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CREATING ARGUMENTS USING A MULTILITERACIES APPROACH: A FORMATIVE EXPERIMENT

Emily Howell
Clemson University, emilysmothershowell@gmail.com

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CREATING ARGUMENTS USING A MULTILITERACIES APPROACH:
A FORMATIVE EXPERIMENT

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by
Emily Howell
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Accepted by:
David Reinking, Committee Chair
Donna Alvermann
Cynthia Deaton
Danielle Herro
Rebecca Kaminski

ABSTRACT

This dissertation study addresses the New London Group's (1996) concern that technology and globalization require an expanded concept of literacy that focuses upon the multimodal nature of communication. This study combined a formative experiment with multiple-case-study methods to understand the pedagogical implications of implementing an intervention based upon the multiliteracies perspective (New London Group, 1996), a perspective that remains theoretical in application. This study sought to implement this perspective in a ninth- and a tenth-grade English class in a rural school district and develop assertions that further the localized, pedagogical understanding and application of the present study's intervention (Gravemeijer & Cobb, 2006; Reigeluth & Frick, 1999). In this formative experiment, an intervention was implemented in which students constructed arguments including claims, evidence, and elaboration of evidence; used digital tools suitable for producing digital, multimodal arguments; and utilized a process approach to writing. The goal of this intervention was to improve the quality of conventional and digital, multimodal arguments. Overall, there was qualitative evidence that this intervention improved the students' digital, multimodal arguments and expanded their knowledge and concept of argument. The students believed their knowledge of multimodal arguments would transfer to their more conventional writing of argument. However, the quantitative results provided no evidence that there was such transfer. This study provides seven theoretical assertions and recommendations for teaching practice and future research that may guide future iterations of similar interventions.

Keywords: argument, multimodality, multiliteracies, digital tools

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CHAPTER ONE

INTRODUCTION

Described as Millennials and Digital Natives, students today are characterized by their pervasive use of technology, and their life after school will depend upon their digital capabilities (Bennett, Maton, & Kervin, 2008; Madden & Jones, 2008; Pew Research Center, 2014). For these students, born after 1980, digital tools are a part of their daily life. Students in middle and high schools devote on average, an hour and a half each day to computer use for recreational purposes (Rideout, Foehr, & Roberts, 2010); 95% are online, and 74% are mobile Internet users (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). Further, the jobs predicted for their future will increasingly rely upon various digital tools. According to Madden and Jones (2008), 96% of employed Americans use new communication technologies inside and outside of work, including 62% percent of working Americans who use the Internet or email for their work.

Kress (2010) argued that these advances in technology, as well as increased globalization, have altered how we communicate or, in his terms, how we use semiotic resources. *Semiotic resources* are means for making meaning, and the term *mode* is an organized grouping of semiotic resources (Jewitt & Kress, 2010). For example, music and sound effects are semiotic resources that would be grouped under a larger audio mode (New London Group, 1996). The use of these semiotic resources has changed as technologies have become increasingly digital, and the representation of these resources has changed as use of images has gained prevalence relative to writing (Kress, 2003, 2010). New forms of digital communication provide more options for expressing

meaning through varying modalities, or groupings of semiotic resources (Bezemer & Kress, 2008; Jewitt & Kress, 2010).

The New London Group (1996) proposed that the growing influences of technology and globalization require an expanded concept of literacy, what they refer to as *multiliteracies*, which includes designing, thinking, and critiquing multimodally. To them, multimodality included using linguistic, audio, spatial, gestural, and visual modes of semiotic resources. Professional organizations such as the National Council of Teachers of English (NCTE), have suggested that multimodal communication can enhance student work and expand understanding of a subject, yet these multimodal literacies are often complex and need to be integrated purposefully into the literacy curriculum (NCTE, 2005). Siegel (2012) offered two reasons for including multimodality in the classroom: students live in an era that demands new literacies, and they often bring multimodal practices to school.

However, students may not be learning how to use multimodality in their schooling for several reasons. For example, Dyson (2003) discussed the dominant view of children's literacy as often excluding multimodality, focusing instead on printed texts and conventional forms of written communication. Further, Ajayi (2009) suggested teachers might not have adequate training to teach students how to design multimodally using the current semiotic resources available. Finally, Graham and Benson (2010) suggested that most of the research available on multimodal composing and multiliteracies is theoretical rather than providing practical classroom application of such concepts. The present study addresses this gap in the research by examining an

intervention based in the multiliteracies perspective that includes multimodal design in the content area of writing, specifically argument writing.

Dimensions of the Problem

National organizations have called for increased attention to the teaching of writing due to its neglect in the school curriculum (National Commission on Writing [NCW], 2003). In addition, surveys have shown the importance of writing to achieve future professional success (NCW, 2004). However, more recent studies of writing have found that students are copying notes and responding to directed prompts rather than creating compositions, which suggests that the teaching of writing needs continued attention (Applebee & Langer, 2013). In a recent case study of 138 students from 20 schools in five states, Applebee and Langer (2013) documented the status of writing in classrooms: "…only 19% of assignments represented extended writing of a paragraph of more; all the rest consisted of fill-in-the-blank and short-answer exercises, and copying of information directly from the teacher's presentations-activities that are best described as writing without composing" (p. 14). This type of writing, which does not involve creating one's own content, is contrary to what Jenkins, Clinton, Purushotma, Robison, and Weigel (2006) called a participatory culture. They advocated creating a participatory culture of strong support for student creation and freedom of expression. The type of "writing without composing" (Applebee & Langer, 2013, p. 14) done in schools is at odds with the type of writing that students are doing outside of school where they are creating their own digital content (Lenhart, Arafeh, Smith, & MacGill, 2008; Lenhart & Madden, 2005). Such content creation is necessary for students to engage in a process of design using

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multiple modes of expression, which is central to multiliteracies (New London Group, 1996).

Lenhart et al.'s (2008) national survey of 12-17 year-old students revealed further aspects of the problem this dissertation study addresses. They found that digital forms of writing are prevalent in students' lives outside of school, including that "85% of teens ages 12-17 engage at least occasionally in some form of electronic personal communication, which includes text messaging, sending email or instant messages, or posting comments on social networking sites" (p. ii). Although their report found that teens are writing digitally outside of school, teens do not classify the digital writing they do outside of school as writing, perhaps because such digital writing is not validated in their lives within schools. Digital writing utilizes the semiotic resources students have at their disposal and uses the elements of design crucial to the multimodal composing process that Kress described (2000b, 2010). In school, students are not adequately engaging in extended writing in conventional forms (Applebee & Langer, 2013), which may further complicate introducing them to digital tools aimed at engaging them in the creative design and presentation of text to express their own ideas that is more characteristic of multimodal composing.

Peterson and McClay (2012) found that when students were using technology for their writing assignments, it was typically used to produce a good copy of their compositions, rather than as a part of the composing process. Similarly, in a study of 1,441 literacy teachers, Hutchison and Reinking (2011) found that teachers believed technology was important, but they reported that they used technology to support

traditional means of instruction rather than integrating technology into their curriculum.

Teachers also reported using technology to compose conventional texts rather than engaging their students in writing digital texts. For instance, teachers were more likely to have students create a Word document or locate information online than have students create a multimodal presentation or publish information with more multimodal technologies, such as a website or a blog (Hutchison & Reinking, 2011). These findings are consistent with a more recent study by Purcell, Heaps, Buchanan, & Friedrich (2013), who found that a higher percentage of teachers report having students research online or download assignments online than those who have students develop and post their work online. Overall, studies suggest that (a) students digitally compose outside of school, but do not identify these digital compositions as writing (Lenhart et al., 2008), (b) that writing in school consists less of creating content and relies instead on limited writing that involves copying information or filling in prompted responses (Applebee & Langer, 2013), and (c) that digital writing in school may consist of publishing conventionally written assignments rather than integrating technology into writing curriculum with digital, multimodal composing (Hutchison & Reinking, 2011; Jewitt & Kress, 2010; Peterson & McClay, 2012).

Purpose and Significance of Study

The study reported in this dissertation addresses the New London Group's (1996) concern that technology and globalization have impacted students' literacies, requiring an expanded concept of literacy focused upon the multimodal nature of communication. Although there have been multiple calls for integrating multimodality and technology

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into the classroom (International Reading Association [IRA], 2009; NCTE, 2005, 2008), there is little research that gives teachers a context for their instantiation. In fact, several researchers have noted that the multimodality entailed in multiliteracies lacks research on implementation in the classroom, especially for academic purposes (Graham & Benson, 2010; Jocius, 2013; Sewell & Denton, 2011). The purpose of this study is to better understand how an intervention that uses elements of the multiliteracies framework, such as design with digital, multimodal tools, influences student writing and how such an intervention might be used to improve students' arguments. The intervention of the present study encouraged students to integrate digital, multimodal tools in school writing curriculum. Such a use of digital, multimodal design has previously been a practice that students may be accustomed to in their lives outside of school, but is often neglected in school, as outlined in the previous section on the dimensions of the problem.

A central component of the multiliteracies perspective is that students be taught to design multimodally (New London Group, 1996). Bowen and Whithaus (2013) defined multimodal composing as "the conscious manipulation of the interaction among various sensory experiences-visual, textual, verbal, tactile, and aural-used in the processes of producing and reading texts" (p. 7). Research on multimodal composing has shown that it benefits writers by encouraging them to take risks in their writing and be creative (Jones, 2010; Vasudevan, Schultz, & Bateman, 2010). Other studies, such as Bruce (2009) and Jocius (2013), found that multimodal composing increased student engagement. However, research demonstrating the influence of multimodal composing on academic literacies is lacking (Jocius, 2013). Specifically, relating to multimodality

and argument, research is needed that combines cognitive aspects of argument, such as the elements of argument, and the social practice of argument, such as how and why arguments are composed (Newell, Beach, Smith, and VanDerHeide, 2011). In addition, others have raised questions of whether students' multimodal composing transfers to their more conventional writing (Matthewman, Blight, & Davies, 2004).

This dissertation study focuses on how multimodality combines with a particular area of academic literacies, composing arguments. Argument is a genre that is not only emphasized in current educational standards, but it is a tool for students to become critical thinkers and active citizens in a democratic society by negotiating and defending ideals (Hillocks, 2010, 2011; Smith, Wilhelm, & Fredricksen, 2012). There are multiple calls for students to be able to negotiate these argumentative claims in an increasingly visual world (Andrews, 1997; Birdsell & Groarke, 2004; Hocks, 2003; Howard, 2011). However, these calls are made in a professional literature that is predominantly theoretical.

In the present study, multimodal arguments are defined as employing the modes established in the theory of multiliteracies- linguistic, visual, audio, gestural, spatial, and multimodal (New London Group, 1996)-to make and support an argument. To address student construction of conventional arguments and multimodal arguments in the present study, I observed two classroom teachers as they guided students in using digital tools to create multimodal arguments in such forms as infographics and websites. This study is significant because it fills the gap in the largely theoretical research on multimodal composing to date (Graham & Benson, 2010; Sewell & Denton, 2011), providing readers

with a context of practical classroom application to instantiating the theoretical

perspective of multiliteracies. This study is also significant because it examines both the

social practice of the multimodal design of arguments (a need seen in Andrews, 1997;

Birdsell & Groarke, 2004; Hocks, 2003; Howard, 2011; Newell et al., 2011) with

cognitive elements, such as the structure of an argument. Newell et al. (2011)

emphasized this need for the examination of both the social and cognitive elements of

argument.

Methodological Approach

This dissertation study employed a formative experiment because I wanted to

understand the pedagogical implications of implementing an intervention based upon the

multiliteracies perspective, a perspective that remains theoretical in application.

Elements of the multiliteracies perspective that need clear pedagogical implication

include multimodal composing (Graham & Benson, 2010; Sewell & Denton, 2011) and

how multimodal composing applies to academic learning (Jocius, 2013), such as

arguments. Formative experiments focus on pragmatically informing instructors about

the context of a classroom intervention (Reinking & Bradley, 2008). Formative

experiments were also fitting for this study as they have been previously implemented in

the field of literacy (Bradley et al., 2012; Ivey & Broaddus, 2007; Jimenez, 1997;

Reinking & Watkins, 2000; Tracy & Headley, 2013). The defining characteristics of

these experiments include the following: an intervention undertaken in a classroom

context, using grand theory to guide the intervention to make more localized theoretical

assertions, working towards a pedagogical goal rather than a research question, making

and recording modifications during the intervention to reach the stated goal, and noting any transformations in the learning environment due to the stated intervention (Reinking & Bradley, 2008).

This study used a formative design methodology and case-study methods to observe how the stated intervention was implemented and adapted to achieve the goal of this experiment, to improve the quality of conventional and digital, multimodal arguments for high-school students in a rural context. Students practiced making multimodal arguments through the intervention of this study. The intervention implemented consisted of three essential elements: a) construction of arguments composed of claims, evidence, and elaboration of that evidence; b) using digital tools suitable for producing digital, multimodal arguments; and c) a process approach to writing. Thus, the pedagogical goal and research question guiding this experiment was: How can the stated intervention be instantiated into high-school classrooms to improve the quality of conventional and digital, multimodal arguments?

Formative experiments use systematic approaches to data collection that treat data as interdependent rather than more analytical approaches that attempt to isolate variables and determine their correlations (Reinking & Bradley, 2008). Traditionally, this has meant that formative experiments rely upon qualitative data and may use some quantitative data to understand the context and application of the stated intervention (Reinking & Bradley, 2008). To observe this intervention and its influence upon the stated goal, I used multiple-case-study methods to compare two cases: a tenth-grade classroom and a ninth-grade classroom in a rural school in a Southeastern state. The

qualitative data collected included interviews, observations, field notes, and student

artifacts. In addition, quantitative data, in the form of students' responses to a pre- and

post- argumentative writing prompt, were collected to better understand the implications

of the intervention for conventional argumentative writing. The data were compared in a

cross-case comparison, as is the expectation in multiple-case studies (Stake, 2006).

Although this intervention was guided by a theoretical perspective, in this case, that of

multiliteracies, I analyzed the data during the intervention and in the retrospective

analysis after data collection (Gravemeijer & Cobb, 2006) to inform new theoretical

assertions, or local theory (Reinking & Bradley, 2008).

The essential goal and intervention elements of this study were originally studied

in a smaller-scale study in a different context in the spring of 2014. The concept of this

smaller-scale study was replicated in this dissertation study to determine if similar

findings were confirmed. Some replications seek exact duplication of the original

experiment whereas others may alter some conditions considered nonessential to the

findings (Yin, 2014). In formative experiments the goal and the intervention are essential

elements to the study (Reinking & Bradley, 2008). Thus, the intervention of the present

study seeks what others have termed constructive replication or conceptual replication in

which a construct, model, or theory is intended to be replicated rather than a direct,

literal, or operational replication, which seeks to more directly duplicate the original

study's sampling, methods, and analysis (Makel & Plucker, 2014).

<center>**Key Terms and Concepts**</center>

Multiliteracies

Multiliteracies is a perspective the New London Group (1996) developed to broaden the concept of literacy beyond print-based texts. The perspective of multiliteracies recognizes an expanded definition of text created with multiple modes. The New London Group (NLG) argued that this perspective of literacy and more multimodal forms of text were not new, but were increasingly available because of developing technology and globalization.

Semiotic Resources

Semiotic resources are means for making meaning (Jewitt & Kress, 2010). In this dissertation, I have chosen to use the term semiotic resources because it is commonly associated with the study of social semiotics (Van Leeuwen, 2005). Social semiotics is a perspective concerned with how people use semiotic resources to convey meaning in various social contexts (Van Leeuwen, 2005). Social semiotics is important to the present study because the students engaged in this intervention used digital tools, which afforded multiple semiotic resources, to convey meaning, specifically to convey elements of argument. I wanted to understand the implications of using these semiotic resources for conveying arguments. Social semiotics is a perspective that Kress has used since his work with multiliteracies in the New London Group (1996) to discuss multimodality (Bezemer & Kress, 2008; Jewitt & Kress, 2010; Kress, 2010).

Theoretical Perspective

I chose the term perspective, for my use of multiliteracies and social semiotics, rather than theory. First of all, theory is a term that has various, undefined meanings especially in education (Thomas, 1997). Some regard theory as truth until proven otherwise whereas others view it as just an alternative term to practice. In addition, theory may imply trying to explain or predict a phenomenon, whereas, I was trying to investigate and question. Finally, theory may imply a set of beliefs that is sacred, something to be upheld, rather than questioned. However, I used multiliteracies and social semiotics to guide my thinking about this intervention, but I also used my data to question these perspectives (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; Unrau & Alvermann, 2013). Thus, I hope that the term perspective implies a more dialectical role of both multiliteracies and social semiotics in examining this intervention and the data of this study than theory might relay (Unrau & Alvermann, 2013).

