she found.

In a similar instance, Devon was in charge of the iPad during the creation of their Comic Life. The pair was working on information and drawings to add to their project. James was drawing pictures and Devon was taking pictures of the drawings and adding the accompanying text to go with the drawings. At one point, James asked Devon to find a picture of a greyhound as a reference for a drawing.

James: How does a greyhound look? (thinking) Hmm. Probably just search a picture of a greyhound.

(Devon has the iPad. He has some trouble typing it in and finding it.)

James: Those are hounds. Look (spelling aloud) h-o-u-n-d.

Devon: Here (shows him the screen with a picture of a dog he had found.)

James: That's not a greyhound. This one is a ro-ro. That’s a rrr... (trying to sound out the word and gives up) Grey hounds are gray! That’s a Rhodesian Ridgeback. Devon, you could have gotten a gray dog. Lady Gray is gray and Lord Gray is gray. Both of them are gray.

Another friend: I agree.

The picture of the dog Devon found wasn’t a picture of a greyhound. It was one of the first dogs that appeared when he searched using the term “hound.” In spite of the fact that he had
the resource of the Internet available to find accurate information, he settled for a picture of the first dog that popped up during an initial search.

While the students were willing and eager to use the iPads to find information for their assigned tasks, they were often presented with information that was difficult or unwieldy. Without being taught how to read the material critically, the students relied on information that was inaccurate.

![Image](image.png)

**Figure 4.23.** Example of inaccuracies found in the students’ products. This dog does not resemble the greyhound described in the novel.

From my analysis of the data, I noted a number of benefits and barriers to the inclusion of digital technologies for students with literacy-related learning difficulties. The students were both motivated and persistent to work towards the instructional goal. Additionally, they were able to serve as a “knowledgeable other” for the peers – which traditional literacies don’t afford. However, the use of digital technologies also highlighted barriers such as individual
accountability, inaccuracy of information, the ability to hide with technology, and a sense that technology is hard for the participants. Each of these aspects are important to consider when incorporating technology in the classroom with students with literacy-related learning difficulties.

**Analysis of Composition**

As new technologies emerge, new composing and reading processes arise to exploit and accommodate the new technology. Mastering online and digital skills requires students to be competent in print-based and digital texts. As such, digital literacies “enable the bridging of traditional print literacies with other media” (O’Brien, 2008). Given the focus of this study, I sought to examine the composing processes of students who struggle with literacy-related tasks. Following Troia’s (2006) examination of four components of students’ writing processes, I used her work to focus on the strategies my focus students exhibited.

During my observations, I noticed that students struggling with assigned tasks in spite of the different tools they were introduced to and allowed to use. Specifically, I noticed difficulty composing, both on paper and digitally, the required material in response to the given tasks. After I transcribed all of the video and audio data of the major literacy events, I read through my transcripts for evidence of students’ struggling with composition.

Troia (2006) described four processes that students with learning difficulties struggled with when executing and regulating the processes underlying proficient writing to include: planning, content generation, revising, and text transcription. Based on his description of those four processes, I reread and coded my data for instances of students “struggling” with writing as described by Troia (2006) within the context of integrated digital literacy instruction. The four a
priori codes I used were: planning, constrained content generation, limited revision, and poor text transcription. The number of instances I observed within the data are included in Table 4.3.

Table 4.3
Characteristics, Description, and Number of Observed Instances of Troia’s (2006) Characteristics

<table>
<thead>
<tr>
<th>Characteristics of Struggling with Composition</th>
<th>Description of Characteristic</th>
<th>Number of Instances Observed Characteristic Across Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Instances of time spent planning for writing</td>
<td>11</td>
</tr>
<tr>
<td>Constrained Content Generation</td>
<td>Content contained within student writing</td>
<td>35</td>
</tr>
<tr>
<td>Limited Revision</td>
<td>Evidence of revision during the process of writing</td>
<td>16</td>
</tr>
<tr>
<td>Poor Transcription</td>
<td>Mechanics of turning content into written text</td>
<td>22</td>
</tr>
</tbody>
</table>

Planning. Planning behavior, particularly the time spent planning for writing, is an important aspect of the composing process and is linked to the quality of the written product (Graham, 2008). During my observations and interviews, I looked for evidence of the processes the students used to create digital texts. Additionally, I wanted to know the steps they took to plan for completing their written tasks. I identified instances of planning behaviour within the data and share examples below.

As I enter the conversation, Devon is looking up pictures of Star Wars to add to his iMovie. I look over his shoulder and notice that he and a friend are looking at the computer screen and Devon is saving images as he comes across the ones he likes.

Aimee: Oh, is he helping out with yours (referring to his iMovie he is creating).
Devon: A little bit yeah.
Aimee: Oh, are you all Star Wars fans.
Devon: Yeah and Dylan and Joey (pointing to his friends and smiling).
Aimee: The Star Wars Club. Is that the last thing you have to work on?
Devon: Yes
Aimee: You have your songs and…?
Devon: Oh no, I need like one more thing or two more things.
Aimee: How do you decide what’s going on the thing (referring to his iMovie)?
Devon: Whenever I go over it I guess. [All About Me Ariana Devon Quotes 5.29.15]

Devon did not have a plan. His product evolved as a result of exploration and interactions with those around him. Students with learning disabilities often overestimate their writing ability and the need for strategic planning (Ellis, 1986; Paris & Winograd, 1990). Without a plan for his writing, he was not likely to present a project that encompassed all of the requirements at a high level of accuracy. Writing instruction, including writing done in a digital format, should include strategies for planning.

In the following example, I spent some time with Bella and Ariana as they were working to compile information for the written portion of their Country Research paper (See Figure 4.13). After some time, I noticed that Bella kept writing down information she found on a website related to her selected country. I was curious to what plans she had for this information and how she imagined using it in her write up.

Aimee: So how do you know how much information to write down?
Bella: (Thinking, looking perplexed) I don’t.
Aimee: How do you make that decision. Cause you’re still writing. How do you know when you’re done? When you’ve had enough?
Bella: I’m just writing this paragraph right here.
Ariana: I’m writing the 20 facts here (pointing to the information on the website she found).
Aimee: Do you have to do all 20?
Ariana: *(thinking)* I think.
Aimee: How do you know much information to put down? (no response, looking around)
When do you think you’re done?
Bella: When I uhm, when I finish the whole page *(pointing to her sheet of notebook paper she is writing on)* and when I’m done with the whole paragraph and if I have more time I’ll do more.
Aimee: So, a page is enough? Is a page full enough?
Bella: Yeah, probably.
Aimee: So, it’s the length of stuff that you wrote?
Bella: Yeah. *(they continue to copy down the information from the page while they have time)* [Country Research Ariana and Bella 5.19.15]

**Figure 4.24. Image of one of the websites Bella used to copy her information from.**

Based on our conversation, the girls knew they needed information related to their selected country. However, they did not have a plan for what specific information they needed and how it would be used in their final report. For the final report they were instructed to include the information from the list (See Figure 4.24). I did not observe and writing instruction specific to this event or see any specific rubric used for grading.
Similar to what Troia (2014) described as the practice of “list(ing) potential content in a first draft format” (p. 3), the girls wrote down everything they came across online that was related to the topic in order to fill the page. This later turned into rewriting similar information into the final draft without deviating from the initial data gathering.