Modes

Modes are groupings of semiotic resources (Bezemer & Kress, 2008; Jewitt & Kress, 2010; Van Leeuwen, 2005). For example, the audio mode may be used as a grouping of semiotic resources, such as sound effects and music (New London Group, 1996). The New London Group identified six modes of meaning: linguistic, visual, audio, gestural, spatial, and multimodal.

Multimodality

Multimodality is concerned with the design of modes and how they work together (Kress, 2010; New London Group, 1996). Kress (2000b) described that although all texts

are inherently multimodal, this multimodality has become more central to communication as digital tools provide more options for including multimodality.

Multimodal Composing

Bowen and Whithaus (2013) defined multimodal composing as "the conscious manipulation of the interaction among various sensory experiences-visual, textual, verbal, tactile, and aural-used in the processes of producing and reading texts" (p. 7). Thus, multimodal composing goes beyond linguistic elements of communication, although it does not preclude those linguistic elements as one mode of communication, and uses multimodality as emphasized in the theory of multiliteracies (Kress, 2003; New London Group, 1996).

Conventional Argument

This term is used to define the type of argument more traditionally taught in schools (Lunsford, 2002) that focuses on using written language to convey the parts of argument based on Toulmin's (1958/2003) model. His model consists of six fundamental components: (1) *claims* or assertions that must be proven by the argument, (2) *data* or evidence that supports the claim, (3) *warrants*, statements that explain how the datum support the claim, (4) *qualifiers,* words that specify the degree to which the arguer thinks the data supports the claim, such as the word "probably," (5) *rebuttals*, statements of condition of which the warrant would not apply, and (6) *backing* or statements needed to support the warrant (Toulmin, 1958/2003). His model is frequently the basis for teaching argument in writing instruction, although typically emphasizing these elements as

cognitive structures rather than a conception of argument as a social practice (Newell et al., 2011).

Multimodal Arguments

Multimodal arguments also convey the parts of an argument, often associated with the cognitive aspect of argument (Newell et al., 2011) and Toulmin's (1958/2003) model. However, multimodal arguments also emphasize *how* cognitive meaning is conveyed using the social practice of designing arguments via multiple modes attuned to the context in which they are presented (Newell et al., 2011). Multimodal arguments are cognitive in that they involve the students thinking through the logic of an argument: what side of the argument the student will argue as the claim, how this claim will be supported with evidence, and, finally, how a student will justify that evidence through elaboration. However, there is also a social practice in the composition and presentation of these arguments as a student makes design decisions about which modes best reflect these elements of argument and how to use the semiotic resources and digital tools of society to effectively convey the meaning of an argument in relation to its intended audience. Although research has often addressed the cognitive and social aspects of argument separately, there is overlap between these two aspects of argument. Newell et al. (2011) have called for more research investigating the multiple perspectives of argument and connections between them. For instance, Newell et al. (2011) explained the overlap in argument between the cognitive and the social: "Cognitive processes are always part of how people act and react to one another socially, including when they discuss issues and debate ideas important to them" (p. 280).

Digital Tools

Digital tools are those characterized by their availability and association with computer technology and its unique affordances as applied to literate activity, particularly in this study to writing and reading arguments. For example, in this study a digital tool allowed students to make a digital, online multimodal poster. The tool enabled students to use multiple modes to create a single composition comprised of pictures, text, audio, and video files in addition to designing their arguments on a digital screen.

Process Writing Approach

In this study, the process writing approach included the following: extended opportunities for student writing (Graham & Perin, 2007b); writing for authentic audiences (Applebee & Langer, 2013; Graham & Perin, 2007b); peer interaction (Graham & Perin, 2007b; Graham & Sandmel, 2011); a recursive process of writing including planning, drafting, and revising (Applebee & Langer, 2013; Edwards-Groves, 2011; Graham & Perin, 2007b; Graham & Sandmel, 2011; Hillocks, 1986); and direct and personalized bursts of instruction, such as conferencing or minilessons (Graham & Perin, 2007b; Graham & Sandmel, 2011).

Summary

In this chapter, I described that students may be involved in digital, multimodal composing outside of school, but not inside of school walls. Instead, schools seem to be reifying a practice of "writing without composing" (Applebee & Langer, 2014, p. 14) that excludes digital tools and multimodality. To address this problem and the call for research to explore both a social and cognitive practice of argument (Newell et al., 2011),

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I examined an intervention based in the multiliteracies perspective. This intervention consisted of three essential elements with the goal of improving the quality of conventional and digital, multimodal arguments for high-school students. To understand the implications of enacting such an intervention for the stated goal, I used a formative experiment methodology and case-study methods. In Chapter 2 I review the relevant theoretical and empirical literature to this study. Chapter 3 describes the method used to guide both the data collection and analysis of this study, and Chapter 4 discusses the results. Chapter 5 presents theoretical assertions, gained from a cross-case analysis, that focus on developing pedagogical understanding of the intervention enacted in each case.

CHAPTER TWO

A REVIEW OF THE LITERATURE

This chapter discusses the theoretical perspectives guiding this study including

multiliteracies and social semiotics and the connections between those perspectives and

concepts pertinent to the present study. It reviews relevant literature concerning two

elements of a formative experiment: (a) identifying a worthy pedagogical goal and (b)

justifying an intervention with potential to achieve that goal (Reinking & Bradley, 2008).

The goal of this formative experiment was to improve the quality of students'

conventional and digital, multimodal arguments. Thus, the pertinent literature reviewed

addresses teaching and writing conventional written arguments as well as constructing

digital, multimodal arguments. Further, I discuss the justification for the intervention and

its essential elements: a) construction of arguments composed of claims, evidence, and

elaboration of that evidence; b) using digital tools suitable for producing digital,

multimodal arguments; and c) a process approach to writing. Finally, because this study

replicates a previous smaller-scale study, I discuss the need for replication in education

research and how the present study addresses such a need.

Theoretical Perspectives

The overarching theoretical perspective guiding this study is the New London

Group's (1996) perspective of multiliteracies. Members of the New London Group

included the following: Courtney Cazden, Bill Cope, Norman Fairclough, James Gee,

Mary Kalantzis, Gunther Kress, Allan Luke, Carmen Luke, Sarah Michaels, and Martin

Nakata. They were a group of educators, who met in 1994 in New London, New

Hampshire, to discuss the state of literacy pedagogy and bring to this discussion ideas from a variety of domains including language, education, diversity, semiotics, and critical literacy, among others. The perspective of multiliteracies is discussed in the subsequent section especially regarding its focus on the changing nature of literacies, the concept of design, and teaching engaged citizens. Since the New London Group's (1996) discussion of multiliteracies, Kress (2003, 2010) and others have continued to advance topics proposed by the New London Group, such as multimodality, in their work on social semiotics. Therefore, the following sections not only discuss multiliteracies and social semiotics, but also address these perspectives relating to important concepts in the present study including multimodality, writing, and writing instruction.

Multiliteracies

  Changing nature of literacies. In 1996 The New London Group responded to developments concerning literacy: expanding mediums of communication and increasing focus on cultural diversity and globalization. Like the New London Group, other scholars have also noted a need to embrace changes in communication that may result as digital tools expand students' access to multimodality and multiple forms of text (e.g., conventional and electronic) and promote pedagogy that is inclusive of these tools. For example, Lanham (1993) wrote,

    Unlike most humanists discussing technology, I argue an optimistic thesis. I think

    electronic expression has come not to destroy the Western arts and letters, but to

    fulfill them. And I think too that the instructional practices built upon the

electronic word will not repudiate the deepest and most fundamental currents of

Western education in discourse but redeem them. (p. xiii)

The New London Group (1996) shared Lanham's (1993) optimistic view that the

growing availability of digital tools would give students greater access to information and

more opportunities to design and create their own texts, thereby democratizing literacy.

The New London Group (1996) helped others to think about the changing role of

education in a time of growing digital tools by discussing the changing nature of literacy,

discussed in this section, and the essential practices needed in pedagogy to accompany

such change.

The New London Group broadened the conventional concept of literacy to what

they termed *multiliteracies*. Conventional literacy relied mainly upon language and

books. However, The New London Group saw the need to emphasize an expanded

notion of text, with their concept of multiliteracies, increasingly important as digital tools

continue to flourish. The comparison of conventional literacy and multiliteracies, as

defined by the New London Group (1996), can be found in Table 2.1. The New London

Group's goal for students learning multiliteracies was two-fold; they wanted students to

have access to the diverse forms of communication necessary to apply in multiple

contexts, and they desired that students have the means to be active citizens in an

increasingly globalized world.

Table 2.1

A Comparison of Literacy and Multiliteracies

Literacy Definition	Multiliteracies Definition
Focuses on language (the dominant form)	Focuses on modes inclusive of, but broader than, language alone
Stable system (e.g., learning correct form of sound letter formations of the dominant language)	Evolving system of communication (e.g., it fluctuates as communication practices and technologies change)
Social context incidental	Social context fundamental
Expression governed by formal rules (e.g., grammar according to Standard English)	Expression respondent to sociocultural context
Print-based textual forms	Multimodal texts, including digital forms

The concept of design. The New London Group (1996) focused on a process of design across multiple modes of representation-linguistic, visual, audio, gestural, spatial, and multimodal. Multimodality is central to multiliteracies, especially as new digital tools make comprehending and conveying meaning an exercise not only in understanding each individual mode, but also in determining how those modes can be integrated, as well as how to move among modes (Cope & Kalantzis, 2000). To understand how *writing* in conventional conceptions of literacy is changing to *designing* in multiliteracies, the New London Group (1996) introduced two key terms: hybridity and intertextuality. Hybridity essentially means creating new forms of meaning using established genres across various

modes. The New London Group (1996) described popular music, combining the forms

of one culture with the technology of another to create a new genre, as an example of

hybridizing. Furthermore, intertextuality is important to the expression of meaning

because any text can be connected to other texts and textual forms in ways that are

essential to understanding a text and to creating meaning when writing one. Literacy, in

this view, is not a static construct. Instead, it is an evolving, ever-changing system of

designing meaning that is dependent on individual readers or writers and, importantly, the

culture in which they live (Cope & Kalantzis, 2000). The New London Group saw this

ability to design meaning as essential for students to succeed in a workforce that is no

longer dominated by formal systems of language (e.g., Standard English in the United

States), but becoming more fluid as new technologies make communication more

informal and composed increasingly of multimodal texts. Such a context requires

innovation and creativity, skills that are valued in an increasingly globalized world

(Crockett, Jukes, & Churches, 2011; New London Group, 1996).

   Teaching engaged citizens. According to the perspective of multiliteracies,

knowledge is always gained within a sociocultural setting (New London Group, 1996).

Students learn meanings from others and express their own meanings within a particular

context, bringing their experience, culture, and beliefs to bear upon that exchange.

Students must see what they are learning as relevant to a sociocultural context; thus,

teachers will need to allow for the context and identity of each learner. The New London

Group considered four teaching practices essential to the pedagogy implied by the

multiliteracies perspective: situated practice, overt instruction, critical framing, and

transformed practice. For example, after considering the context of a learner, which is the situated practice, a teacher would teach students about multimodality and how to implement it to convey students' intended meaning directly through overt instruction. The component of critical framing involves teaching students to apply their learning in a relevant sociocultural context. Once students are able to transfer their learning to their own cultures, values, and contexts for an authentic purpose, they have accomplished transformed practice, the last component of the multiliteracies pedagogy.

According to the New London Group (1996), the purpose of these four practices of the multiliteracies pedagogy differs from the traditional purpose of schooling. Whereas traditional schooling attempted to develop homogeneous citizens by inculcating the same skills and knowledge preparing them for the economic market, the intent of multiliteracies is to celebrate differences, to teach students to use their particular skills and interests to be active, engaged citizens capable of designing "their social future" (New London Group, 1996, p. 60). This concern was especially relevant to the New London Group in relation to increasing digital tools and options for communication that enabled multimodal communication outlets for students.

Multimodality and Social Semiotics

Kress (2003, 2010) and others further developed the concept of multimodality, which is also central to a multiliteracies perspective, drawing on social semiotics. Social semiotics goes beyond the study of signs in semiotics to consider how people use resources to convey meaning in various social contexts (Van Leeuwen, 2005). It is based upon Halliday's (1978) work on the semiotics of language and extends that work to be

more inclusive of a variety of resources, tools of communication, and the social basis of their use (Jewitt & Kress, 2010; Van Leeuwen, 2005). Furthermore, social semiotics reflects the work of Vygotsky who believed "all learning is mediated by tools such as language, symbols, and signs" (Schunk, 2012, p. 252). These tools are acquired through social interaction and internalized to further other more sophisticated learning. Social semiotics is based upon the belief that semiotic resources are not limited to "speech and writing and picture making" (Van Leeuwen, 2005, p. 4). These semiotic resources are used in all actions and are inherently dependent on the context in which they are used, thus their social nature. Van Leeuwen (2005) gave the example of walking and discussed how this action may be done in different contexts to produce varied meanings. People in the army walk differently from those in church, just as a person may use their walk to at times seduce or threaten, depending upon what the context demands. It is this "semiotic potential" (Van Leeuwen, 2005, p. 4) that semiotic resources have to produce different meanings that underlies the potential of social semiotics for multiple disciplines. This semiotic potential of various semiotic resources suggests the need, particularly in education, to teach students the differences between various semiotic resources and to differentiate meaning by how students design these resources (Kress, 2000a): Van Leeuwen (2005) spoke to this issue stating, "…it is one of the key contributions semioticians can make to interdisciplinary projects: inventorizing the different articulations and permutations a given semiotic resource allows, and describing its semiotic potential, describing the kinds of meaning it affords" (p. 4). Kress (2000a, 2010) argued that the changes in our current and those anticipated in a future society,

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particularly as they relate to globalization and growing technology, demand theories of communication that are not based upon language alone.

Connections Between Multimodality and Writing

Kress (2003) emphasized multimodality and the importance of the transition from relying upon writing centered upon language to embracing the current prevalence of images. He considered the advantages of new technologies and the access they provide to create meaning using different modalities. Kress not only discussed the move from writing as being a phonetic experience to being a visual one, but he also addressed the repercussions of the screen displacing the book. Bezemer and Kress (2008) argued that this historic shift from writing to images affects education, as learning resources, such as written information in textbooks, are transformed by their increased multimodality. For instance, they compared textbooks published in 1935 to contemporary textbooks. They found that the proportion of writing to images in textbooks decreased during this period, in part because writing and images were now combined in ways that were not previously possible. As a result, Bezemer and Kress (2008) argued that students would need different skills because: "text, *design* and *principles of composition* [italics in original] move into the foreground" (p. 166).

This change in writing practice and the characteristics of texts not only involves how students process knowledge in textbooks, but also reflects a larger social movement away from a focus on understanding and conforming to a rule-based system of language. Again, Bezemer and Kress (2008) stated,

The shift, conceptually, from *composition* to *design* [italics in original] mirrors a

social shift from competence in a specific practice conceived in terms of

understanding of and adherence to convention governing the use of a mode—

writing, say—to a focus on the interest and agency of the designer in the making

of signs-as-texts. (p. 174)

The present study represents writing as a process of design using a variety of semiotic

resources. In the perspective of multiliteracies, a digital society increases access to

multimodal forms of representation, although communication has been multimodal to

some extent long before digital tools were available. For example, Lanham (1993)

argued, "The struggle between icon and alphabet is not, to be sure, anything new, as the

history of illuminated manuscripts attests. This complex interaction of word and image

never actually vanished; it only fell out of fashion" (p. 34). However, he also

emphasized, as does the present study, that digital tools and the design of multiple modes

involved with such tools necessitates a renegotiation of the rules upon which

conventional reading and writing are based. Thus, this concept of teaching writing as

multimodal composing, rather than focusing primarily on language, becomes increasingly

important.

This practice of writing as a design using semiotic resources is not uncontested in

theory or in its practical implementation by writing teachers. As noted in Chapter 1,

teachers still teach writing in conventional forms and approaches such as responding to

prompts rather than as extended pieces of writing, let alone as multimodal design

(Applebee & Langer, 2013). Some scholars, such as Skaar (2009), worried that choosing

images and other modes to communicate did not involve the complex cognitive reasoning

involved in writing. Skaar (2009) began his argument with two premises: (a) learning takes places when semiotic resources are used and (b) digital tools change the learning done in text production by altering how much students think about their ideas. Skaar implied that digital tools allowed students to pick an image, for example, to represent an idea, which would not require as much thought processing as thinking of an idea and developing the words to signify that idea to another person. His argument is similar to Bauerlein (2008) and Carr (2011) who both feared that the Internet and other digital tools overwhelm and over stimulate students' thinking so that they are only capable of shallow rather than deep cognitive processing. Skaar (2009) argued that at times digital tools can alleviate rather than encourage deep thinking: "Digital media make this work easier for us by giving us the possibility to choose text instead of to code it" (p. 38).

In this view when students write, they think about or code semiotic resources themselves, and using digital tools allows them to choose pre-designed semiotic resources, thus deleting a step of thinking or coding. For example, Skaar (2009) wrote, "Digital images are pre-coded signs that require fewer choices than the written texts, which the pupils make or code themselves" (p. 39). Although Skaar acknowledged that this choosing, rather than creating original signs, is not necessarily less complex thinking using semiotic resources, he argued that it could be. The two options Skaar presented are that students will either make complex multimodal texts or that they will create a multimodal text with less thought involved in the design of these semiotic resources. Skaar argued that Kress (2003) emphasized inappropriately the ideological point that multimodal composing may liberate students' communication. Instead, Skaar expressed

the pedagogical concern that because of the semiotic resource choices rather than creation that digital tools provide, students may opt out of thinking. He used this concern to "defend the continuing hegemony of writing" and argued, "writing should retain its dominant and privileged position even in the new media age" (Skaar, 2009, p. 41).

In response to Skaar (2009), Adami (2011) used the remixing culture as a basis for her argument that using semiotic resources has changed in the new media culture, but that this design of resources still involves coding and learning. The remixing culture is one in which students appropriate content from their culture and transform it for their own meaning purposes; digital tools have made this remixing much more accessible (Jenkins et al., 2006). Adami's first point of disagreement with Skaar (2009) was that choosing or copying and pasting information from digital tools to then form larger units of meaning does not imply a less-involved thought process, although that process may differ from what is done in conventional writing. In addition, she argued that copying and pasting, or choosing signs as Skaar (2009) described it, could be done with images as well as text. Thus, privileging one mode over another does not guarantee deep thinking. Further, remixing content to support students' ideas may involve editing others work and insuring that it flows together in an intentional design, demanding a higher order of thinking than Skaar (2009) acknowledged. She argued, "…it [remixing] actually involves more semiotic work at a higher level, i.e., in the paradigmatic selection and syntagmatic combination of larger units of meanings" (Adami, 2011, p. 46).

She acknowledged that multimodal composing is not without concerns. For example, students may at times randomly choose a clipart image rather than actively

designing images that best represent their ideas. However, far from privileging one mode

over another, such difficulties imply a need to teach students how to think about semiotic

resources and their design and how to transfer this design for their own purposes and

contexts. Thus, Adami (2011) concluded with a call for pedagogical practice to be

inclusive of all semiotic resources. She shared the optimistic view of teaching students to

use these resources involved with digital tools for their benefit that both the New London

Group (1996) and scholars such as Lanham (1993) had previously discussed. This point

and counterpoint between Skaar (2009) and Adami (2011) involves an inherent

discussion of how to be inclusive of various semiotic resources. How much should

educators retain of conventional writing instruction? What new skills will students need

to learn to transfer the signs they code from media for their own meaning and purposes?

Does communicating with digital tools include the same cognitive practices necessary in

conventional writing? The present study allowed for teachers to address such questions

as they implemented an intervention using digital, multimodal tools to potentially

influence students' conventional and digital arguments.

Literature on Multimodality and Writing Instruction

Semiotic resources are essential to and blurred in a writing process that is not

linear. Several researchers discussed that a variety of semiotic resources are increasingly

integral, and sometimes indistinguishable, in a recursive process of writing. For example,

Ranker (2009) conducted a case study of three first-grade students. That study observed

the students composing practices in an assignment (including words and images in a

page-bound book) about the Titanic. He found that composing often entails a process of

design and redesign that combines images and text in ways that are increasingly integrated and less distinct. He also found that multiple semiotic resources were used to compose a text and that cutting off these resources would have been restrictive to students. Students drew original artwork using aspects of visual literacy to convey meaning for their compositions. Winters and Vratulis (2012) also discussed how meaning is carried by each semiotic resource in ways that are instinctive and intertwined: "They [those creating text] mesh together semiotic resources, inevitably drawing on their past connections with the world, their present experience with the sociocultural context, and with the semiotic systems available to them" (p. 549). In that study the authors used the case of a six-year-old boy and his use of Webkinz, a virtual world where children from the age of six can create their own digital identity using pets that they adopt online (www.webkinz.com). They found that Leon's, the six-year-old boy discussed as a case-study participant, composing practices were rarely linear and were instead often recursive and layered using multiple semiotic resources. For example, Leon used "speech bubbles, camera angles, accompanying music, animation choices" (Winters & Vratulis, 2012, p. 549) and mixed these modes to convey his narrative, and he revised his composition multiple times. In that study, a linear writing process of drafting, revising, editing, and publishing became secondary to understanding how to communicate meaning recursively across various modes. Miller (2013) highlighted that transmediation, or the ability to transfer meaning from one mode to the next, created deeper focus and reflection in student learning. An example of transmediation occurs when students portray a theme of a novel they are reading with music, gestures, and images.

Further, limiting semiotic resources may restrict the writing process. For example, Ranker (2009) concluded that cutting off students' ability to transfer their practices with semiotic resources from one venue of learning to another may make the composing process more difficult. Similarly, Ajayi (2009), in a three-week qualitative study of 18 English learners in a junior high school, not only found multimodal thinking allowed for different points of entry to creating text, but that multimodal texts encouraged critical thinking. For example, having a wide variety of semiotic resources available gave students more freedom and ways to approach creating texts or points of entry. Regarding multimodal texts and a connection to critical thinking, Ajayi gave an example of students in a social studies class analyzing political advertisements to understand their broader political message. By analyzing not only the text of these advertisements, but the colors, pictures, and graphics, this multimodal analysis of the meaning develops critical thinking. Miller (2013) found that multimodal composing gave students access to resources from their cultures and context that expanded the assets they had available for writing and learning. Thus, these studies suggest a need to give students access to multiple semiotic resources to expand not only their ability to express meaning, but also to do so in a way that accesses their culture and context.

The theoretical and empirical literature suggests that a transformation of curriculum is necessary to help students access and use a variety of semiotic resources. Bezemer and Kress (2008) looked at texts from English, math, and science for ages 11-14 from 1930 to 2005 and found less writing in textbooks now than in 1935: "Writing and image are combined in ways that could not have been conceived of in the 1930s" (p.

167). However, although curricular materials may be changing, teachers may not be

teaching students how to use such variety of semiotic resources in their own writing.

Miller (2013) found that it was necessary for teachers to focus explicitly on multimodal

design and to teach students to transfer learning from one mode to another.

This focus on multimodal instruction implies changes in fundamental elements of

teaching and classrooms. For example, Mills and Exley (2014), in a design-based study

of 85 students and three teachers, found that time devoted to instructional activities was

reapportioned when teaching incorporated digital tools into instruction. They stated,

"The relationship between time and the use of digital technologies was recursive—new

digital practices were modified by the tight organization of time in the school and,

conversely, reciprocally altered the existing ordering of the curriculum" (Mills & Exley,

2014, p. 452). They also found that this instruction required a reorganization of

traditional boundaries of classroom space (e.g., where a whiteboard is located and how

students' desks are arranged) and control in the classroom: "Digitally mediated forms of

representation, such as filming and podcasting, engendered increased student control over

the construction of spaces as pedagogic sites, and the teachers' softening of the regulatory

boundaries that previously limited access and movement in conventional literacy lessons"

(Mills & Exley, 2014, p. 455). Initially, teachers saw reorganization of traditional

concepts, such as time on instructional activities, as a problem, but eventually, as they

became more familiar with integrating technology into their teaching, that issue was

mitigated. The present study used a formative experiment to understand how curriculum

and teaching and student practices in high-school English classrooms may influence

interventions that include multimodality and digital tools as well as the goal of improving conventional and digital arguments.

Rationale for the Pedagogical Goal

Formative experiments seek practical improvement for teaching and learning in authentic educational contexts. A worthy pedagogical goal and an intervention with justifiable potential to achieve it are the starting point for a formative experiment (Reinking & Bradley, 2008). In this section, I review the literature that provides the rational and justification for the pedagogical goal of this formative experiment: to improve the quality of both conventional and digital, multimodal arguments for high-school students.

Conventional Arguments

Argumentative writing is a genre that is central to academic writing as well as to daily life. Argumentative writing has gained emphasis with current shifts in curricular standards, such as the Common Core State Standards, and national assessments, such as the National Assessment of Educational Progress, focusing on this genre of writing (Council of Chief State School Officers [CCSSO] & National Governors Association Center [NGAC], 2010; National Center for Education Statistics [NCES], 2012; Smith et al., 2012). Not only is argumentative writing essential to academic discourse, it is also critical for civic engagement and effectiveness in the workforce (Yeh, 1998). Further, argumentative writing is often connected to logical thinking (McCleary, 1979; Yeh, 1998). Although argumentative writing is important for a variety of purposes, including

active civic engagement and academic discourse, argumentative writing is often difficult for students (Knudson, 1992; Yeh, 1998).

The construction of sound and convincing arguments can be traced to Aristotle who proffered that argument should be organized by a clear, logical format: major premise, minor premise, and conclusion (Toulmin, 1958/2003). However, this model of argument presents clear-cut statements of absolute truth that are not necessarily consistent with the arguments of common conversation. For example, Aristotle's model does not allow for qualifications and degrees of statements. Thus, Toulmin (1958/2003) saw a need to provide for a style of argument that represented not just claims, but questions of those claims, and responding to those questions of the claims: "Where the logician has in the past cramped all general statements into his predetermined form, practical speech has habitually employed a dozen different forms" (p. 109). Thus, he created a model of argument that consists of six fundamental components defined in Chapter 1: (1) *claims*, (2) *data,* (3) *warrants*, (4) *qualifiers,* (5) *rebuttals*, and (6) *backing* (Toulmin, 1958/2003). Toulmin's criteria for argument are often taught in composition classrooms because of that connection with everyday language (Lunsford, 2002; Smith et al., 2012). It is a model of argument that has been frequently used in composition studies (McCleary, 1979; Knudson, 1992; Lunsford, 2002).

Lunsford (2002) conducted a study of ten high-school students taking a course on argument. She discussed that although Toulmin's model of argument is widely taught in composition classrooms, his model lacks sufficient research; is continuously adapted as "an analytic tool, a heuristic device, a sign of accommodation/alliance…" (p. 160); and

must be "mediated by other writing instruction" (p. 160). Lunsford is not alone in

claiming that research that addresses the teaching of argumentative writing and the

teaching of the logical thinking involved in such writing is insufficient. McCleary (1979)

noted a lack of research concerning logic and writing. Hillocks (1986) did a meta-

analysis of composition research from 1963-1982. In his section of that report dealing

specifically with skills in writing arguments, Hillocks (1986) focused on two studies,

McCleary (1979) and Troyka (1973), both dissertation studies, which are included in the

present discussion because Hillock's work is considered seminal to writing instruction,

and his focus on these studies indicates, once again, how sparse the research on

argumentative instruction was, and perhaps still is, in the field. Although these studies

both found that specified argumentative/logical reasoning instruction led to significant

gains for the treatment versus the control group, a closer look reveals variation in the

gains and suggests the potential for investigating argumentative writing instruction.

McCleary (1979) found that there was not evidence that specifically teaching logic led to

gains in composition of arguments. Instead, gains in all groups led the author to conclude

that writing instruction in general led to gains in argumentative writing. However, he

also pointed out that teaching Toulmin's logic and applying it to writing did yield

statistically significant gains compared to those taught this logic in isolation. Troyka's

(1973) dissertation study, also in Hillocks (1986), produced findings that differ from

those of McCleary (1979). Troyka (1973) paired conventional English instruction with

simulation gaming, in which games included writing that involved "expository rhetoric"

(p. 1), writing based upon evidence, for the treatment. In that study the treatment group

significantly outperformed the control group. Troyka's (1973) findings suggested that the treatment groups scored statistically higher than the control group on the post-test essay, even though the treatment group started off below the control group.

Toulmin's model of argument is widely taught as a cognitive model (Lunsford, 2002; Newell et al., 2011) rather than as a social model. Cognitive models look at the form and structure of argument (e.g., claim, warrants, etc.), whereas a social model considers the social practices of argument (e.g., the tools used to create argument and the sociocultural context in which it is presented). Teaching Toulmin's model as strictly a cognitive one ignores Toulmin's view that arguments were constant, as in the steps of the structural model, as well as dependent on social context, as in their variation by when and where they are given and received (Andrews, 1997; Lunsford, 2002; Newell et al., 2011; Toulmin, 1958/2003). Today, especially given the multimodality afforded by the increasing quantity and variety of digital tools, the sociocultural context of arguments and the social practice of argument are increasingly important and may mean that a new genre of argument is needed.

Newell et al. (2011) conducted a review of the literature on argument, which considered empirical studies between 1985 and 2011. They considered studies addressing writing arguments in kindergarten through college-level writing courses. They argued that those who research, teach, and think about argument often come from two alternative perspectives: the cognitive and the social view. The authors discussed the cognitive view of argument, which is typically concerned with the structure and form of argument, such as Toulmin's model (1958/2003). However, Newell et al. (2011) also

presented a social perspective of argument, which focuses upon the audience intended for the argument and how that audience and the social context of the argument affect its creation. Rather than presenting these views as oppositional, the authors concluded that more studies need to be done about how they relate to each other, as does the present study. They found that argument is often assumed to have benefits for writing and literacy, yet there needs to be more research, not only on the implications of argument, but how argument should be taught and how argument may be dependent upon the context of those engaging in argument. Thus far, there has been little research on argument viewed from a social perspective (Newell et al., 2011). Thus, the present study fills this gap by pursuing a goal of improving students' arguments through an intervention that incorporates both cognitive elements (e.g., claim, evidence, and elaboration of evidence) and a social practice of arguments (e.g., teaching students to design arguments mediated by the multiple modes and digital tools of their sociocultural context).

Digital, Multimodal Arguments

Visual rhetoric (Newell et al., 2011) and visual arguments (Birdsell & Groarke, 2004; Howard, 2011) are examples of the social practice of argument. Newell et al. (2011) defined visual rhetoric as "argumentative social practice mediated by multimodal uses of digital video, image, and music cultural tools" (p. 295). In defining visual argument, Birdsell and Groarke (2004) provided essential elements in developing a theory of visual argument: "…(a) identify the internal elements of a visual image, (b) understand the contexts in which images are interpreted, (c) establish the consistency of

an interpretation of the visual, and (d) chart changes in visual perspectives over time" (p. 318). These terms and the perspective they represent are incorporated into my view of multimodal arguments, which are comprised of the modes established in the perspective of multiliteracies- linguistic, visual, audio, gestural, spatial, and multimodal (New London Group, 1996).

The New London Group (1996) emphasized that modes other than the linguistic mode were becoming increasingly important as our world becomes more globalized and technological. Of the modes discussed by the New London Group, the visual mode has gained prominence in the literature on the changing nature of literacy and argument. For example, Kress (2003) emphasized the visual mode:

…there is a need for some discussion of the different conceptions of language and writing deriving from the distinction between alphabetic and image-based writing systems. This is even more urgent given that in these new environments, writing is likely to move in the direction of its image origins. (p. 73)

Specific to argument, researchers have discussed the ability and need for students to realize that images can be used for argumentative purposes and to use images for this aim (Birdsell & Groarke, 2004; Newell et al., 2011). Visual images—such as colors, graphics, and slides of a PowerPoint—are no longer aids to the written or spoken argument, but may be increasingly taking the place of what was previously done singularly with language (Cyphert, 2007). This broadening of the conception of argument is seen as essential for argument to be able to integrate the visual nature of our lives, including digital practices, with rhetorical purposes (Andrews, 1997; Birdsell &

Groarke, 2004; Hocks, 2003; Howard, 2011). Howard (2010) argued the current

generation of students "aren't members of 'Generation X' or 'Generation Y,' they're the

'eye generation'" (Howard, 2010, p. 220). Birdsell and Groarke (2004) suggested that

without expanding the notion of argument, argument has no way of accounting for "…the

many visual ploys that play a significant role in our argumentative lives…" (p. 318).