A couple of weeks later, Bella had gathered all of her notes together she had taken during online research of her assigned country (Figure 4.25). Most of the other groups had already finished writing up their essay, but this pair was still working on their writing assignment. As I was there observing, she began to ask me questions related to the writing assignment.

Bella: What do I write my essay about?
Aimee: About Great Britain.
Bella: Yeah, I mean I know that. But what about it?
Aimee: About that (pointing to the list of requirements on the board)?

Figure 4.25. List of required information for the Country Research Project.

Bella: Ariana are you going to start on your essay now?
Aimee: You have to write your essay about Great Britain, right?
Bella: Yeah.
Aimee: So how are you going to write your essay?
Bella: I don’t know.
Aimee: Well, how do you usually start writing?
Bella: I indent.
Aimee: No, before writing an essay how do you usually start? Do you plan, or do you start writing? Or what do you do?
Bella: I plan
Aimee: You have all of your research, right?
Bella: Yeah
Aimee: Now you have to decide how you’re going to write about Great Britain in five paragraphs. [Country Research Ariana Digital Product 6.2.15]

![Image of Bella using her notes from the Internet to construct a graphic organizer.](image)

**Figure 4.26. Bella uses her notes from the Internet to construct a graphic organizer.**

I did not see evidence of a plan for writing prior to writing for any of my focal participants. They each had the list of requirements from the board and began searching for and writing down information as they came across the information. They would then take notes on their notebook paper under the various heading (e.g. culture).
Bella in particular spent a significant amount of time copying down information verbatim from the internet. After we finished talking, she sat there a few minutes organizing her pages of notes and thinking about what she was going to do. She may have been planning for writing, but I didn’t see any visible external evidence of planning. She used the requirements from the board to make a graphic organizer related to the information that needed to be included in her paper. She knew she needed a plan for writing but didn’t engage in actually planning from the information she had acquired or was going to write, since she used the bullet points from the board in her planning web (Fig. 4.27). She then got out a fresh piece of notebook paper and began to write her essay using information from her notes.

Ariana copied her notes over again (Fig. 4.28) and made sure they look nice while doing so (Fig. 4.29). She went directly from her note taking sheets to her final draft. Planning was overlooked, in spite of an abundant amount of time and useful information available.
Figure 4.2. Ariana makes her writing neat by using good handwriting and correcting her mistakes with correcting tape.

Content Generation: Students with learning disabilities often produce less content in their writing than their peers (Troia, 2006). Additionally, they include extraneous details within their texts (Graham, 1990; MacArthur & Graham, 1987; Thomas et al., 1987). Previous studies indicate several reasons students with learning disabilities struggle with content generation, including the capability of sustaining their memory search of topic-relevant material (Englert & Raphael, 1988), incomplete topic knowledge (Graham & Harris, 1997), or knowledge of genre patterns and text structures (Englert & Raphael, 1988; Graham, 1990). I have chosen the following examples as a snapshot of the challenges posed during the production of content.

Figure 4.29. Image of the greyhound from Devon and James’ project.
Devon and James were composing their response to the assigned book *Stowaway* as part of their novel study. As they were working to complete the main ideas from the novel, they took turns drawing, finding information, and compiling the drawings and information into their *Comic Life*. Devon and James were discussing which information to include and they both agreed that the greyhound trade would be an important point. James asked Devon to find some information on greyhounds since he was trying to draw it for their comic.

Devon: A grey hound. Hound like. Lady Gray like…


(Devon has the iPad and has some trouble typing it in. James is looking in over his shoulder then goes back to the novel for more information.)

James: Those are hounds (*referring to the dogs from the book*). Look (*spelling it for him*) h-o-u-n-d.

Devon: Here (*he got his search results and shows James the iPad screen)*.

James: (*looks at the search results*) That's not a greyhound. This one is a ro ro (*trying to pronounce the name of the dog he was shown*). That’s a rrrr…. Gray hounds are gray! That’s a Rhodesian ridgeback.

Devon: You could have gotten a gray dog. Lady gray is gray and lord gray is gray. Both of them are gray.

Other friend: I agree.

James: But we need a *greyhound*.

Devon: Yes, but we need to draw someone trading it. (*Speaks into the iPad*) Guy holding a dog and giving it to another person

James: It’s going to be hard. [*Stowaway - Devon 5.12.15]*

James asked Devon to help him locate the specific information for their composition.

While James was drawing, Devon located information, but it wasn’t accurate. James was concerned with the accuracy of the information provided and challenged Devon to check what he
found (Fig. 4.30). For Devon, the fact that he found a dog he liked was enough – he could just color it grey and that would be sufficient. In spite of having a world of information in his hands via the iPad, finding any dog would do.

The final portion of the student’s Country Research Project was a research report on their selected country. Bella was working to finish up a section of information on climate. She was having difficulty locating accurate information at her reading level on the topic.

Bella: Miss Powell I need help.
Anna: Where are all your notes. You should have all the information you need already.
Bella: No, I need the climate though *(she’s looking at the information already in her notes)*.
Anna: That’s not in there?
Bella: That’s Sarah's not mine
Anna: Oh. (she looks through her notes) What do you need?
Bella: The cli-mate *(saying climate slowly as she reads it from the board, not sure what the word is)*.
Anna: I don’t see it in here. *(she starts typing into the iPad while Bella watches)* Does that help or is too much writing? *(showing her a page that she found with information about the climate and making sure she can read the information.)*
Bella: Do we have to write it all? *(It was a text dense website).*
Anna: No!
Bella: What do I have to write *(Anna returns to read the page) Can I just write a paragraph for that?
Anna: Yes, a paragraph with this information right here. It doesn’t have to be all of it. Put it in your own words.
Bella: Okay. *[Country Research Ariana Bella Finding Info 6.2.15]*
Bella had previously found a website with the needed information, but she didn’t realize that the information was contained within the webpage. She was looking specifically for the word climate, but that wasn’t what the website used for a descriptor. Once Anna came over to assist her, she located a webpage with the right information. The website included a large amount of text and Bella was concerned with having to “write a lot of information.” Bella was comforted when she was reassured of the familiar text structure of a paragraph of information (Fig. 4.30). However, “a paragraph” response to the topic didn’t ensure accurate information, just the desired length.