Argument must account for more than a sequence of statements, as in Aristotle's model

and Toulmin's structuralist model; instead, "it is the deploying of verbal, visual, and

physical 'moves' to negotiate a new position or defend an existing one…" (Andrews,

1997, p. 10). Alvermann (2008, 2011) argued that for literacy to remain relevant to

adolescents, it must become less print-centric and account for the increasingly

multimodal, digital aspects of students' lives. Multimodal arguments look not only at the

structure of argument, but also at how students' design their argument. It is this emphasis

on design, as well as on form, that makes multimodal arguments a combination of

cognitive and social elements in making an argument.

Bezemer and Kress (2008) described the social practice of design as a shift in

focus from students' knowledge of specific practices and conventions to the interests and

abilities of the student as a designer. Thus, teaching and researching multimodal

arguments involves not only studying students' knowledge of the form of argument, but

their use of modes to convey their arguments. Students need to understand the cognitive

form of argument, or what Bezemer and Kress (2008) designated as "competence in a

specific practice" (p. 174), to understand what content to convey in their arguments.

They must also understand how to use the semiotic resources of their sociocultural

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context to design arguments that are meaningful, relevant, and engaging to their intended audience. Kress (2000a) explained that teaching multimodality is necessary for equitable participation in a future that will increasingly depend upon multimodal design. By engaging students in multimodal composing, teachers are giving students practice in multimodality that Kress (2000a) described as becoming increasingly pertinent to their futures.

Most of the research on multimodal arguments is theoretical, and there are limited studies focusing on multimodal arguments. The few studies that do highlight multimodality and argumentation, such as Whithaus (2012) and Demirbag and Gunel (2014), are framed in fields other than literacy. Whithaus (2012) analyzed reports written by California's Department of Pesticide Regulation (DPR) using concepts of argumentation, genre, and mode pertinent to the field of science. Whithaus (2012) found that the modal forms of the evidence influenced the "shape and structure of the argument being developed" (p. 106). Whithaus specifically analyzed these reports using the Toulmin (1958/2003) model for argument and found that model difficult because Toulmin's model did not account for the elements of argument beyond a linguistic mode, and alternative modes changed the pattern of argument. For example, the claim-evidence relationship in the Toulmin model is based upon both the claim and evidence being developed linguistically. However, in the scientific reports studied, the claim was often developed linguistically while the evidence presented was displayed visually, numerically, and linguistically. Whithaus (2012) concluded that there was a need for a more multimodal form of argument: "An updated Toulmin model of argument—one that

considers multimodal in addition to linguistic claim-evidence relationships—can be valuable in this process because such a model facilitates a more detailed, even mathematical, consideration of argumentative patterns" (p. 106). The Whithaus (2012) study supports the notion that the current model of argument is dependent upon language alone and does not account for the increasingly visual elements available for constructing arguments with digital tools. For example, interactive graphs and charts can be included that move visual information to a more central, rather than a supportive or peripheral, role in constructing arguments (Jewitt & Kress, 2010). In fact, Whithaus (2012) found that in the DPR reports analyzed, 83% of the evidence provided was visual or numeric rather than linguistic. Whereas Whithaus (2012) studied the changing nature of scientific argumentative writing, Demirbag and Gunel (2014) conducted a quasi-experimental study of 119 students across four sections of a science class at a Turkish university. They used a treatment and control group to determine if multimodal instruction increased the quality of students' arguments and content knowledge. Their findings suggested that the treatment group, which received multimodal instruction, outperformed the control group in both the quality of their arguments and their demonstration of content knowledge. These few studies suggest that a new multimodal model of argument is warranted (Whithaus, 2012) and that multimodal instruction may benefit students' argumentative writing (Demirbag & Gunel, 2014).

Justification of the Intervention and Its Essential Elements

Interventions and how they can be implemented to achieve valued pedagogical goals are central in formative experiments. An intervention is defined by its essential

elements aimed at improving a problem or transforming learning (Reinking & Bradley,

2008). The intervention of this study was composed of the following essential elements:

(a) construction of arguments minimally comprised of a claim, evidence, and elaboration

of that evidence; (b) digital tools useful for constructing digital, multimodal arguments;

and (c) a process approach to writing. The essential elements are non-negotiable in

enacting an intervention; however, teachers can implement these elements in a myriad of

ways (Reinking & Bradley, 2008). Instructional practices that might instantiate these

essential elements of this intervention are shown in Table 2.2.

Table 2.2

Examples of Teaching Practices Supporting Intervention

Intervention Element	Examples
Construction of arguments minimally comprised of claims, evidence, and elaboration of that evidence	• Teachers introduce students to definitions of the parts of argument. • Teachers help students identify parts of argument in writing models. • Teachers help students write parts of the argument. • Teachers help students design parts of the argument using language and other modes, such as visual, audio, spatial, and multimodal. • Teachers help students recognize how arguments are structured in online environments and how this compares and contrasts to conventional arguments.
Writing will be taught using a process writing approach	• Teachers create extended opportunities for writing. • Students are writing for authentic audiences. • Peer interactions are emphasized. • Students regularly work through the writing process: planning, drafting, and revising. • Teachers give brief periods of instruction, such as the minilesson, which is combined with personalized instruction for students, such as conferencing.
Digital tools useful for creating digital, multimodal arguments will be used	• Teachers introduce digital tools at various points of the writing process and give minilessons on how tools can serve arguments. • Students publish argument projects online using digital tools. • Students collaborate using digital tools. • Students are taught how different modes may impact their arguments. • Students analyze models of writing for how they incorporate multimodality. • Students analyze where they use multimodality using varying digital tools in their own lives and how this multimodality may apply in the future.

Construction of Arguments

The intervention's first essential element is that the construction of arguments would consist of a claim, evidence, and elaboration of that evidence. Several researchers have called for knowledge of the structure of arguments to help students write more effective arguments (Knudson, 1992; Yeh, 1998). As previously discussed in this chapter, Toulmin's criteria for argument (1958/2003) have been used in both composition instruction (Hillocks, 2011; Lunsford, 2002; Smith et al., 2012) and in studies of argumentative writing (Knudson, 1992; McCleary, 1979; Yeh, 1998). Toulmin's model of argument extends Aristotle's model of argument to account for the variances between everyday speech and formal written arguments and consists of six parts: claims, data, warrants, qualifiers, backing, and rebuttals (Toulmin, 1958/2003). This study used criteria of Toulmin's model (1958/2003) focusing upon claims, evidence (Toulmin used data), and elaboration of evidence (Toulmin used warrant) to instruct students to state an argument, support that argument, and explain their evidence. The present study focused upon elaboration of evidence rather than the term from Toulmin's model, *warrant*, as research has shown that explication of evidence in argument may be implicit, dynamic, and depend upon the context of the student, which the term *warrant* may not imply (Lunsford, 2002; Toulmin, 1958/2003). Because students may explain evidence in ways that are not typically associated with a warrant, such as describing the evidence or summarizing evidence (Harris, 2006; Klein & Rose, 2010), the broader term (*elaboration of evidence*) was used instead of *warrant*, which has also been used in other studies of argument (e.g., Klein & Rose, 2010). These three elements based upon Toulmin's model

were chosen because these elements seem to be the minimal elements that Toulmin (1958/2003) expected for his own model:

> Data of some kind must be produced, if there is to be an argument there at all: a bare conclusion, without any data produced in its support, is no argument. But the backing of the warrants we invoke need not be made explicit—at any rate to begin with: the warrants may be conceded without challenge, and their backing left understood. (p. 98)

Thus, minimally, the claim of an argument must be defended with evidence and a logical connection, implicitly or explicitly, must be made as to how the evidence supports the claim. McCleary (1979) demonstrated that teaching the logic involved in argument led to gains in critical thinking, but not necessarily to gains in writing effective arguments. However, other studies such as Knudson (1992) found that students are often more unfamiliar with the genre of argument than with other genres, such as narration, and that they must be explicitly taught the criteria for writing good arguments. Further, in a study combining quasi-experimental and case-study methods of two teachers and 116 students in four seventh-grade language arts classes, Yeh (1998) explored whether explicit instruction in argument differed from immersion in arguments without explicit instruction. In that study, Yeh (1998) found that students benefitted from explicit instruction of argument, with the treatment group receiving explicit instruction outperforming the control group, which received no direct argument instruction. When compared on pre- and post-test essay scores, the difference between the two groups on the development of their essays was statistically significant with an effect size of .64.

Knudson's (1992) study of 110 students in tenth- and twelfth-grades, in which students were scored on three writing prompts after receiving one of four different instructional strategies, also supports direct instruction of the criteria for arguments. Based on the results of his multiple regression analysis, Knudson (1992) concluded that, "The teaching of argument must include a clear distinction between data and claims and a clear understanding of what they are must be developed to the point that students comprehend how data and claims work together to support the proposition" (p. 176). Thus, a modified version of the Toulmin scheme of argumentation was included as an essential element of this intervention (see Knudson, 1992; Yeh, 1998). However, this element was intentionally paired with other elements of writing instruction (see Lunsford, 2002; McCleary, 1979), specifically using digital tools for multimodal writing and the process writing approach, as detailed in the subsequent subsections.

Digital Tools Useful for Digital, Multimodal Arguments

The second essential element of the intervention is that the teachers and students use digital tools capable of constructing digital, multimodal arguments. In the perspective of multiliteracies, the availability of digital forms of communication and their integration into daily life increase the importance of multimodal forms of representation in contemporary writing. Several professional organizations such as the International Literacy Association, previously called the International Reading Association, and the National Council of Teachers of English (NCTE) have called for students to be able to use digital tools for their learning (IRA, 2009; NCTE, 2008). As calls for increased technology integration in literacy grow (Hutchison & Reinking, 2011), so do calls for

integrating multimodality into classrooms (NCTE, 2005; Siegel, 2012). Jacobs (2012) speculated why using multimodality in teaching may be becoming more essential: "As the world grows increasingly multimodal, instruction needs to move beyond traditional texts and include opportunities for engagement in multimodal academic literacies wherein students not only 'read' multimodal texts, but also create multimodal texts" (249). However, research to support such integration of multiliteracies and the multimodality they entail into classrooms remains limited (Graham & Benson, 2010; Sewell & Denton, 2011).

There are two types of research on how technology is used with writing: technology that supports traditional writing and technology that encourages students to compose in new ways (MacArthur, 2006). Although research suggests that word processing, an example of the former, is positively associated with the quality of student writing, writing research lacks "clear direction for the use of technological tools other than word processing" (Graham & Perin, 2007b, p. 26). However, the Internet and computers differ from writing technologies of the past, as Baron (2009) observed, "And the point of keyboarding is not simply to replicate other people's words, as it largely was with typing and penmanship, but to create original texts" (p. 159). MacArthur (2006) in his review of the impact of technology upon writing argued that composing digitally can be beneficial to students' thinking: "The case studies and experimental studies together show that composing hypermedia requires high-level cognitive processes and can help to develop those processes" (p. 258). However, he concluded his review by stating that research is limited regarding these new forms of writing and that more research on the

interventions concerning technology and student writing are needed. The present study addresses this limitation.

More recent data from the 2011 National Assessment of Educational Progress eighth-grade writing assessment suggested that students whose teachers asked them to compose their writing using computers scored higher on the writing portion of this assessment, and students whose teachers never asked them to compose on computers scored the lowest (NCES, 2012). Further, the use of digital tools for composing was divided along economic lines with disadvantaged students composing with digital tools less often than their more economically advantaged peers. This disjuncture is concerning especially, considering this report's connection between composing digitally and success with writing. The present study addresses that disjuncture because it was conducted in an economically disadvantaged, rural school district.

Jocius (2013) argued that many multimodal studies examine engagement and meaning, but few studies show the academic learning to be gained through multimodality. Bowen and Whithaus (2013) discussed the tension between the possibility of multimodal composing and what actually is applied in classrooms as teachers try to implement in practice what the New London Group (1996) outlined in theory. The present study and this component of its intervention will give practical pedagogical implications for using digital tools and multimodal composing to accomplish the academic task of argumentation. The following two sections will review research relevant to how multimodal composing has been applied to classrooms, focusing upon the emerging themes of digital tools and engagement.

Digital tools and multiple modes. Multimodal composing not only involves the

design of modes to form meaning, but also often entails using digital tools to achieve

such design. In addition to the traditional writing technologies associated with

conventional print and the use of word processing software to enhance essentially printed

forms, multimodal tools include, for example, video editing software, applications,

online-poster and infographic software, and tools for creating slideshows. Research on

multimodal composing discusses that these digital tools can be an important determinant

of the creativity students exhibit (Jocius, 2013; Jones, 2010; Johnson & Smagorinsky,

2013). However, digital tools are often not integrated into school curriculum for the

purpose of multimodal composing. For example, Edwards-Groves (2011) found that

teachers used word processing as the main tool to allow students to publish their writing.

In an eighteen-month qualitative study using observation, surveys, and interviews of 17

teachers and their students in primary schools, she found that teachers did not utilize

multimedia technology to publish their writing. Even when digital tools other than word

processing were used (e.g., PowerPoint), writing was mainly carried out linearly

following conventional forms, often ignoring the design features of the technological

tools and the often recursive nature of the writing process when using such tools. Those

conclusions are supported by robust findings that teachers often consider technological

integration to be simply using digital technologies rather than curricular integration

requiring new instructional goals and activities (Hutchison & Reinking, 2011; Peterson &

McClay, 2012). Research on writing has also focused upon technology used for

traditional goals rather than technology used to create new forms of writing (MacArthur,

2006).

On the other hand, when digital tools are used to create multimodal texts, the constituent technologies and their affordances are an important factor in the meaning created, and may promote creativity, seen in the variety of modes used in compositions and the willingness to use this multimodality. In Jocius (2013), a qualitative study of eight multimodal student projects carried out by 14 students in response to the novel *The Kite Runner*, Jocius found that the choice of technology affected which modes the students used in their projects. For example, the students who used PowerPoint for their presentations relied upon text and stationary images. However, those students who used digital video technology, such as iMovie for Mac (http://www.apple.com/mac/imovie/) or Windows Movie Maker (http://windows.microsoft.com/en-us/windows-live/movie-maker), refrained from using text and used multimodality instead, including voiceovers, moving images, and music. Johnson and Smagorinsky (2013) also found in a study of a multimodal project with pre-service teachers that the digital tools available made a difference in the quality of the multimodal composition and the variety of modes used. They discussed that those students using Animoto (a web-based video editing tool; see animoto.com) had relatively few options for including multimodality in their publications and thus were restricted in their creativity. However, when using the Windows Movie Maker software, which provided a greater variety of video creation and editing options, the student of the case study, Mara, retained control and freedom in her design of modes for the project.

The research on multimodal composing also suggests that it is not enough to

simply assign students to create multimodal compositions while providing them with digital tools. Students often need more overt instruction, which is one of the four pedagogical elements that the New London Group (1996) recommended to engage students in multimodal composing. Rowsell and Decoste (2012) conducted a two-year ethnographic study of an eleventh-grade English class in Toronto. In that study, the students did not initially have the ability to connect learning about multimodality and composition. Both Rowsell and Decoste (2012) and McDermott and Hand (2013) discussed the need for students to understand how different modes work together for multimodal texts to eventually contribute to student learning. Thus, from the outset of the present study, I assumed it likely that students would need opportunities to explore, and perhaps be explicitly taught, how the multimodality afforded by digital tools might be incorporated effectively in creating multimodal arguments.

Student engagement. Multimodal writing seems to increase student engagement. Walsh (2008) found that engagement, particularly in boys who had otherwise been disengaged in the classroom, was high when engaged in a podcasting project that emphasized multimodal composing. Bruce (2009) explored the video composition process in a yearlong, teacher-researcher study of three case-study groups from media literacy classes, in grades 10-12. He found that students spent hours poring over their video compositions and were much more enthusiastic about these multimodal projects than they were in writing conventional compositions. Other multimodal studies supporting an increase in engagement with students include Vasudevan et al.'s (2010) case studies of fifth-grade students writing multimodal stories. Likewise, Jocius (2013)

found that 94% of the student participants preferred multimodal compositions to traditional essays; although, 73% reported that they never experienced this type of multimodality in other classes. Johnson and Smagorinsky (2013) described a case study of Mara, a pre-service teacher who was typically shy in her English Education classes, spending many days on a multimodal poetry project. Such engagement seems to persist even though students are navigating complex, multiple variables in these assignments (Bruce, 2009) and even though in many instances they have never worked with the digital tools sometimes necessary in multimodal composing (Jocius, 2013; Johnson & Smagorinksy, 2013).

Process Approach

The final essential element of the intervention is that a teacher involved in using it will embrace and use a process writing approach to writing in the classroom. A process approach to writing instruction has been researched since the 1970s (Applebee & Langer, 2013; Hillocks, 1986), is widely used by many writing teachers, and has been associated with such national organizations of writing as the National Writing Project (Pritchard & Honeycutt, 2006). Further, there is precedence for pairing process writing with instruction aimed at developing written arguments (Yeh, 1998). Several studies have noted the significant effect a process approach to writing has had on the quality of student writing (Graham & Perin, 2007a, 2007b; Graham & Sandmel, 2011). The process writing approach often incorporates writing in a workshop style with brief segments of formal instruction, such as what is often referred to as a *minilesson* (Graham & Sandmel, 2011). Such lessons are often combined with other aspects of process writing such as

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engaging in recursive writing, providing time for extended writing, ensuring an authentic audience for writing, and personalizing attention to each student's writing (Graham & Perin, 2007b; Graham & Sandmel, 2011).

This essential element was included because multimodal projects can involve multiple, interacting components where students may be at various stages of writing at different points. The process approach to writing supports such a needed recursive process in designing multimodal arguments (Applebee & Langer, 2013; Hayes & Flower, 1980; Graham & Perin, 2007b). In addition, students may need extended time for writing supported by individual instruction from their teacher to design multimodal arguments, which are accommodated within a process approach to writing (Graham & Perin, 2007b). The process approach also focuses on the process of writing over the final product of writing (Applebee & Langer, 2013), which is compatible with the perspective of multiliteracies and its conception of writing as a process of design (New London Group, 1996). In addition, a process approach involves teaching students explicit strategies for writing (Applebee & Langer, 2013) rather than assigning a writing product, which is compatible with the multiliteracies pedagogical practice of directly teaching students design processes and elements (New London Group, 1996).

Need for Replication

As indicated in Chapter 1, this study is a replication of an earlier smaller-scale study. The present study was conducted in a similar, but different, context that varied in grade level (ninth- and tenth-grade, as opposed to eleventh-grade) and in the teachers' experience (a first-year teacher and teacher of 23 years in this study as opposed to a

teacher who had taught for seven years). The context of the present study and the

smaller-scale study was similar because both were conducted in the same rural school

district. However, the school in the present study is classified as *Rural, Distant* as

opposed to the school in the smaller-scale study, which was *Town, Fringe*, or located

closer to the nearest urbanized area. Replication is essential to design-based research in

general and formative experiments in particular (Reinking & Bradley, 2008). Replication

enables emerging pedagogical theories to be tested and refined across multiple contexts

toward developing less context-specific assertions and recommendations that might more

broadly inform instruction (see Firestone, 1993 for case-to-case transfer). Replication

also addresses the concerns that Makel and Plucker (2014) documented in their study of

published education research. They analyzed the publication history of the 100 top

education journals selected on the basis of their five-year impact factor. They found that

only .13% of education articles were replications, revealing a disparity in the field of

education when compared to other disciplines and implicitly calling into question the

validity of its research base. Consequently, they have called for more replication studies.

Replication is needed in the field to verify findings and contribute to more stable and

useful generalizations. Specifically, they call for multiple replications of studies made in

a timely manner: "All this being said, one replication, successful or failed, should neither

cement nor condemn the original finding. The more replications (and the sooner they are

conducted), the better" (Makel & Plucker, 2014, p. 312). This dissertation study

addresses that call for replication, seeking to test and refine the findings and emergent

theory generated from a previously conducted, smaller-scale study in a different context.

Summary

This chapter described the theoretical perspectives guiding the intervention of this formative experiment, including multiliteracies and social semiotics. Furthermore, this chapter addressed the value of improving students' conventional and digital, multimodal arguments by showing that research to date calls for such instruction, but lacks sufficient research on how to implement it. To justify an intervention capable of reaching this goal, I presented research related to each essential element of the intervention: (a) construction of arguments composed of claims, evidence, and elaboration of that evidence; (b) using digital tools suitable for producing digital, multimodal arguments; and (c) a process approach to writing. Furthermore, I explained that the present study is a replication of a previous, smaller-scale study, and this replication addresses a current need in education research (Makel & Plucker, 2014). In the next chapter, I discuss how this intervention was implemented and how data was collected and analyzed.

CHAPTER THREE

METHOD

This chapter details the methods used in this investigation. It focuses on the methodological details of the formative experiment conducted in accordance with Reinking and Bradley (2008) and of multiple-case studies (Yin, 2014) used to define, collect, and analyze the data. After reviewing why the formative methodology was chosen for the present study, I describe (a) how I followed the procedures for formative experiments, (b) the context for the present study, (c) case methods used, (d) the case participants, (e) how the intervention was implemented, (f) the data collection, and (g) the data analysis. I conclude this chapter with a discussion of the trustworthiness of the methods used.

Formative Methodology

Formative experiments are pragmatically grounded in understanding pedagogical interventions that potentially advance a valued instructional goal (Reinking & Bradley, 2008). Consistent with that orientation, the pedagogical goal and research question guiding this experiment was: How can the stated intervention be instantiated into high-school classrooms to improve the quality of conventional and digital, multimodal arguments? Formative experiments are conducted on interventions that are also grounded in theoretical and empirical findings. They aim to determine how those interventions can be implemented to achieve a valued pedagogical goal and in the process develop, test, and refine pedagogical theories directly useful to practitioners and those who work with them.

Consistent with this orientation, I chose to conduct a formative experiment as my methodological approach because I was interested in better understanding how an intervention aimed at achieving a goal consistent with a multiliteracies theoretical perspective (see Chapter 2) might be successfully integrated into typical high-school English classrooms. This methodological approach is particularly suited to exploring digital interventions, such as those used in this study, as it is inherently iterative and allows for the observation and adaptation of multiple, complex, interacting variables that often accompany integrating technology in the classroom (Reinking & Watkins, 2000). In addition, there is precedence for using formative experiments for literacy research in general (Bradley et al., 2012) and for examining writing in the context of classrooms in particular (Tracy & Headley, 2013) and also in studying adolescent literacy (Bradley et al., 2012; Ivey & Broaddus, 2007; Jiménez, 1997). This study used the following framework for conceptualizing and conducting (Reinking & Bradley, 2008) the collection and analysis of data:

1. Identification of a worthy pedagogical goal to be investigated,

2. Creation of an intervention capable of achieving the pedagogical goal,

3. Identification of enhancing and inhibiting factors of the intervention,

4. Implementation of modifications to the intervention to achieve the pedagogical goal,

5. Documentation of unanticipated outcomes of the intervention, and

6. Documentation of changes in the instructional environment due to the stated intervention.

The first and second components of this framework were addressed in the previous review of the literature. The remaining four elements are addressed in subsequent sections of this chapter.

Procedures

The procedures for this formative experiment were carried out in six phases recommended by Reinking and Bradley (2008). These phases and their constituent activities (see Reinking, Colwell, & Ramey, 2013) are described in Figure 3.1. Because this study uses both a formative experiment methodology and case-study methods, I have organized this chapter by sections typically presented in case studies, which may be more familiar to readers of this study. However, in each section, I have explicitly described the pertinent phases of formative experiments in Figure 3.1. For example, the description of context and case participants in the subsequent sections of this chapter align with Phases 1-3, and the intervention described subsequently in this chapter aligns with Phase 4.

Phase 1: Recruitment and Preparation: October 2014	• Met with teachers expressing interest • Joint planning with teacher
Phase 2: Understanding the Context October 2014	• Interviewed teachers and faculty members • Observed in school and classrooms
Phase 3: Gather Baseline Data October 2014	• Interviewed teachers • Administered questionnaire on argument • Administered pre-intervention writing prompt • Administered pre-intervention mulitmodal reflection
Phase 4: Implementation and Adaptations November 2014-March 2015	• Noted and made adaptations needed for progress toward goal • Held frequent debriefings with teachers • Reviewed initial coding • Interviewed teachers, students, and faculty
Phase 5: Gather Post-Intervention Data March 2015	• Administered post-intervention writing prompt • Administered post-intervention student questionnaire • Administered post-intervention multimodal reflection • Interviewed students and teachers
Phase 6: Retrospective Analysis of Data and Writing of Study March-May 2015	• Trained scorers for scoring of writing prompts • Retrospective analysis and coding; SPSS testing

Figure 3.1. Timeline of the formative experiment.

Context

This section addresses the school context of the site chosen for the study as well as the classroom context for each case in the present study. I collected data to understand this context in Phase 1, 2, and 3 of the formative experiment (see Figure 3.1). I conclude

this section with a discussion of my role as a researcher as this role was part of the context of the study.

School Context

This study was conducted in a high school located in a community with a locale code in the National Center for Education Statistics (NCES, n.d.b.) of *Rural, Distant*, which means that it was more than five miles but less than twenty-five miles from an urbanized area. The school district in which it is located was also eligible for the Rural and Low-Income School Program for the Fiscal Year 2011 (United States Department of Education, 2011), which bases its requirements on children living in families below the poverty line and locale codes. According to data from NCES in the year prior to this study, the high school Waverly High (all names are pseudonyms) had 992 students and was classified as a Title I school. Waverly qualified as a Title I school because it had at least 40% of students from low-income families (NCES, n.d.a.). The student population was 90% White, whereas only 4% were Hispanic, 4% were Black, and 2% were other races/ethnicities. In the same year, on a rating assigned by the state in which it is located, Waverly received an absolute rating of Good out of a range of At-Risk, Below Average, Good, and Excellent, meaning that the school was judged to exceed that state's standards for academic progress. In 2013, the school had a 70.7% graduation rate, which was below the 76.2% rate of schools with similar students as established by the state report card. On the exam data given in the state report card for this state's high-school exit exam, administered to all students before graduation, 53% of Waverly's students scored at the levels of proficient or advanced in the area of English language arts in the past two-

year period.

As part of Phase 2 (see Figure 3.1) of this formative experiment, in which I collected data to gain an understanding of and a perspective on this study's context, I met with the principal of Waverly before and during the intervention. Almost half of the student body of Waverly (48%) was eligible for free and reduced price lunch according to data from NCES. However, when I interviewed Mr. Cather, the principal, he explained that the proportion may be higher because of difficulties getting students to fill out federal forms (interview, December 16, 2014). He described Waverly as rural, with the economics of the community dependent upon farming and agriculture, and many of the activities of students revolving around rural culture. For instance, the school had a large population of students involved in Future Farmers of America (FFA) and had three agriculture teachers, more than other high schools in the area. A major issue Waverly faced was transporting their students, often living in isolated, rural areas, to a school zoned for one of the largest geographic areas in the district. This transportation hurdle created problems for getting students to extracurricular activities, parent conferences, and other activities that would require students or parents to coordinate transportation outside of the school day. Mr. Cather said that about 45% of students would go on to pursue a two-year or four-year college degree. However, he also estimated that approximately 30-35% of the students were largely apathetic towards school and were more motivated by the relationships they developed with teachers, rather than other goals, such as graduation or future careers. Thus, one of the major hurdles that the school faculty worked to overcome was motivating these students academically.

According to Mr. Cather, Waverly had a student population that was not guaranteed Internet access at home. He was concerned about the difficulties in working towards greater technology integration into the school curriculum because of that lack of access (interview, December 16, 2014). Therefore, he asked all of the Waverly teachers at the beginning of the school year to survey their students to determine which students lacked such access. Based upon that information, he estimated that 25% of the students at the school did not have Internet access at home. In addition to interviewing the principal, I interviewed the media specialists in the school to gain context for the present study especially regarding digital tools (see Figure 3.1, Phase 2). According to my interview with two media specialists of Waverly, the school had three computer labs with 28 computers in each lab, a carrel of 28 laptop computers in the library, a small computer lab of 11 computers, and two mobile laptop carts, each with 26 laptop computers (interview, October 14, 2014). In addition to these computer labs, the media center kept at least 12 netbook computers for teachers or students to check out temporarily. Wireless Internet was available at the school, supported by high bandwidth; however, connectivity with mobile access points to this bandwidth was sometimes unavailable. In addition, each student at Waverly was assigned a school district Google email account that included access to Google Applications (http://learn.googleapps.com), such as Google Docs (http://www.google.com/docs/about/) and Google Sites (http://www.google.com/sites/overview.html). In addition, every teacher had a laptop computer and most classrooms had SMART boards (http://education.smarttech.com/?WT.ac=homepage_ed). All classrooms had a digital

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projector available for instructional activities. Three full-time media specialists managed

the media center. When interviewed about technological needs for the school, two of

these media specialists said that student Internet access at home and access to personal

devices, such as Chromebooks, were their top priorities although there were no funds at

the time of the interview to support such initiatives. When asked about other

technological factors that affected Waverly, they said,

> I think there is a huge digital divide, I really do...There are kids that come in who
>
> literally don't know how to log in…they've never had a computer at home and
>
> they've never worked with except what they've seen, their limited access they get
>
> in schools…. (interview, October 14, 2014)

Classroom Context

A ninth-grade English I and tenth-grade English II classroom comprised the two

cases of this study. I met with the ninth-grade and tenth-grade teachers prior to the

intervention to gain details to contribute to my knowledge of the context of their

classrooms (i.e., their teaching style, their past experience teaching argument, the units

they traditionally taught, etc.; see Appendix A). I met with and observed the ninth-grade

teacher for two weeks prior to starting the intervention in her classroom and the tenth-

grade teacher for three weeks prior to starting the intervention in her classroom. I

observed each teacher teach classes that did not pertain to the intervention of the present

study to gain context, such as their classroom routine and setup, their interaction with

students, and their teaching style, as well as how students responded to their instruction.

I also interviewed each teacher at the beginning of the intervention to gain contextual

detail and baseline data regarding their goals for their teaching and students, beliefs about students strengths and weaknesses, and their experience teaching argument and teaching with digital tools (see Figure 3.1, Phase 2 and 3).

The school operated on an alternating schedule, such that each class section met every other day for 90 minutes. In the ninth-grade classroom, Ms. Barrister had been teaching at Waverly for 23 years. She is Caucasian and was in her forties. Her investment in the school and the community were obvious, as at the time the data were collected, she lived in the same city that she taught, coached several of the school's athletic teams, and her two children attended Waverly. Her room had a SMART Board at the front and two dry-erase boards on each side, covered with inspirational quotations. Her desk was at the front of the room and included her laptop computer. The students' chairs were arranged at tables, grouping students into threes and fours. On the entrance side of the classroom, there was a counter running the length of the room that had shelves above it, housing classroom texts, and four classroom desktop computers sat on this counter, although I never saw a student use one of these computers (field notes). The room was decorated in bright colors with flowers and inspirational quotes decorating each of the classroom walls.

The routine of the classroom often began with Ms. Barrister sitting at the outside of the door greeting students as they entered. When the bell rang to signal the start of a class period, the students had an agenda and an opening activity, usually a short vocabulary activity (interview, October 30, 2014). Prior to implementing the intervention, Ms. Barrister would then have students begin a reading activity that

typically continued for half an hour or more followed by guided reading activities. This routine was typically followed by group work. When the students' work required computers in this class, they typically used one of two computer labs, both housing 28 desktop computers and located at the opposite end of the hall. Ms. Barrister used these computer labs when computer-related activities were done in the classroom, as she did not have enough computers in the classroom to accommodate each student, and students had difficulty logging on to the computers available on Waverly's two mobile carts.

The tenth-grade classroom was led by Ms. Tucker, who was teaching for the first year of her teaching career at Waverly. She recently graduated from the local university with a double major in English and secondary education and lived in a town about 30 minutes from the school (interview, October 20, 2014). She grew up and went to a high school in the same district as Waverly. She is a single, Caucasian female, and at the time the data were collected was in her twenties with no children. She had arranged her classroom into five rows of desks in which students faced the front of the classroom where there was a SMART board and two dry-erase boards flanking it (field notes). The teacher's desk sat to the right of this board and was typically full of student papers and the teacher's laptop. There was a shelf along the left side of the classroom next to the classroom door, and this shelf contained baskets for each class section's journals. Above this shelving were cabinets with textbooks for each of her classes. Her students also used primarily two of the computer labs when they were using technology for an assignment. The computer labs were located just down the hall from Ms. Tucker's classroom. Ms. Tucker described her typical classroom routine prior to the intervention as her students

beginning each day with some type of starting activity, which varied, but often included

journal writing, a worksheet, or vocabulary work (interview, October 20, 2014). Students

were given freedom to talk and laugh while they worked on these activities. After this

activity beginning the class, Ms. Tucker reviewed the agenda on the front board and

students practiced reading every day, which also frequently included writing activities.