During one of my final observations, Morgan and Devon were working to complete their final writing assignment. Devon was sitting there playing with his pencil and looking around while Morgan continued to write from her notes. According to Devon, he had finished his writing.
Morgan: Devon, seriously you need to do the essay.
Devon: I already did.
Morgan: Three paragraphs, that are really short. Like one sentence each. You have to put all the facts in it.
Devon: I don’t have the facts
Morgan: Well work on it. Biome’s tomorrow and you want to type it.
Devon: I don’t want to type any of it. [Country Research Devon Writing Part 3 6.2.15]

Looking at Devon’s essay revealed that he had only written a sentence for each topic, but because the sentence was long, and he structured it like a paragraph, he had included enough information. He even admitted he didn’t have the facts to Morgan, but visually his essay looked complete because of the way he structured the information.

**Revision**: Revision of text poses a difficult task for student with learning disabilities (Troia, 2006). Little time is spent on the task of revision and includes minor modifications such as changing words, phrases, and mechanical errors (Graham, 1997) and has little impact on the quality of their writing (Graham, MacArthur, & Schwartz, 1995). Substantive changes are rare, accounting for less than 20% of student revisions (Graham, 1997; Graham et. Al, 1995). The participants in my study also demonstrated this difficulty during my observations. Revision can refer to both the content and the structure of a piece of writing. The observations of limited revision refer to the mechanics of writing. There were no substantive revisions made by my focal participants.

As a general rule, Anna asked the students to review their work prior to turning it in. At times, she would look over their work and return it to the students to make revisions. On one particular occasion, Devon and Morgan had finished their PowerPoint presentation which included the information they research on New Zealand. “Go show her our work while I go ask
Briana something,” instructed Morgan. Devon approached Anna with his iPad to show her the presentation of their Country Research Project on New Zealand. She returned the iPad to him and requested he make changes to several slides, including more information about French Explorers. After returning to his seat, he sat looking at the iPad briefly, made a few changes, and then started to chat with his friends since he was finished with his work.

A short time later, Morgan returns to check on his partner’s progress. She reads through his additions. “You didn’t do capitals!” she exclaims as she starts to correct several things. “Type up about the French Explorers!” she tells him, but he has already turned around to chat with his friends. After several minutes she tries to get his attention again. “Devon!” she yells impatiently. He turns around to see what the fuss is about. “Wait, I wanted to do that!” he insists, referring to the changes in the capital letters. “You were too busy talking to them,” she responds impatiently.

I can’t be certain of the exact changes Devon made to their report, but based on Morgan’s reaction, his revisions didn’t make the substantive improvements that the teacher had requested (the information about the French Explorers) or even some of the minor revisions of mechanical errors.

On another occasion, I observed Ariana after she had finished putting together her information on Great Britain. She was in the process of revising her presentation. Previously, she hadn’t included all of the required information and was asked to make additions. I noticed she was typing into her presentation and seemed to be making changes to her work (Fig. 4.31). After a little while of work on her presentation she exclaimed, “Done!”

Ariana: (being silly and wiggling around) I’m done with everything!
Aimee: You have all the information in there that you need? You have all of these things? (I pointed to the board at the list of required information the teacher requested they include. She looks at the board and stretched and doesn’t answer.)
Ariana: Look what I did! *(She turns the iPad around to show me what she’s done. It has her title surrounded by different smiley face emojis.)*

Aimee: *(I look at her work, and I am intrigued by her title page. The students generally included images that represented their selected country. The emojis weren’t there previously, so this was one of her revisions.)* How do the emojis fit Great Britain?

Ariana: What?

Aimee: How do the emojis fit Great Britain? *(She responds to my question with a slight mumble. She starts flipping through the pages of her Comic Life. I let her continue without further probing.)* [Country Research Ariana Digital Product 6.2.15.mp4]

This incident highlights one of the various instances I observed that students would add extraneous information to “fill the page” in an attempt to meet assignment requirements. Since this occurred in a digital format, the types of changes the students made were different than what Graham (1997) describes in traditional writing such as adding images and emojis or adding or deleting a PowerPoint slide. However, they do apply when considering those minor revisions had little impact on the quality of student writing.

![Figure 4.31. Example of “revisions” Ariana made to her project.](image-url)
A final instance that highlights the idea of limited revision can be demonstrated by the students’ lack of willingness to revise in general. As the students would finish composing their projects, they would share them with the teacher or myself. On this particular occasion, I was sitting next to Ariana and Devon, both of whom were near completing their iMovie (Fig. 4.32).

Ariana: Devon. Look, it’s scary! *(She played a spooky sound effect she inserted into the movie.)*

Aimee: I don’t know if you want this for your grandma! *(We both laugh a little, thinking about the sound effect in comparison to the images on her slide.)*

Ariana: No, I’m just showing him.

Aimee: You think that is appropriate for the movie of your life? *(Referring to her selection of spooky music.)*

Ariana: No, I picked *Chains, Take Me to Church, Radioactive* and *How Much is That Doggy in the Window?*.

Aimee: Nice, Devon's got some music in his already. *(I look over at his project to see if he added his music into his iMovie already)* Did you add it in there? *(He nods his head yes.)* Cool! So, do you have all those quotes and pictures you need in there?

Devon: Yep.

Aimee: What are any extras you can do? Like other advanced features? Like, what’s that a picture of? *(I point to his slide, attempting to get him to think about the choices he had already made and others that could be made to enhance his work – like an addition of a title, description of the contents of the image, or why that image was important for him when describing his family.)*

Devon: Tennis.

Aimee: Tennis?

Devon: Yeah.

Aimee: There are some times when you can put what that means for you.

Devon: *(He cuts me short and doesn’t consider that things I’ve questioned him about.)* I want to save this.

Aimee: It saves by itself. Just X out of it. *(He X’s out of the program and goes to chat with his friends.)* [All About Me Devon Bella iMovie 6.1.15]
Devon’s project met the minimum requirement of adding images that reflect his life. However, that information was minimal, and could have used additional details during the process of revision. He also did not take advantage of additional features within the program to create interest for the audience. I attempted to point out that he could add these details or other features of the program during the process of revision, but he cut me short by asking how to save the information. What he had written was enough, regardless of available time and prompting. There were no revisions to be made.

Figure 4.32. Devon adding making final additions to his iMovie.

Text Transcription: At a more fundamental level, students with disabilities demonstrated what Troia (2006) described as “extraordinary difficulty” with the mechanics of turning content into written text. When compared to their peers, compositions of students with
learning disabilities are full of spelling, capitalization, and punctuation errors (Fulk & Stormont-Spurgin, 1995). Their handwriting is also described in the literature as slow, uneven, and illegible (Graham & Weintraub, 1996; MacArthur & Graham, 1987). While the aspect of handwriting doesn’t apply to all of their projects, the students did produce some written text in one of their major assignments. In order to consider students text transcription, I reviewed my data for instances of turning content into text, both on paper and on the screen. In the following examples, I highlight instances from both.

On a number of occasions, my participants expressed their difficulty with the physical aspects of writing, particularly what their text looked like. Devon tended to be more focused on the mechanical errors that had little impact on the quality of his work. During one observation, I wanted him to vocalize his thoughts on his work, so I asked to see his paper.

Devon: Okay, this is my first draft. We have to write it better.
Aimee: Why?
Devon: We have to write it better.
Aimee: (I wanted him to clarify what “better” meant, so I asked him the question again.) Why? It’s hard to write?
Devon: Yeah
Aimee: It’s hard to write here?
Devon: No, it’s just that I have bad handwriting.
Morgan: I can read it.
Aimee: Does it have to be pretty?
Devon: No, I don’t know. (He glances at his paper, and stares at it for a few seconds.) But I can’t just hand this in…
Morgan: Maybe you can ask your mom if you can type it up? (Morgan offered the suggestion nonchalantly.)
Devon: Yeah
Morgan: You type some and your mom type some.
Devon: (Nodding in agreement) I might have to type it.
Aimee: Honestly, it doesn’t have to be pretty. It’s what the essay says. It’s more important.
Devon: Yeah, I have three paragraphs? I’m not done [Country Research Devon Writing Part 2 6.2.15]

Later that observation, Devon was still working on his essay alongside his partner Morgan. He was using the PowerPoint to help him with the information on his assigned country. He hadn’t made much, if any, progress on his essay during the half hour of elapsed time (It was still the same length of text on the page.).

Devon: Are you done with that? (pointing to their group PowerPoint)
Morgan: NO! I’m not even on that. I’m not using that right now. (Morgan takes Devon's paper to read, checks it out, and hands it back to him) I can read that. It’s hard to read, but I can read it. Try to make space in your writing.
Devon: I know! (looks around distractedly) [Country Research Devon Writing Part 2 6.2.15]

Devon seemed paralyzed by what he perceived as bad handwriting, instead of adding information related to the content of the paper. He focused more on the mechanical errors that would have had little impact on the quality of his text (Graham, MacArthur, & Schwartz, 1995). McCutchen (1996) indicates that when students with writing difficulties devote cognitive resources to handwriting and spelling, content, organization, and style are ignored. I noticed that instances of paper and pencil text creation would cause the students to be stuck and unable to move forward. On another occasion, Ariana sat staring at her computer screen. After several minutes, she asked her friend Bella a question.

Ariana: How do you spell Azalea?
Bella: (thinking about it for a second and then responds, signing the lyrics to the song Ariana is asking about.) I-g-g-y put my name in bold!
Ariana: (Amused by her singing, but then acts slightly annoyed.) But how do you spell Azalea?

Bella: I have no idea! Just sound it out! She’ll know what you are talking about. (She then starts to count how many things she’s included in her assignment.) One, two, three four, I need two more! [All About Me Devon Bella iMovie 6.1.15]

Ariana didn’t seem satisfied with the suggestion to sound it out, but it would have helped her to move forward in her work. It is a strategy that Bella found in order to be more productive in her content.

A final example highlights Devon’s attempt to proofread his work as instructed by the teacher. She had been making rounds in the classroom to check in with the students about their progress. She stops by James and Devon’s table where Devon is reading though their Comic Life.

Anna: James, are you helping him find letters that are capital? You just need to edit for capital letters.

Devon: (He speaks up.) I can’t find any.

James: (He looks over Devon’s shoulder to see the changes he had made.) You don’t have to capitalize that!

Devon: (Realizes that James is pointing to the work Stowaway.) It’s a person, place, or thing. It’s a place.

Anna: If it’s a person, place, or thing, it needs a capital letter. Stowaway - it’s a name.

James: It sounds like go away. Stowaway (making them rhyme).

Devon: Just go away, Stowaway! [Stowaway - Devon 5.12.15]

Devon was successful in finding examples of words that needed to be capitalized. He went on to defend his choice to his partner James, even though Stowaway was a name, and not a place. However, he spent a lot of time and effort “fixing” his writing, instead of adding content. And from his response, it is clear that he was not enjoying the process of writing.
Summary

In this chapter, I analyzed Anna’s digital literacies instructional practices and situated them using the TIM in order to understand the context of her instruction. Based on her instructional context, I shared my interpretations of her instruction across the four highlighted events. I then moved in for a closer look at the classroom context by reviewing the students’ response to her inclusion of digital literacies and found that there are both benefits and barriers to engagement in productive technologies for students with literacy-related learning difficulties. Finally, I analyzed the ways students with literacy-related learning difficulties composed during the digital literacy events and found that the difficulties they face with composing digitally are similar to those with ‘paper and pencil’ composition.
CHAPTER FIVE;
DISCUSSION AND IMPLICATIONS

In this dissertation, I examined the ways students with reading difficulties navigated digital tools in a technology-rich environment created by an accomplished teacher who has experience using digital tools for instructional and student-learning purposes. I wanted to know how students with literacy-related learning difficulties respond to the incorporation of digital literacies in the classroom. The study was guided by the following research questions: (1) What was the context, content, and structure of the teacher’s technology instruction? (2) In what ways did the students use technological tools? (3) How did students with reading difficulties compose during digital literacy events? Through the use of qualitative case study, my analysis of the data highlight several important findings to inform the research questions: (a) Knowledge of Technology Does Not Ensure Technological Pedagogical Content Knowledge (b) Students with Reading Difficulties Still Have Difficulty with Reading Despite Technology Integration and (c) Change in Writing Tool (technology) does not Guarantee Change in Writing Performance.

Discussion

The focus of my dissertation was an effort to determine how students with literacy-related learning difficulties responded to the integration of productive technologies within the
classroom. However, prior to taking a close look at the students’ engagement, I needed to closely examine the students’ environment. After looking at the macro level of the classroom teacher and her classroom environment. I then moved in closer to study the student’s interaction with the environment she created. Finally, I closely examined the students’ digital composition.