One of Ms. Tucker's primary goals for the year was to improve her classroom

management (interview, October 20, 2014). The need for this management was

witnessed on multiple occasions as the students often spent the first segment of class time

talking to one another and getting out of their seats rather than completing the beginning

activities, and I observed that she often struggled to gain and keep the students' attention

(observation, October 14, 2014, October 30, 2014).

Role as Researcher

My role as a researcher collecting data was as a participant-observer (Glesne,

2011), which is a typical role for a researcher conducting a formative experiment

(Reinking & Bradley, 2008). Formative experiments require that a researcher work

closely with teachers because researchers using this methodological approach often

"enter deeply into the ecology of a classroom" (Reinking & Bradley, 2008, p. 78). In

establishing such a role, I worked with the teacher in each case to determine and

continually discuss what our roles would be in the research. For instance, in the initial

discussions in Phase 1 (see Figure 3.1) of this study prior to beginning the intervention, I

asked each of the teachers what they would like their roles to be in the research. I

discussed with them that this research would be collaborative in that I would be

dependent upon them for their feedback, suggestions, and observations (Cole & Knowles, 1993). In this discussion of my and the teachers' roles in the study, I also asked the teachers if they would like to be involved in the analysis or presentation of the research, and they declined, explaining they wanted to be involved in the intervention of the research rather than in the analysis of the research (field note, October 15, 2014; interview, October 30, 2014). Accordingly, we established a collaborative relationship with separate, but complementary roles. For research to be collaborative, it must be a "process of ongoing negotiation" (Cole & Knowles, 1993, p. 484). Thus, with each lesson, or series of lessons, during the intervention, I discussed with each teacher the level they desired of my participation in carrying out the intervention. Ms. Barrister preferred that I introduce any instruction related to the intervention's elements and activities, and she then co-taught with me as we helped students carry out the respective parts of the intervention. Often, this co-teaching involved me introducing a concept and Ms. Barrister and I working with students as they implemented that concept in their own work for the respective concept. However, Ms. Tucker felt comfortable leading the instruction of the intervention, and I supported her instruction mainly by helping her to plan and develop teaching materials to use in the intervention, conferencing with students, and, at times, assisting her instruction.

In both cases, I met with the teachers to plan how the intervention would be implemented in their classroom lesson plans and instruction. I met with both teachers prior to the intervention to understand units that they typically taught, their goals for integrating the present intervention with those units, and the timing of the

implementation. During the intervention, I met with the teachers weekly, at times during

their planning periods or before or after the class session, to debrief and discuss how they

felt the intervention went that day and any modifications needed for the future. This

discussion and planning of the intervention, before the intervention in Phase 1 and during

the intervention in Phase 3 (see Figure 3.1), is common as formative experiments must

allow for enhancing and inhibiting factors of the intervention and make modifications to

the intervention accordingly (Reinking & Bradley, 2008).

The students in each of the two classes knew that I was a researcher, and their

teacher was in charge of instruction while I was there to support their teacher. Due to this

role of participating in classroom interaction, but never becoming a complete member of

the classroom context, I was an active participant on the continuum of participant-

observation, which includes five levels of participation: nonparticipation, passive

participation, moderate participation, active participation, and complete participation

(DeWalt & DeWalt, 2002). For example, in Ms. Barrister's class, I was an active

participant as I often taught minilessons and conferenced with students, but never became

a complete participant as the students always knew their teacher was in charge of

classroom instruction, and I was only a temporary visitor. In Ms. Tucker's classroom, I

was also an active participant as I was often there to conference with students and support

Ms. Tucker, but I never became a full participant because I offered support only as it was

needed to the full participants, the teacher and her students.

A researcher's presence, especially the active participation necessary in this study,

raises questions as to how this presence could potentially influence the intervention. This

is an "unresolved, methodological issue" (Reinking & Bradley, 2008, p. 79) in formative experiments. One suggestion is that formative experiment studies be considered more holistically with some studies involving great involvement and further studies needing less involvement from researchers (Reinking & Bradley, 2008). Thus, further study may pursue this intervention with a decreased level of participant observation. For this study, I took measures to member check my role as researcher. For instance, Glesne (2011) stated, "One of the ways in which researchers address the power imbalance is through various modes of reciprocity" (p. 148). This reciprocity was achieved in the present study by developing a collaborative relationship between each teacher and myself. I shared the research goals with each teacher and planned collaboratively their implementation. For example, in Phase 1 of the present study, I met with each teacher, explained the principles of formative experiments, and emphasized the need for their continuous feedback regarding the implementation of the intervention. In Phase 3 of this formative experiment when the intervention was underway, I met with each case teacher to "debrief" (Creswell, 1998, p. 202) and to member check my understandings of the implementation of the intervention. Each teacher provided suggestions for modifications to the intervention and commented on the strengths and weaknesses of the intervention, and these were recorded in my field notes. The formal interviews with each teacher occurred before, during, and soon after the intervention. The formal, semi-structured interviews (see Appendix A) and the weekly debriefings with each teacher provided them the opportunity to share their feedback and for me the opportunity to member-check my findings (Creswell, 1998). These meetings were to share and reflect with each teacher

about the implementation of the intervention and insured that others shared my interpretations and that my own subjectivities did not unduly influence these interpretations (Glesne, 2011).

Case Methods

To frame data collection and analysis in this formative study, I employed established methods for conducting case studies. Case-study methods have proved particularly useful for conducting formative experiments (Reigeluth & Frick, 1999). In this study, a tenth-grade section of English II and a ninth-grade section of English I were the two cases. Multiple-case studies are often considered more robust than single-case studies (Yin, 2014). Multiple-case studies can be conceptualized as a form of replication (Yin, 2014). Thus, each of the cases in this study replicated the stated goal and intervention of this formative experiment, providing insight into the applicability of the intervention to two different, though similar, classrooms. Researchers may purposefully select differing cases, as was the case in the design of the present study, to support theoretical replication (Yin, 2014). These cases differed due to the teachers' experience with teaching and the grade taught. The ninth-grade teacher was in her first year of teaching, whereas the tenth-grade teacher had been teaching at the same school for 23 years.

Case Participants

Yin (2014) categorized a common-case study by its embodiment of "the circumstances and conditions of an everyday situation" (p. 52). To recruit participants for the present study, I contacted a high-school English teacher at Waverly and asked that

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he send out an email to teachers in his department asking if they were interested in participating in an intervention aimed at improving students' conventional and online arguments. When I met with each of these teachers during the first phase of recruitment, I asked that interested teachers teach students of common ability level (neither honors students nor students receiving remedial instruction). I also asked that teachers not have advanced professional development or experience teaching either with digital tools or with argumentative instruction. The teachers of the two cases in this study met these conditions as they had neither taught nor received professional development extensively on the topics key to this study: argument and digital, multimodal tools. The students they taught in each case were students at the college-preparatory level; thus, these students were considered to have a common ability level. Therefore, the teachers and students of each case in the present study were common cases. As suggested in formative experiments conducted to investigate new interventions (Reinking & Bradley, 2008), these teachers and their students were neither clearly predisposed toward the intervention's success nor failure.

Ninth-Grade Case

The ninth-grade case included studying the interaction of the teacher and the students during their implementation of the intervention studied in this formative experiment. Thus, the intervention served as the binding of this case for not only the participants, but also the time the participants were observed and the activities that served as the focus of the study (Yin, 2014). *Bounding of the case* (Yin, 2014) is an important term in case-study methods as this binding helps to determine what serves as the

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boundaries that define each case and helps to keep researchers focused on the unit of analysis of their case. The participants included the ninth-grade teacher, Ms. Barrister, previously described in the classroom context of the study. In addition, the case included the 24 students in the class. The make-up of the class consisted of 12 White females, 10 White males, and two Hispanic males. The teacher identified each student as high, medium, or low regarding his or her writing ability. Six students were low, 13 students were medium, and five students were high. Although my observations and the interviews with Ms. Barrister are reflective of the whole class, 12 of these students gave permission for their data to be collected, and the remaining data, described in the subsequent data collection section, is limited to these students. Repeated attempts were made to collect these permission forms, but their return did not seem to be a priority for some students. A low return rate of administrative forms was described in other school initiatives (interview, December 16, 2014). However, all students in the class were included in the classroom observations and the interviews with the teacher. The participants who returned forms included nine White females, two White males, and one Hispanic male. Regarding writing ability of these participants, the teacher classified one of these students as low, seven as medium, and four as high.

I met Ms. Barrister early in October 2014. I observed her classroom twice in a two-week period to give context to the case prior to the intervention. The intervention began at the end of October and ended at the beginning of March. The 15 weeks during which the intervention occurred helped to bind this case. Data were collected when it applied to the teachers' and students' use of the steps of the intervention or the

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intervention's outcomes. Each week that the students were in school engaged in the intervention, I observed in Ms. Barrister's classroom, sometimes several times each week. The class in which I observed met every other day from 1:40-3:10 p.m., which was the final period of the school day.

Ms. Barrister believed that meeting during this final period influenced the class dynamic. For example, in comparison to her other classes, Ms. Barrister explained that this was her largest class and the worst behaved perhaps because, being at the end of the day, students were least likely to concentrate (interview, March 18, 2015). She described that these behavior problems were "not anything major," mainly "sitting still and keeping their hands off of each other" (interview, March 18, 2015). However, she described these students as having "their hearts in the right place" (interview, March 18, 2015), and she focused on developing close relationships with these students. She explained this need for relationships:

> I think they have to love you before they work for you…they have to know that you would fight for them. There is kind of a sense of loyalty before they're going to put out that extra effort in that quality work. To them, relationships are more important, and before you can have them academically excel, you have to build those relationships with them. (interview, October 30, 2014)

Ms. Barrister described the academic strengths of the students in the class as being their cooperativeness and their vocabulary ability, but she described their reading and writing skills as "weak" (interview, October 30, 2014). When asked why her students possessed these strengths versus weaknesses, Ms. Barrister described the value

system of the community as being instrumental in making the students value personal relationships and act well mannered. However, she described that in their community there was "not a whole lot outside of school that requires them to read" (interview, October 30, 2014). She described their writing as their biggest weakness. Regarding argumentative writing, Ms. Barrister had not taught argument in this class at all prior to the intervention. In the past, Ms. Barrister said she taught argumentative writing as "more of the hot topics" issue in which students picked a controversial issue and wrote about their side of that issue (interview, October 30, 2014). For their academic writing, students mainly relied upon text, using pictures (the only mode other than the written word mentioned) to illustrate vocabulary words (interview, October 30, 2014). Regarding technology, Ms. Barrister stated that she had used digital tools, primarily Internet use or Microsoft Word and Microsoft PowerPoint, approximately once a week in her classroom prior to the intervention of the study (interview, October 30, 2014). The ninth-grade students that she taught were also required to take a keyboarding/computer class. Ms. Barrister described herself as being moderately comfortable with technology: "…on a scale of one to 10, I say I'm about a four or five" (interview, October 30, 2014).

Tenth-Grade Case

Ms. Tucker, described previously in the context section, was the first-year teacher teaching the tenth-grade case of this study. This class also met from 1:40-3:10 p.m., every other day. I began meeting with her early in October to discuss the intervention, and we met four times during the next three weeks helping me to understand the context of her classroom. During this time, I observed her classroom and teaching prior to the

intervention, discussed the planning of the intervention, and interviewed her. This pre-intervention data collection instantiated Phase 1 (see Figure 3.1) of formative experiments, and included explaining to Ms. Tucker the fundamental rationale for and concepts of formative experiments and discussing plans for her role in the research (as described previously). We also discussed plans for implementing the intervention. In addition, these meetings allowed me to observe her interactions with the class, contributing to the knowledge of the context needed in Phase 2 of formative experiments and to establish the baseline data needed in Phase 3 (see Figure 3.1). As with the ninth-grade case, this case was bound by the implementation and timeframe of the intervention.

Ms. Tucker had 23 students in the class section of the tenth-grade case, 12 females and 11 males: one Black female, 11 White females, one Black male, one Hispanic male, and nine White males. Ms. Tucker identified 11 students as average, three students as above average, and nine students as below average in their writing ability. Although my observations and interviews with the teacher in this case are reflective of the class as a whole, the remaining data, described in the data collection section of this chapter, were collected from 11 students in this class who returned signed permissions allowing me to collect their data in the study. Repeated attempts were made to collect these permission forms, but their return did not seem to be a priority for some students. The principal had described similar low-return rates when trying to get students to return administrative forms (interview, December 16, 2014). However, all students in the class were included in the classroom observations and the interviews with the teacher. Of the participants who returned forms, there were seven White females and four White

males. The writing abilities of the students with permission slips were the following: five average, two above average, and four below average.

When asked to describe her students' strengths overall, Ms. Tucker described her students' ability to identify themes in major works and to recall information (interview, October 20, 2014). However, she noted that her students' greatest weakness was their writing. Ms. Tucker stated that her goals for the academic year included improving her classroom management, learning to teach to the different levels of classes she taught (she was teaching English II, English III, and English IV Honors), and helping her students to express themselves through writing. Ms. Tucker described the students' writing ability as "just not up to a high-school level really at all" (interview, October 20, 2014). Prior to the intervention, she had used a memoir writing assignment to assess student writing and had included smaller writing assignments, such as journal entries, in her instruction. She described her previous experience teaching argument as having students choose a literary figure and debate a topic from that character's viewpoint, which she had done during her student teaching (field note, October 15, 2014). Ms. Tucker had not taught argumentative writing prior to the intervention with the students in this case (interview, October 20, 2014).

Ms. Tucker explained that she used technological tools to assist in her teaching daily in class prior to the intervention, primarily conveying information to the students using the SMART board (interview, October 20, 2014). She also described taking her classes to the computer labs for "typing things that they've written about" (interview, October 20, 2014). When asked about multimodal composing her class had done prior to

the intervention, Ms. Tucker replied that most of her students' writing depended upon written text and was done in the classroom with pen or pencil and paper: "Just because like I said a lot of them aren't comfortable with computers, and I think it's easier to get their thoughts down at first" (interview, October 20, 2014). Ms. Tucker described her students' familiarity with technology as being less than what they were "supposed to be familiar with" (interview, October 20, 2014). For example, she described that many of the students had trouble with basic computer tasks such as saving, typing, researching on the Internet, and signing into their email accounts.

Intervention

This section will describe how the intervention was initially planned and implemented; modifications made to the intervention will be discussed in detail in Chapter 4. Although each case's specifications of this implementation will be explained in the following sections, the essential elements of the intervention were the same for each case. The essential elements of this intervention were the following: (a) construction of arguments composed of claims, evidence, and elaboration of that evidence; (b) using digital tools suitable for producing digital, multimodal arguments; and (c) a process approach to writing. Although these elements of the intervention can be implemented in multiple ways, removing any of these essential elements negates the intervention as a definable instructional entity (Reinking et al., 2013). The essential elements and how they were included initially in each case are shown in Table 3.1 and Table 3.2. A more detailed description of the weekly implementation of these elements can be found in Appendix B and Appendix C.

Table 3.1

Initial Implementation of Intervention in Ninth-Grade Case

Stage	Essential Element	Implementation of Essential Element
Stage 1, Infographic, Weeks 1-7	Elements of Argument	Students learned the language of argument by direct instruction, practiced making arguments including these elements, and analyzed arguments on the topic of euthanasia for these elements.
	Writing Process Approach	Students worked through the writing process on their infographics drafting, revising, and publishing their arguments. This was an extended piece of writing in which students often were given a minilesson followed by time to practice that lesson in their writing.
	Digital, Multimodal Tools	Students used Glogster EDU to create infographics. Students also used Google Docs to explore arguments, including multimodal arguments, on the topic of euthanasia.
Stage 2, Public Service Announcement (PSA) Website, Weeks 8-15	Elements of Argument	Students analyzed PSAs for elements of argument, researched and evaluated evidence for their construction of a PSA, and composed a multimodal argument by constructing a PSA website on a social issue relating to their class novel *Of Mice and Men*.
	Writing Process Approach	This was an extended piece of writing including research, planning, drafting, revision, and publication. Students also had minilessons on composing elements, such as how to include multimodality in their websites.
	Digital, Multimodal Tools	Students collaborated on their research topic using Google Docs. Students made a Glogster EDU poster that used evidence from their class novel to make an argument. They also embedded this poster into their PSA website made with Google Sites.