This process of examination aligns with the underlying premise of sociocultural theories in that learning is determined by the interactions humans have with other people and the society that surrounds them (Lave & Wegner, 1991). In this study, the teacher shaped the environment of the classroom and the types of activities that occurred within it. Anna created the classroom context, chose the activities for the students to complete, and decided which aspects of digital literacies to include. Only a rich understanding of the classroom ecology can provide insight into how and what students with literacy-related learning difficulties were able to do within their environment.

Implications

Knowledge of Technology Does Not Ensure Technological Pedagogical Content Knowledge. As I previously mentioned, I selected Anna for this case study due to her knowledge of and training in technology integration. As the classroom teacher, Anna was allowed the freedom to conduct the classroom as she desired. She was given lesson plans, but they were no more than basic descriptions (i.e. page numbers in a workbook), which allowed her flexibility to move beyond entry level technology integration. As I described in chapter four, there were several occasions in which both Anna and the students moved beyond an entry level of technology integration. It was those instances that merited further analysis in this study. However, it is also important to consider the Technological Pedagogical Content Knowledge (TPACK) to understanding the instructional decisions demonstrated throughout my observations.
Teachers should present a range of technological integration across the matrix during the course of instruction. Evidence of the ability to integrate technology at an advanced level even once would mean that the teacher is capable of that level of technology integration (Welsh, personal communication, date). It is necessary to move between the various categories of the TIM depending on the needs of the material being taught. Considering Anna’s deep knowledge of technology, it was surprising higher levels of integration weren’t included more often in her lessons. “While technology tools can provide powerful support for instruction, technology is not in and of itself an academic intervention” (Harmes, et al., 2017) Several studies indicate a shift from learning about technology, to learning from technology, to learning with technology (Ertmer & Ottenbreit-Leftwich, 2013; Saavedra & Opfer, 2012). The shift from the transmission model of technology to a model that emphasizes “the pedagogy that technology enables and supports, rather than on the technology itself” (Ertmer & Ottenbreit-Leftwich, 2013, p. 175).

Analysis of the highlighted events indicate Anna often assumed prior knowledge from the students regarding their ability to navigate technological tools. She would jump right into asking them to complete a task, without considering what content they would need to access her instruction. Perhaps this assumption lies in the perception that these students are “digital natives” that already know and understand technological tools such as the iPad and computer. On one specific occasion, a student was seeking clarification on how to complete the task.

Bella: How do you put this (an image) on there?

Anna: (Showing her how it’s done while she is talking) It saves on the desktop, so I can drag it and drop it in.

Student: (Interrupting) Wait, what if it’s on your flash drive?
Anna: If it’s on your flash drive you need to have your flash drive open. And then you can drag it from your flash drive. It’s so easy. (She goes back to her sample PowerPoint and starts to describe the process) So, you can change the size, you can overlap them. This is a collage, so you can add them differently to make it look like however you want to make it look. But, you’re going to fill in as much as the white space as you can. You have lots of pictures and hardly any white space. John?

While this may seem rudimentary to someone proficient in technology, scaffolding is required in order for successful learning to occur. The use of digital tools also requires specific disciplinary literacy, such as opening a document or the use of a right click for example, that needs to be taught and not assumed, or just “shown.” Through the entire discussion of constructing a collage, she didn’t stop to first explain what collage is and how it is done. It was evident through their questioning that the students didn’t understand the concept of collage, therefore they couldn’t access the content of her explanation. Additionally, they weren’t all certain how to use the digital tools required of the process of creation. Careful consideration needs to occur when using digital tools in the classroom, not only regarding the tools themselves, but also instructional practice and the content to be covered.

Mishra and Koehler (2006) state that the TPACK “is the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones” (p. 66). Effective technology
integration requires interdependent content, technological, and pedagogical knowledge (Mishra & Koehler, 2006, Koehler & Mishra, 2008). While it might be “so easy” to some, all areas of the TPACK should be taken into careful consideration prior to instruction. Teachers must “directly link students’ content-related learning needs with particular content-based learning activities and related educational technologies that will best support the activities’ successful implementation” (Harris, et al., 2010). Preservice and in-service teachers need support to link students’ content learning needs with the learning goals and educational technology that will best support successful implementation.

One method designed to guide teachers through planning for technology integration is the Technology Integration Cycle for Literacy and Language Arts (Hutchison & Woodward, 2014). Through their work, Hutchison and Woodward (2014) developed a model for planning to integrate technology into instruction (Fig. 5.1). The elements involved in the model are designed to support teachers in planning for both digital and non-digital literacy skills in the roles of both producer and consumer.

Figure 5.1. The Technology Integration Planning Cycle for Literacy and Language Arts (Hutchison & Woodward, 2014) Reprinted with permission (Appendix C)
As part of the planning cycle, teachers keep the instructional goal at the forefront of their teaching. Moving through the cycle, the tool is selected after the goal and instructional approach have been decided upon. Two important considerations of identifying a digital tool’s contribution to instruction are the literacy learning use of the tool affords and the multimodalities students are asked to engage in (Hutchison & Woodward, 2014).

After the tool selection, the teacher has the opportunity to exit if using paper and pencil or continue along the cycle. There is also another exit point if the barriers overwhelm the instructional goal. In my study, there were times when Anna could have done some of the activities using paper and pencil instead of utilizing technology. For example, the Stowaway Project could have been just as easily been done by writing a list of the main ideas from the book. Adding in the technology of Comic Life did not necessarily facilitate an entirely different outcome but did change with the addition of a digital tool. But did it make a difference for student learning? What about differentiation? Pedagogical Knowledge of how students learn best, especially those with learning disabilities, should have influenced her instruction. As Woodward (2016) discusses, the instructional goal may need more prioritization and be the foundation of planning in order to strengthen the planning process, with less emphasis on the tool (technology) itself.

**Students with Reading Difficulties Still Have Difficulty with Reading, Despite Technology Integration.** Technology can be a wonderful tool when incorporated appropriately. It served as a motivational tool in this study and in my previous experiences in the classroom. It also allowed students who typically struggle to serve in the role of “knowledgeable other” based on their familiarity with technology. However, it also has some drawbacks. Prior to conducting this study, my belief was that technology could only serve to benefit students with reading
difficulties. I wanted to conduct this research in order to document how technological tools would be a support and scaffold for students with reading difficulties. Ultimately, I found out that students with reading difficulties are still struggling. Tools, technological or not, are inanimate objects. Unless the teacher is explicitly using the tools in a way that is meaningful for learning, they aren’t going to change anything.