Table 3.2

Initial Implementation of Intervention in Tenth-Grade Case

Stage	Essential Element	Implementation of Essential Element
Stage 1, Infographic, Weeks 1-6	Elements of Argument	The students were given direct instruction on the language of argument and practiced creating arguments with these elements. Students read and analyzed texts on prejudice for elements of argument. Students created their own argument on a prejudice from *To Kill a Mockingbird* using an infographic.
	Writing Process Approach	Students planned, revised, and published their infographics, which were extended pieces of writing.
	Digital, Multimodal Tools	Students looked at example arguments that included multimodality using Google Docs. They also created multimodal arguments using Glogster EDU.
Stage 2, PSA Website, Weeks 7-13	Elements of Argument	Students reviewed the elements of argument by analyzing editorials and PSAs. They researched and evaluated evidence to include in their own PSAs, which were arguments on social issues.
	Writing Process Approach	Students regularly had minilessons on a topic of the day and then practiced this lesson in their writing. They went through the process of writing while constructing their PSA website, including planning, drafting, revising, and publishing.
	Digital, Multimodal Tools	Students used Google Docs to collaboratively share research. Students used Glogster EDU to make an argument of their social issue as it applied to their state. They embedded this Glogster EDU into a PSA website made with Google Sites, which was an argument about their social issue on both a state and national level.

In each case this intervention was enacted in stages (see Table 3.1 & 3.2). The first stage consisted of the students completing a smaller project, an argument of an issue presented via an infographic using Glogster EDU (edu.glogster.com). The second stage consisted of a larger project, a Google Sites website in which the students argued for a social issue in the form of a public service announcement (PSA). I discussed with each

teacher the intervention I had done in the previous smaller-scale study and the need to allow for modifications during the intervention, and we also discussed the digital tools that were available at their school. Based upon these considerations, each teacher, in our initial Phase 1 planning, decided to do an infographic as the smaller project and a PSA website as the larger project. Implementing the intervention in these stages, in which students were engaged in the essential elements of the intervention, allowed for modifications to be made to the intervention between the first and second stage as well as during each stage, which is consistent with and a necessary condition of formative experiments, which are "adaptive and iterative" (Reinking & Bradley, 2008, p. 20). However, in each case these stages were implemented differently as described in subsequent sections in this chapter.

I met with both teachers during the pre-intervention planning, and we discussed their curriculum and the timing of this curriculum (field notes, October 9, 2014, October 14, 2014). For example, Ms. Barrister had certain novels and timeframes for each novel that she wanted to include during the intervention. Ms. Tucker wanted to include a novel at the beginning of the intervention, but did not have a mandated curriculum that needed to be included in the second stage. The first and second stages of the intervention were mutually decided upon to fit with this curriculum.

In addition to each classroom implementing the essential elements of the intervention, each case also used the same technologies: Glogster EDU, Google Sites, and Google Docs. I discussed potential digital tools with both of the teachers as well as the media specialists at the school, and the teachers and I mutually decided upon these

tools in our Phase 1 planning of the intervention because of their accessibility, their potential to include multimodality, and the teachers' comfort level with these tools. Ms. Tucker had not used these digital tools in her instruction, but was familiar with Google Sites and Glogster EDU from her teacher education program (field note). Ms. Barrister was familiar with Google Docs, but had not used any of the digital tools during her instruction (observation, November 12, 2014). Each of these tools was suitable for including multimodality. Glogster EDU is an online site that allows students to make digital, multimodal posters. Google Sites is a digital tool for making websites, and Google Docs is a digital tool for sharing collaborative documents. Google Docs and Google Sites were platforms easily accessible to students as they were available through the students' Google email accounts provided to them by the school district and allowed them to include multimodality.

From the planning of the intervention to the collection of the final student written arguments and interviews, I worked with each case from October 2014 through March 2015. However, the weeks of the intervention varied to accommodate teacher schedules, school holidays, and days missed due to inclement weather. The intervention was enacted for 15 weeks for the ninth-grade case and 13 weeks for the tenth-grade case, which does not include respectively 3 and 5 weeks during the intervention, weeks that were used for exam preparation, holidays, and inclement weather (see Appendix B & C for respective intervention calendars).

Ninth-Grade Case

When I began planning with Ms. Barrister, the ninth-grade teacher, in early October 2014, she focused on the literature units that structured her English I curriculum: *Tuesdays with Morrie*, *Of Mice and Men*, *Romeo and Juliet*, and *The Odyssey* (field note, October 14, 2014). She described her instructional theme for the year as overcoming obstacles, and she described how she aspired to teach her students more than just texts, but also how those texts applied personally to her students' lives. Thus, we structured each stage of the intervention to fit into her literature curriculum and to be consistent with that overall goal. With each stage, the infographic and the PSA website, I met with Ms. Barrister before beginning the stage to discuss the overall plan and timeframe for the respective stage. Then, throughout each stage, I suggested activities that might be used in that stage, Ms. Barrister gave her feedback, and we met after each class session in which the intervention was implemented to discuss, modify, and plan for the next class session. As previously discussed, Ms. Barrister desired that I begin the instruction by introducing the concept central to the lesson, and then we co-taught the remainder of the class by conferencing with students and helping them implement the lesson. Although I tried to give Ms. Barrister more instructional responsibility, by having her lead the instruction, she did not feel comfortable taking this responsibility as she would promise to lead the instruction but then not fulfill this promise (observation, January 7, 2015), which will be discussed in Chapter 4 and 5 in further detail.

The first stage of the intervention was seven weeks and was a project in which the students created infographics answering the following prompt: Should euthanasia or

physician-assisted suicide be legal? That prompt tied into the novel *Tuesdays with*

Morrie, which the students were reading during this stage of the intervention, as the main

character Morrie knows he will die, yet uses his days before death to reflect upon his own

life rather than giving up hope. The prompt also allowed the students to learn about and

connect to a current event at that time. Popular media were reporting stories of Brittany

Maynard contemplating her right to die (see popular media example, Egan, 2014). Ms.

Barrister had never used Glogster EDU, but she was willing to try, as one of her reasons

for volunteering to participate in this formative experiment was to learn more about

digital tools and how they could be used in her teaching (interview, March 18, 2015).

For the initial implementation of the first stage, the students began with learning

about the elements of argument by learning the language of argument (i.e., claims,

evidence, etc.), analyzing existing arguments, and engaging in creating their own

arguments (see Appendix B for weekly activities of intervention). For instance, in an

initial class period in which the students were learning the language of argument, they

were then given a random artifact, such as a spoon and a compass, that their particular

group was assigned, and they had to use the elements of argument, including providing a

claim, using supporting evidence, and explaining that evidence, to sell this artifact to their

other classmates (activity from Smith et al., 2012). This activity was also their first

experience in the intervention with creating a digital, multimodal argument as they used

Glogster EDU to create an advertisement that included the argument for the artifact their

group was charged with selling.

After reading and creating that initial argument, the students used Google Docs to explore a set of nonfiction pieces about the topic of euthanasia. As previously described in the introduction of the intervention, this tool was initially chosen because each student had access to it via their school assigned Google email address. In this instance, the students worked in groups with a Google Doc that had links to nonfiction texts, including digital, multimodal texts. Using this Google Doc, students examined written arguments on that topic, but they also analyzed infographics, images, and video on the topic to view models of multimodal arguments. As they read, students initially worked in their infographic groups to gather evidence for this topic and began to think about the claim they would make about this topic. Students used information from the text they had been reading in class, *Tuesdays with Morrie* by Mitch Albom, as well as these nonfiction sources as their evidence for their infographic argument. Students worked through the writing process with these infographics, drafting and revising until each group presented their infographic in front of their class members, teacher, and myself. A more detailed description of activities included in this stage can be found in Appendix B. Students finished the first semester by starting to read *Of Mice and Men* by John Steinbeck and reviewing and taking exams.

At the end of the fall semester, Ms. Barrister and I met to plan for the second stage, the previously described larger PSA website project, which we had decided in the pre-intervention planning would be a website using Google Sites so that each student could create a PSA. During this time, we discussed modifications needed for the second stage of the intervention, which are discussed in Chapter 4. Ms. Barrister was teaching

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Of Mice and Men at the beginning of the spring term, so we initially decided to align the PSA with social issues occurring in modern day and the novel. We decided students would research their chosen social issue using resources discussing the issue as it occurs in modern day as well as information about the issue from the book. Students used *Of Mice and Men*, the Internet, and databases available through their media center, such as the *Opposing Viewpoints in Context* website (http://scdiscus.org/discus-resources), to obtain this research. Their goal in conducting this research was to construct a PSA arguing for or against some aspect of their chosen social issue, typically arguing for a solution to the issue. Ms. Barrister wanted the students to each create their own website (interview, December 16, 2014), so she decided that the students would research their topics in groups, but students would create a website individually. The students could pick from a list of social issues in the novel. The issues included: poverty, the agriculture industry, education, employment and unemployment, minimum wage, prostitution, race relations and racism, special education and learning disabilities, migrant workers, women's rights, and capital punishment.

Students began the second stage, in which they created a PSA website, when they returned to school in January. They began by reviewing the elements of argument in models of argument. They examined editorials as models of how writers make claims and support those claims with evidence and elaboration of that evidence. The students also explored examples of PSAs as models of multimodal arguments. Students worked in groups to examine how writers used PSAs to portray claims and evidence not only with text, but also with multimodal composing. Students explored several possible topics

before deciding upon one. After deciding, students worked in groups to research possible text, pictures, hyperlinks, audio and video clips, and other design elements to include in their websites. Students drafted arguments for their PSAs using evidence from research online as well as their reading of the text *Of Mice and Men*. In addition to drafting the text of an argument, students also drafted Glogster EDU posters to include in their websites. The Glogster EDU posters focused on the evidence they found from the novel that pertained to their chosen social issue. Finally, students were introduced to Google Sites with handouts as well as having the website modeled for them to introduce them to different aspects of the site including creating a site, adding pictures to their sites, and embedding their Glogster EDU posters into their website. The students drafted, revised, and edited their websites using a process approach to writing. This second stage of argument writing, consisting of the students creating their PSA websites, continued for eight consecutive weeks and ended when the students presented their websites to their peers during the culminating day in which the class engaged in the intervention.

Tenth-Grade Case

I began planning with the tenth-grade teacher in early October 2014. During the pre-intervention planning, she expressed interest in using their upcoming literature novel, *To Kill a Mockingbird* by Harper Lee to write their first paper as the class had focused on reading, but had limited writing at this point in the school year (field notes, October 9, 2014). We discussed using the theme of prejudice in the novel as the basis for the students' first argument. We determined that as the students' initial argument project, referred to here as stage one of implementing the intervention, they would develop an

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infographic in which they picked a prejudice from the novel and argued for whether or not this prejudice had improved in society since the time of the novel, the 1930s. The students created this infographic using Glogster EDU, a tool Ms. Tucker had used previously. The students worked in groups to create these posters and chose to write about prejudice regarding either race, age, or gender. The students created these posters and published them by presenting them to the other members of the class, the teacher, and myself. This phase of the intervention lasted for six consecutive weeks of the thirteen weeks of the intervention. A detailed weekly account of the intervention activities in the tenth-grade case is located in Appendix C. During this stage, and the second stage, with the PSA website, Ms. Tucker and I planned the goals for the overall project of the stage, and then met after each class session that the intervention was implemented to modify these plans and plan for the next class session of implementation. These modifications and the data that indicated they were necessary are presented in Chapter 4. I presented Ms. Tucker with activities that she might use to implement the intervention and then followed Ms. Tucker's decision of how to implement these activities in her classroom. Her decisions, too, were considered data, particularly that informed a retrospective analysis (Gravemeijer & Cobb, 2006). As previously discussed, Ms. Tucker led the instruction of the activities related to the intervention, and I helped as needed by conferencing with students, answering student questions, or aiding Ms. Tucker's instruction when she requested it.

During the first stage of the intervention, in which students created an argument in the form of an infographic, students learned the elements of argument, focusing on

claims, evidence, and elaboration of evidence. Ms. Tucker introduced the elements of argument with direct instruction using a PowerPoint, and then students practiced developing their own arguments. For instance, the students solved a murder mystery by looking at a photo and providing claims and evidence to support their solution for the crime. They also created commercial advertisements in which they made a claim for a product and supported that claim with evidence and explanation of that evidence (see activity in Smith et al., 2012). To begin to experience multimodal arguments during this time, the students created their advertisements using Glogster EDU. They also analyzed multiple examples of texts on their chosen prejudice issue, which included sources that presented information primarily with written language, as well as multimodal texts. The students created their infographics as they worked through the writing process— researching, planning, drafting, and revising—before finally publishing their infographic product. Further details on the weeks of the intervention and the corresponding goals for student learning, essential elements of the intervention, teaching and learning activities, and digital tools used are relayed in Appendix C.

Although Ms. Tucker and I had decided in the pre-intervention planning that the students would do two projects creating arguments, the first being a shorter stage aimed at creating an infographic and the second, a longer stage involving a PSA website, we planned further details about the PSA website after the completion of the infographic, which was informed by data presented in Chapter 4. The second stage of the intervention was planned before the students and teacher left for a two-week winter break and began after they returned following the new year. Ms. Tucker and I discussed modifications

necessary based on the implementation of the stage one infographic project, and these

modifications were included in the planning of stage two, where the students would

create a PSA website. These modifications are discussed in further detail in Chapter 4.

For this second stage, we decided on a longer, more involved project in which the

students would make a PSA using Google Sites. Each student's website would include a

written argument, a Glogster EDU poster, and multimodal elements. For this assignment,

Ms. Tucker wanted to focus on the writing instruction rather than trying to tie this

assignment in with teaching a large literature unit as with the infographic, which was

related to *To Kill a Mockingbird* (interview, December 17, 2014). Thus, she decided that

this project would be based on the students exploring their choice of a social issue (from

a list of provided, teacher-condoned issues). The students researched this issue at the

state level and the national level. The students produced a Glogster EDU poster of their

information at the state level and embedded this online poster into their final product of

the Google Site.

This second stage, with the students creating the PSA websites, of the intervention

began with students analyzing models of argument by examining a set of texts based on a

writing prompt developed by Gallagher (2006). These texts were editorials dealing with

whether or not students should have homework. After reexamining elements of

argument, again emphasizing claims, evidence, and elaboration of that evidence, the

students looked at examples of PSAs to have a model for their writing of a PSA as well

as to analyze multimodal arguments and discuss how arguments are presented using

multimodality. The students then chose a social issue and researched this issue in groups,

although each student created and submitted their own website. This phase of the intervention lasted seven consecutive weeks, and the students spent each day of the intervention engaged in the writing process, working through phases of the writing process, until they published their website by presenting it in front of their classmates, teacher, and myself. Students were given specific instruction on the technical aspects of using digital tools to include multimodality in their websites, which included handouts (see example handout in Appendix D) as well as the media specialists visiting them in the computer lab and explaining ways to access research resources and include pictures and sounds in their Google Sites without violating copyright law (observation, January 23, 2015). Ms. Tucker suggested using the media specialists for their support of resources in our planning between the first and second stage of the intervention. A description of each week of this phase of the intervention can also be found in Appendix C.

Data Collection

This section outlines the data collected for three distinct purposes in formative experiments: (a) before the intervention to observe the context of the intervention and gather baseline data to understand where participants are regarding the goal of the study, (b) during the intervention to observe enhancing and inhibiting factors of the intervention, modifications needed to the intervention, and unanticipated outcomes of the intervention, and (c) after the intervention to determine whether the instructional environment changed as a result of the intervention (Reinking & Bradley, 2008).

In using case-study methods to collect such data, Yin (2014) recommended six sources of data: documentation, archival records, interviews, direct observations,

participant-observation, and physical artifacts. For each case, the multiple points of

evidence outlined in Figure 3.2 were used in this formative experiment to observe the

progress of the intervention towards the instructional goal and insure data triangulation.