Like the participants in this study, students with learning disabilities are largely included in the general education setting. Research indicates that cooperative learning is associated with positive outcomes on student social interactions and self-concept development (Slavin, Madden & Leavey; 1984; McDonnell, 1997). Students often work collaboratively when using digital tools in the classroom in large part because the number of available digital tools is less than the typical number of students in the classroom. While collaborative work was beneficial in many aspects, it also impeded individual accountability.

For example, Devon attempted to make contributions to his collaborative project but was often overshadowed or ignored by his partner Morgan.

Morgan: I need to find the culture! I can’t find the culture!

Devon: It’s right here (pointing to the screen). It says people and culture.

Morgan: But it doesn’t say, Miss Powell, what’s culture. I can’t find culture.

Devon: (reading) Today, most kiwis are known… (fades out as Morgan begins to talk over him).

Morgan: Like it says people and culture, but I don’t know what part is culture.

On the other hand, Ariana would often engage in off task behavior while Bella worked to complete their group assignment.
Aimee: Ariana what are you working on? (No answer. Lifts her iPad up slightly so I can’t see the screen.) You’re over there playing on the iPad, aren’t you? (I look over at her screen and she is searching through Google images of cats.)

Bella: Ariana!

Aimee: Why don’t you go ahead and work on your essay?

Bella: Work on your essay young lady!

Ariana: Tomorrow

In both instances all of the students “looked busy,” but what were the contributions made by the students that struggled the most? Accountability is often thought of in a negative manner and I want to clarify that I mean accountability in regard to who is responsible for the decisions being made in collaborative partnerships. This is not to critique the use of cooperative learning, but given the difficulty faced by my participants, classroom structure, such as assigned partners, needs to be prioritized when planning for instruction.

Related to accountability within the student-selected partnerships is the students’ abilities to navigate the technological tools in an area they struggle with in print-based form. As I previously discussed in Chapter 4, there is evidence of beneficial aspects with the inclusion of technological tools. However, I also documented an additional layer of difficulty these tools added as well. For example, most of the projects the students needed to complete involved using the Internet to find images or information. While teachers can control the level of text difficulty students use within books (e.g. textbooks, ancillary materials), text complexity is harder to control when students are left to surf the Internet for any source available. Devon provides an interesting example when faced with searching for information.
Aimee: How did you find that out? (referring to the information he has written down)

Devon: Mara

Aimee: How does Mara know?

Devon: She likes science and I asked her. She likes New Zealand.

Aimee: Mara, how did you know New Zealand is a country?

Mara: Because Australia is my favorite continent.

Aimee: So, it’s one of the countries in that continent. So, you use your friends? You don’t use Google, you use your friends? Is that what you recommend?

Morgan: Yeah, for some things.

Devon: This takes longer!

Aimee: What’s longer?

Devon: That. (looking down at the iPad to his Google search)

Aimee: The Internet?

Devon: Yeah.

He had difficulty sorting through the information his Google search yielded, so he decided to consult with a classmate, essentially avoiding the task altogether. During a separate observation, I noticed that Bella was becoming frustrated in her attempts to find information. Her partner Ariana had already decided to skip the task and was looking to complete the next part of the assignment which involved an art project. I suggested that Bella use different search terms.

Aimee: So, what does that mean? What helped you find this website?

Bella: Uh, You.

Aimee: Well me, not me! But what did I tell you would have helped? To search what?

Aimee: Yeah, kids! That will filter out a lot of the harder websites and get you to information directed for students. I mean it’s good to fact check to make sure it’s good information, but you think you can trust National Geographic Kids?

Bella: Yeah.

Aimee: National Geographic is known for this stuff. Right? It’s not like I wrote the website, so you don’t know if it’s true. Geography is my worst subject by the way (Bella giggles) I can never remember where anything is. (Ariana is not paying attention to this conversation. She’s looking around the room. Probably at other people’s projects.)

Once I helped her filter out information, in this case use more precise search terms for what she was actually looking for, she was able to read and understand the information on the website. Finally, the text complexity of websites geared towards an adult audience impeded accuracy in the students’ completion of their assignments. As I watched Ariana complete her work, I noticed she was trying to find information on a well-known landmark as a reference for both her physical landmark and the digital display.

Aimee: What are you doing?

Ariana: Looking up stuff

Aimee: What are you looking up?

Ariana: Stonehenge Great Lakes

Aimee: Why Stonehenge Great Lakes? What do those things have to do with each other? (She just gives me a blank stare.) No, I’m not criticizing. I just want to know what you are doing. Why did you look up Stonehenge Great Lakes?

Ariana: Cause I wanted to see how they looked like underwater.
Aimee: They aren’t underwater.

Ariana: *(looking puzzled)* They’re not?

This salient example from Ariana shows how important comprehension and critical thinking are when utilizing the Internet. The implications for teachers using the Internet with students, struggling are not, are important to consider. Teachers should explicitly teach how to determine accurate sources when using the internet. Teachers might also provide students with a collection of approved sources to use when searching for information, instead of having access to any website available on the internet. In this particular study, Anna could have demonstrated how to conduct internet searches and also provided her students with websites containing information related to the specific countries at an appropriate reading level.

In this study, the addition of technological tools seemed to exacerbate certain difficulties students with reading difficulties demonstrate. Not only do teachers need to plan carefully for technology integration in when planning lessons, they also need to consider the unique difficulties their students have and provide accurate support in order to help them be successful. As Schneider, et al. (2015) mention, if students are left to “go play” with the technology without scaffolding or guidance from the teacher, curriculum-directed learning opportunities may be diminished. Other instructional models show us that when teachers scaffold, with models such as a gradual release of responsibility (Brown & Campione, 1981; Pearson & Gallagher, 1983), the instruction transfers from teacher modeling to student application. Without careful consideration of the technological tools and explicit guidance from the teacher with those tools, students with reading difficulties do not stand to benefit from their inclusion.
Change in Writing Tool (Technology) does not Guarantee Change in Writing Performance. During the course of my study I set out to document the ways in which the students responded to a technology-rich environment. All of the events that I studied closely were inherently multimodal, combining visuals, words, images, and sounds. Multimodal texts require and support a different type of meaning making than previously considered in print-based text (Kress & Domingo, 2013). Since writing is becoming more intertwined with the other modes (Cope & Kalantzis, 2009), it is important to consider how students produce digital content via productive technologies (Pandya & Avila, 2017). While I observed my participants, I took notice of the struggle they had composing, both on paper and digitally, in response to the assigned tasks. Thus, a change in writing tool (technology) did not guarantee a change in writing performance. So how do we help students with difficulties overcome the challenges of composition - especially in a technologically-rich environment?

It is important to mention that reading and writing don’t have to be connected. The writing could be circumvented all together if students are allowed to do alternative assignments. One example could be an audio or video response to discuss their understanding of the literature instead of writing words, such as in their Comic Life Project related to Stowaway. Hay, Courson, and Cipolla (1997) found that when students are provided with alternatives to traditional written tasks, such as oral presentations, role plays, murals, or other creative projects, they are enabled to use their learning strengths (e.g. visual, auditory, tactile, and kinesthetic) rather than their deficits. Hay and colleagues (1997) posited this prior to the influx of technological tools – which only expand upon the alternatives to traditional writing. However, circumventing writing altogether would be a disservice to an already vulnerable population of students.
By upper elementary, writing becomes a fundamental tool for learning and demonstrating knowledge (Harris & Graham, 2013). Lack of skilled writing endangers students at risk for school failure, extending well beyond the school years as high-level literacy skills are a necessary part of jobs that pay a living wage (Berman, 2001; Graham & Harris, 2011). Students with learning disabilities have more difficulty with writing than their typically achieving peers, including executive function, self-regulation for organized, strategic behaviors for composing and an overall negative attitude toward writing after the primary grades (Harris & Graham, 2011).

From my observations, I noticed that the engagement in productive technologies did create some positive aspects that could be leveraged for the potential of improving student composition, particularly regarding the negative attitude towards composing. During this study, participants exhibited both persistence and motivation, which are uncharacteristic in traditional writing tasks. Devon, Bella, and Ariana all demonstrated aspects of persistence and motivation to accomplish the assigned tasks involving productive technologies. On example that stands out in my mind is related to Bella.

Bella: (You can see that she has figured it out. Not sure if someone told her, but from her visible frustration and sighing, to her happily working now. She is quickly adding images to her movie and is humming. Ariana didn’t help her even though she already has her movie together and is playing with sound effects.) Okay! I think I’m done! (dragging the last of her images into her movie.)

Aimee: You got it all figured out?

Bella: Yep!
In this instance, as I observed Bella, she went from being frustrated about how to navigate the tool necessary for composition, to leveraging the tool in order to accomplish her goals.

Additionally, the use of technological tools allowed my participants to feel like they were experienced with the tool they were using (e.g., composing on the iPad or computer), where a pen or pencil didn’t encourage the same sense of competence. “The will to write, the motivation to engage in the writing process, is influenced by factors including students’ attitudes and beliefs about writing and themselves as writers, their self-efficacy for writing, and their ability to energize and direct their thoughts and actions” (Harris & Graham, 2013, p. 69). As I mentioned in chapter four, James and Ariana, the students with identified disabilities, served as experts on the iPad on a number of occasions.

Aimee: Devon where did you go?
Devon: Over there.
Aimee: To hang out with your friends?
Devon: Yeah.
Aimee: You helping them?
Devon: Yeah.
Aimee: What are you helping them with?
Devon: With their quotes and stuff.

I want to highlight the above transcript because during that particular observation I assumed that Devon had wandered off to join his friends in order to avoid the assigned task. When he told me what he had been helping his peers find the quotes needed for the assignment (which I confirmed with the peers he helped), I realized what an impact integrating technological
can have on the composing process. Their attitudes and beliefs about themselves in those instances went from that of “bad writer” to “competent composer” as the tool required a different skill set. Experiencing success is a precursor to improving their attitudes and beliefs towards themselves as writers.

Finally, the technological tools provided a set of additional resources for Devon, Bella, and Ariana not available with paper-pencil tasks. According to Harris and Graham (2011, p. 68) skilled writers “draw upon a rich store of knowledge, cognitive processes, and strategies for planning, text production, and revision to achieve their goals during the recursive, self-regulated, problem-solving writing process.” It is easy to understand why students with learning difficulties struggle with such a complex task. Drawing on the resources (e.g. speech-to-text software, dictionary) that technological tools provide might reduce the cognitive load required of composition and allow struggling writers focus on other areas of the composition process.

Effective writing instruction for students with LD and other struggling writers, in the traditional setting, starts with evidence-based, effective writing practices for all students – which research indicates isn’t strongly evident in schools and classrooms (Graham & Harris, 2009; Harris & Graham, 2013). Harris and Graham (2013) suggest that an effective program for writing development takes place across age and grade-level and addresses knowledge, strategies, and will. Writing research, particularly on writing and students with LD, has begun, but much more is needed (Harris & Graham, 2013). Based on the literature I gathered for this study, I echo the concerns of Harris and Graham, as what has been done since their statement has not moved their field forward enough. My suggestion, based on my observations of the focal students during this present study, would be to marry what we know works from years of research on writing for students with LD with the motivating aspects of technology. If students have the will - are
motivated to compose with productive technologies – then teachers have an avenue to engage them in knowledge and skills development.

Limitations

Case study, as method, presents several important limitations to consider. While case studies provide an intensive unit of study, its narrow focus has limited representatives and does not allow for generalization. This qualitative case study, while not generalizable, does provide insight into the digital literacy practices of students with literacy-related learning difficulties and. Additional studies need to occur in order to gain further insight into the way students with literacy-related learning difficulties engage within digital environments and with digital tools, and the supports necessary to ensure those environments are most beneficial.

Furthermore, this case study is limited due to the number of participants with reading disabilities. A larger number of participants would be beneficial in order to more fully understand how to make digital tools and environments more accessible to students with disabilities.

A final important limitation to this study is the lenses from which I approached the research. In an attempt to bridge the fields of literacy studies and special education, I found it critical to analyze my data and present my findings to speak to both fields. An a priori analysis of student composition provides an important look into the ways digital literacies present unique difficulties for students with writing challenges. The data highlight important descriptions of what “struggle” looks like with digital tools when composing, which can shape how teachers approach technology integration, in order to allow all students to be successful. The a priori analysis did not, however, look at what the students with literacy-related learning difficulties CAN do with digital tools when given the opportunity. Forthcoming analysis of the data will
demonstrate the affordances that digital tools allow for students with literacy-related learning difficulties.

**Future Research**

This study highlights several possibilities for future research. Regarding the population studied, research should be conducted with a wide variety of students with literacy-related learning difficulties to further develop understanding of the complex processes students use when navigating digital tools and environments. In addition, the participants in the study were in the 5th grade and have experienced failure with traditional literacy instruction, so it would be interesting to consider younger children’s experiences with different tools for literacy learning. Finally, it would be important to conduct this research in an environment that provides the types of support needed by students that struggle with literacy tasks (i.e. scaffolding, modeling) to gain an understanding additional supports can provide when using digital tools.

Since the field of writing research is severely lacking regarding students with learning disabilities, it is important to investigate they ways in which technological tools can enhance students’ composition. Based on the results of my study, technological tools served to motivate the students with learning difficulties. Having the students engaged in the task of writing with technological tools might allow for teachers to develop students’ knowledge and skill in writing simultaneously.

Additionally, it is important to gain insight into literacy teachers’ planning for the use of digital tools. The careful incorporation of the TPACK and the TIM frameworks might enhance both pedagogical and technological knowledge. Of particular importance is the pedagogical knowledge required when working with diverse populations, such as with students with disabilities. The U.S. Department of Education acknowledges that teachers have the biggest
impact on student learning stress that it is critical to support teachers with access to technology and support them in learning how to use it in the classroom (U.S. Department of Education, 2017). Many teachers, particularly preservice teacher, considered to be digital natives have been exposed to an abundance of technology throughout their lives. However, most of this technology integration was not part of the classroom learning process. Teachers need to experience effective training in the integration of technological tools or they will “continue to use the same methods of teaching they have always used” (Clark & Zagarell, 2012, p. 138). The “best way to bring more teachers on board is... by increasing knowledge and skills, which, in turn, have the potential to change attitudes and beliefs” (Ertmer, 2012, p. 433).

Closing Thoughts

The focus of this study was of interest based on my experiences in the classroom and the difference digital tools made for my students with reading difficulties. The way my students would engage in and with digital tools was unlike their engagement with traditional print-based, pencil-paper literacies. Given the lack of research, my objective for completing this research was to inform understanding of how students with reading difficulties engage in productive literacy practices when provided the opportunity and how those opportunities shape their literacy practices. It is my hope that this study will inform future research to explore students with reading difficulties engagement and access to digital tools and environments in order to understand the possibilities digital tools provide. Literacy of the 21st century is no longer constrained to print-based materials, and neither should one of our most vulnerable student populations.
REFERENCES


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Harris, T. L., & Hodges, R. E. (1995). The literacy dictionary: The vocabulary of reading and writing. Order Department, International Reading Association, 800 Barksdale Road, PO Box 8139, Newark, DE 19714-8139 (Book No. 138: $25 members, $35 nonmembers).


National Governors Association Center for Best Practices, Council of Chief State School Officers Title: *Common Core State Standards* Publisher: National Governors Association Center for Best Practices, Council of Chief State School Officers, Washington D.C. Copyright Date: 2010


Appendix A: Sample Interview Guide

Questions were generated based on a series of observations of classroom instances. A sample question for the students included: “Can you tell me more about this (name of product created)?”

Some sample questions for the teacher included: “During my observation I noticed…Can you tell me more about…? ”

Lessons to ask about specifically:

Clickers -  
- Reviews (science and math tests)  
- Comprehension questions

Comic Life -  
- Math comic for shapes  
- Stowaway

Country research  
- What did you pick and why?

What was your favorite activity using technology? Why

What was your least favorite activity? Why?

Do you think that technology helps you learn? Why?

Ask in final interview:

*How does technology make learning easier? Why?

*How does technology make learning more difficult? Why?

*How do you recommend that teachers use technology in the classroom?

*How can teachers help make technology easy for students to use in the classroom?
## Appendix B: Full List of Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tr>
<td>create a product</td>
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<tr>
<td>drawing versus the act of writing</td>
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<tr>
<td>equal partnership</td>
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<tr>
<td>demonstrates topic knowledge/competence</td>
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<tr>
<td>mom as a resource</td>
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<tr>
<td>does work when required to</td>
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<tr>
<td>lets higher achieving peer do the work</td>
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<td>Pictures are ok, typing is not</td>
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<tr>
<td>technology is hard</td>
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<tr>
<td>avoiding technology</td>
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<tr>
<td>demonstrates competence / isn't recognized by peer</td>
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<td>overshadowed by higher achieving peer</td>
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<td>relies on higher achieving student</td>
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<td>teacher as resource when she doesn't understand. doesn't copy</td>
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<td>Writing is overwhelming</td>
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<td>Technology is motivating</td>
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<td>avoiding writing</td>
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<td>Organizing information</td>
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<td>Technology is overwhelming</td>
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<td>Division of labor / playing to strength</td>
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<td>Trouble with technology</td>
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<td>Technology as resource</td>
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<td>turns into expert</td>
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Appendix B (continued)
persistance
confused with assignment
Defers to "knowledgeable other"
Peer as resource
Off task behavior
Off task behavior
Peer encouragement
Off task behavior - Adryana
Peer as a resource
Demonstrate lack of spelling knowledge
Knows how to use resources
Book as resource
Teacher as resource
Peer as resource
Accuracy of information
Accuracy of information
Using a resource
Demonstrate content knowledge

Demonstrate content knowledge
Demonstrating content knowledge
Technology as work
Peer as reference
Accuracy
Knowledge of content
Technology knowledge
Accuracy
Relinquishes control
Relinquishes control
Teacher as helper
Demonstrates knowledge
Relinquishes control
Trouble spelling
Accuracy
I think this is good.
Inaccuracy
Relinquishes control
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Appendix C. Permission to Reprint Figure from Hutchison & Woodward (2017)

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<td>Beyond Replicative Technology: The Digital Practices of Students with Literacy-Related Learning Difficulties in the Engaged in Productive Technologies</td>
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<td>Expected completion date</td>
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<td>Expected size (number of pages)</td>
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<td>Requestor Location</td>
<td>Aimee Frier</td>
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United States
Attn: Aimee Frier
Appendix D: IRB Study Approval

April 10, 2015

Aimee Frier, M.A.
Teaching and Learning
4202 E. Fowler Avenue, EDU105
Tampa, FL 33620

RE: Expedited Approval for Initial Review
IRB#: Pro00021586
Title: The Digital Practices of Struggling Readers in the Context of Integrated Technology Instruction


Dear Ms. Frier:

On 4/9/2015, the Institutional Review Board (IRB) reviewed and APPROVED the above application and all documents outlined below.

Approved Item(s):
Protocol Document(s):
Digital Practices Struggling Readers Protocol

*This study involving data pertaining to children falls under 45 CFR 46.404 – Research not involving greater than minimal risk.

Consent/Assent Document(s)*:
DigitalPracticesStrugglingReaderParentalConsent.pdf
DigitalPracticesStrugglingReaderTeacherConsentForm.pdf
DigitalPracticesStrugglingReaderAssent (child verbal assent)

*Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent document(s) are only valid during the approval period indicated at the top of the form(s).

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve
only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

Kristen Salomon, Ph.D., Vice Chairperson
USF Institutional Review Board
Certificate of Completion

Aimee Frier

Completed the Social / Behavioral Investigators and Key Personnel Refresher Course

on Friday, January 29, 2016

CITI Certificate ID#: 18343