In this figure *Aspects of the Formative Framework* includes documentation of such

elements as enhancing and inhibiting factors of the intervention, modifications to the

intervention, unanticipated outcomes of the intervention, and change in the instructional

environment (Reinking & Bradley, 2008). These multiple data points served as a method

of data triangulation for the goal, aspects, and the context of this formative experiment.

Data triangulation is used to support construct validity in case-study research (Yin, 2014)

and is called for in formative experiments as an aspect of rigor (Reigeluth & Frick, 1999;

Reinking & Bradley, 2008).

Quality of Students' Traditional Arguments
- Conventional argumentative writing prompt (pre- and post-)
- Teacher and student interviews

Quality of Students' Digital, Multimodal Arguments
- Student questionnaire (pre- and post-)
- Digital, multimodal argument reflection (pre- and post-)
- Student artifacts
- Teacher and student interviews

Aspects of Formative Framework
- Observations and field notes
- Student artifacts
- Teacher and student interviews

Context
- Documentation, such as school and teacher schedules
- Archival records, such as NCES data and state report cards
- Interviews with administrators, faculty, teachers, and students
- Observations and field notes

Figure 3.2. Sources of data used for triangulation.

Interviews

I interviewed the teachers, students, administrator, and the school media specialists using semi-structured interview questions (Glesne, 2011); see Appendix A. Some of the interview questions were adapted from Colwell, Hunt-Barron, and Reinking (2013). 32 interviews were conducted in this study: two administrative interviews with the principal and the media specialists, 15 interviews in the ninth-grade case (12 student and three teacher), and 15 interviews in the tenth-grade case (12 student and three teacher). In addition, I debriefed with the participating teachers weekly concerning the current status of the intervention, potential enhancing or inhibiting factors, and modifications needed. These debriefings and interviews gave context to the intervention as well as helped to determine unanticipated outcomes, inhibiting and enhancing factors of the intervention, and modifications of the intervention that were needed.

Administrators and media specialists were interviewed prior to the intervention to determine the context of the intervention and as needed throughout the study. The teachers were interviewed prior to the intervention, during the intervention, and following the intervention. The students were interviewed individually in the context of the school day both during the intervention and following the intervention. All interviews were audio recorded and analyzed as described subsequently in the qualitative data analysis. Interviews were analyzed during the intervention to gain perspective on modifications needed as well as after all data were collected in a retrospective analysis (detailed in a subsequent section of this chapter).

Student Artifacts

Throughout the intervention, the students produced artifacts from the assignments they were given in the intervention. These included the students' infographics and PSA websites previously described in the intervention. These artifacts were analyzed at times during the intervention to help determine inhibiting and enhancing factors of the intervention and modifications needed to the intervention. In addition, they were analyzed during the retrospective analysis as described in a subsequent section detailing data analysis.

Student Questionnaire (Pre- and Post-)

The students completed a pre- and post-intervention questionnaire expressing their beliefs and practices regarding arguments (see Appendix E). The questionnaires were one part of multiple data collection points aimed at documenting and understanding students' knowledge of and improvement with argument. The items on the questionnaire were coded during the retrospective analysis, and the responses on the pre- and post-questionnaire were compared as described in a subsequent section detailing data analysis.

Student Multimodal-Argument Reflection (Pre- and Post-)

The students completed a multimodal-argument reflection before and after the intervention. The reflection asked them about how they would construct an argument using technology (see Appendix F). This reflection was used in conjunction with student and teacher interviews, student artifacts, and the questionnaire to determine students' experience with and ability to write digital, multimodal arguments.

Conventional Writing Prompt (Pre- and Post-)

Before and after the intervention, the students' ability to write a conventional argument was assessed. For the assessment, they were asked to write a conventional argument in response to a prompt, using paper and pencil or pen. Students were given an hour to write their responses, although more time was given to finish if needed. These assessments entailed reading two sources about an issue and writing an argumentative response either supporting or not supporting the respective issue. The prompts were based on draft assessments developed by Smarter Balanced Assessment Consortium charged with developing assessments for the Common Core State Standards (CCSSO & NGAC, 2010) by the U.S. Department of Education (see Hess, 2011; Smarter Balanced Assessment Consortium, 2013). Trained raters with experience assessing argumentative writing scored these arguments. This training is discussed further in a subsequent section detailing data analysis. Each rater was given a rubric to score the student samples (see Appendix G); this rubric was adapted from the Smarter Balanced Assessment Consortium (2012).

Observations and Field Notes

Before and during the intervention, direct- and participant-observations were made over a five-month period (Yin, 2014). These observations were recorded as descriptive and as analytic notes in a field notebook, stored electronically in accordance with procedures that Glesne (2011) recommended. In the ninth-grade case, 26 observation entries were recorded, each on a separate date. In the tenth-grade case, 19 observation entries were recorded, each on a different day. A protocol to guide

observations was used to note key aspects of the formative framework (Reinking & Bradley, 2008; see Appendix H). I used these observations and field notes to record enhancing and inhibiting factors of the intervention, modifications needed, unanticipated outcomes of the intervention, transformation of the learning environment, and evidence of progress toward the goal of the intervention. The observations and field notes were analyzed during the intervention and through the retrospective analysis of the data after the intervention. This analysis helped to form emerging codes, to collect more data when needed, and to identify the need for modifications of the intervention and the outcomes of modifications made.

Data Analysis

To analyze the data, I used a grounded-theory method of coding (Charmaz, 2014). This method is similar to one of Yin's (2014) recommended strategies for data analysis, working your data from the ground up. Using this coding method, I analyzed the data until patterns emerged, working from initial to focused codes to theoretical assertions. The initial codes are listed in Appendix I and J. The representative data examples leading to these initial codes are shown in Appendix K and L. The initial codes and the focused codes they formed are shown in Chapter 4 (see Figures 4.1 and 4.7) for each respective case. The theoretical assertions and the focused codes leading to these assertions are shown in Figure 5.1.

Yin (2014) also recommended using any of the following analytic methods: pattern matching, explanation building, time-series analysis, logic models, or cross-case synthesis. After I worked with the data and found initial and focused codes, as discussed

in Chapter 4, I did cross-case analysis to determine more theoretical assertions, which are discussed in Chapter 5. In this cross-case analysis, I not only analyzed the findings in both cases of this study, but also compared these to the previous, smaller-scale study's (described in Chapter 2) findings. The data were analyzed to guide modifications and in a retrospective analysis of the data (Gravemeijer & Cobb, 2006) after the data collection was completed. A retrospective analysis of data is called for in the final phase of formative experiments (see Figure 3.1; Reinking & Bradley, 2008). A retrospective analysis examines all of the data after it has been collected with the specific purpose of generating pedagogical theory and recommendations for practice (Gravemeijer & Cobb, 2006; Reinking & Bradley, 2008). These recommendations are also framed as local theoretical assertions (Bradley et al., 2012; Gravemeijer & Cobb, 2006; Reinking & Bradley, 2008). The qualitative data, the quantitative data, and the cross-case analysis were analyzed in the retrospective analysis (Gravemeijer & Cobb, 2006) of the present study to inform the assertions that emerged and that are reported in Chapter 5.

Qualitative Analysis

The qualitative data—interviews, observations, and field notes—were coded using a grounded-theory method of coding and a constant-comparison analysis in which I formed initial codes, reviewed emerging codes, gained more data when necessary, and formed more focused codes and theoretical assertions during the retrospective analysis of data (Charmaz, 2014; Glaser, 1965; Gravemeijer & Cobb, 2006). The initial codes for the ninth-grade case are shown in Appendix I, and the initial codes for the tenth-grade case are shown in Appendix J. When analyzing these initial codes, I analyzed the data of

each case individually. I used constant comparison analysis to identify emerging initial

codes (Glaser, 1965). Once initial codes were formed in each case, I grouped similar

initial codes into more focused codes for each case. Representative examples of

frequently referenced initial codes are shown in Appendix K for the ninth-grade case and

Appendix L for the tenth-grade case. These data were analyzed during the intervention to

inform modifications and after the intervention in the retrospective analysis of the data

(Gravemeijer & Cobb, 2006).

Qualitative analysis of the student questionnaire, student multimodal-argument

reflection, and student multimodal artifacts were coded in the retrospective analysis using

a priori coding that probed for any changes in the students' ability to convey elements of

the goal and intervention of the formative experiment, specifically how they used digital,

multimodal tools and their ability to convey argument, including claims, evidence, and

elaboration of that evidence. An example of such a priori coding of the students'

websites is available in Appendix M.

Quantitative Analysis

The students' responses to a pre- and post-intervention prompt to write a

conventional argument were first scored by two raters and then analyzed using SPSS

software and the Wilcoxon matched-pairs signed-rank test. Because each student's

scores were paired and rubric scores are considered ordinal data, and thus a normal

distribution may not be assumed, an appropriate nonparametric test, the Wilcoxon

matched-pairs signed-rank test, was used to analyze the scores (Hinkle, Wiersma, & Jurs,

2003). The Wilcoxon test finds the significance of the ranked absolute value of the

difference in scores (Hinkle et al., 2003). This difference is shown in the median of the difference between the students' pre- and post- prompt scores for each category on the rubric and its respective significance level (Peers, 1996). Medians are used with the Wilcoxon test, as opposed to means, because means are not typically used when analyzing ordinal data.

The two raters of the written arguments were high-school teachers: one with 12 years and the other with 11 years of high-school English teaching experience. Both raters had been trained in the teaching of writing as part of their participation in National Writing Project (NWP) training. One rater had served for two years and the other rater for six years as NWP Teacher Consultants. Further, each of these teachers worked for at least one year on a grant with the NWP in which they helped lead professional development on argumentative writing for adolescents in grades 7-10. For the present study, each teacher was trained to use the rubric for assessing the prompt as is recommended when using criteria-based rubrics (Thorndike & Thorndike-Christ, 2010). I trained the raters by meeting with each of them, reviewing the rubric, scoring sample arguments, and discussing our scores. Each rater scored all of the pre- and post- writing prompt responses (n=18). The raters' inter-rater reliability on each prompt was determined using the Spearman's rho correlation, a correlation test recommended for nonparametric data (Morgan, Leech, Gloeckner, & Barrett, 2013). Their inter-rater reliability was statistically significant ($P < .05$) for scoring responses to each of the two prompts. Each scorer's ratings were averaged to achieve a higher degree of reliability of measurement (Thorndike & Thorndike-Christ, 2010), and the averaged score for each

student was used for further data analysis in the Wilcoxon matched-pairs signed-rank test.

Cross-Case Analysis

Because this was a multiple-case study, cross-case analysis was performed (Stake, 2006; Yin, 2004). This analysis involves treating each case as a separate study. Thus, each case was analyzed independently for initial and emerging coding; then, cross-case conclusions were formed to make more local theoretical assertions. Thus, each case was first examined individually in the retrospective analysis (Gravemeijer & Cobb, 2006). I then examined the focused codes that emerged in each case, looking across cases at both the significance and the frequency of the initial codes the focused codes covered. This cross-case analysis was used to identify the commonalities and differences across cases, which led to local theoretical assertions about the stated intervention and goal (Stake, 2006). I used a method from Stake (2006) to compare how these assertions applied to the cases of this study and the previous, smaller-scale study, shown in Appendix N.

<center>**Trustworthiness**</center>

Formative experiments may use both quantitative and qualitative data, as this study does, but conclusions do not hinge upon the quantitative data (Reinking & Bradley, 2008). Thus, as this study predominantly used qualitative data and qualitative case-study methods, I used qualitative standards for trustworthiness associated with these methods (Creswell, 1998). Table 3.3 shows the aspects of data collection in this study aimed at increasing trustworthiness as well as the relevant literature recommending such measures.

The procedures shown in the table are drawn specifically from Creswell's (1998)

procedures for increasing trustworthiness and go beyond his recommendation that at least

two be adopted in a particular study.

Table 3.3

Procedures to Increase Trustworthiness of Data

Procedure	How Procedure Was Attained in Study	Sources Recommending Procedure
Length of data collection	Five months collection, including 13 weeks of the tenth-grade and 15 weeks of the ninth-grade interventions.	Creswell (1998); Reinking and Bradley (2008)
Triangulation	Multiple sources of data (see Figure 3.2).	Creswell (1998); Kyburz-Graber (2004); Reinking and Bradley (2008); Yin (2014)
Rich, thick description	Detailed collection of data about the context of the study and the intervention.	Creswell (1998); Firestone (1993)
Controlling for subjectivity and bias	Following the lead of the teacher (i.e., not imposing my own ideas or perspectives unless requested). Triangulation of data sources.	Creswell (1998); Reinking and Bradley (2008)
Role of researcher	Debriefing with teachers and establishing collaborative relationships.	Cole & Knowles, (1993); Creswell (1998); Glesne (2011)

Overall, I did not approach this intervention convinced that it would succeed. For

example, formative experiments, because they are based on the metaphor of engineering,

acknowledge that useful data and understandings can accrue from false starts and failure

to fully achieve a goal (Reinking, 2011). Formative experiments reporting obstacles to

success are also publishable additions to the literature (e.g., Colwell, Hunt-Barron, &

Reinking, 2013). Thus, rather than be heavily invested in achieving success, my stance

was to observe the intervention's implementation with a desire to identify obstacles encountered and to find ways to manage or circumvent them (Reinking & Bradley, 2008).

Summary

In this chapter I explained the formative experiment methodology guiding the present study and how I followed established procedures for formative experiments (Reinking & Bradley, 2008). I described the school context of Waverly as well as the classroom context for the ninth- and tenth-grade case of the present study. Multiple-case-study methods (Yin, 2014) were used to collect and analyze the data, and each case was bound by the intervention implemented and included the classroom teacher and the students in their respective class sections. The intervention was enacted for 15 weeks for the ninth-grade case and 13 weeks for the tenth-grade case, and I described the steps of this intervention. I collected multiple data points to observe the intervention, and I analyzed this data using both qualitative and quantitative analysis. Initial coding emerged during the intervention when observing enhancing and inhibiting factors of the intervention, modifications needed, unanticipated outcomes of the intervention, transformation of the learning environment, and evidence of progress toward the goal of the intervention. Initial and focused codes (Charmaz, 2014) continued to emerge in the retrospective analysis after the completion of the data collection (Gravemeijer & Cobb, 2006); these codes as they applied to the formative framework (Reinking & Bradley, 2008) are discussed for each case in Chapter 4. The cross-case analysis (Stake, 2006) of these focused codes for each case led to local, theoretical assertions specifically related to

the pedagogical implications of this intervention. The cross-case analysis and the

resulting theoretical assertions are discussed in Chapter 5.

CHAPTER FOUR

RESULTS

This chapter will report the results of data collected and analyzed retrospectively during a multiple-case study within the methodological frame of formative experiments that focuses specifically on the following: modifications to the intervention in light of inhibiting factors during the intervention, factors that enhance or inhibit the success of the intervention in achieving the pedagogical goal, unanticipated outcomes, and the extent to which the environment for teaching and learning was transformed. It will also report progress toward the goal as indicated by qualitative and quantitative evidence. These results emerged from a retrospective analysis (Gravemeijer & Cobb, 2006) of the data. Theoretical assertions pertaining to pedagogy and pedagogical theory drawn from a retrospective analysis and a cross-case comparison will be presented and discussed in Chapter 5.

Ninth-Grade Case Results

The field notes, observations, and student and teacher interviews were analyzed retrospectively according to a grounded-theory method of coding (Charmaz, 2014; Gravemeijer & Cobb, 2006). Using this method, 52 initial codes were determined for the ninth-grade case. These codes are listed alphabetically in Appendix I. To form more focused codes, the initial codes were grouped according to emerging themes. These focused codes are described in the subsequent sections according to where they aligned with aspects of the formative framework (Bradley & Reinking, 2011). Figure 4.1 shows aspects of the formative framework (in the boxes at the top), the focused codes aligned

with these aspects (in bold under each respective aspect), and the initial codes that formed the focused codes (in bullet points). A representative example of data coded in frequently referenced initial codes can be found in Appendix K. Each of these aspects of the formative framework and respective focused codes will be discussed in this section. The a priori coding of students' artifacts, students' questionnaires, and multimodal-argument reflections as well as the quantitative scoring of pre- and post- conventional writing-prompt responses will also be discussed according to what focused codes they supported as is the tradition of using both qualitative and quantitative data to inform data findings (Onwuegbuzie, 2012).

Modifications

Providing Scaffolding Versus Allowing Freedom

• Assessing time spent on project
• Engaging in writing
• Expressing frustration with digital tools
• Feeling uncomfortable or unfamiliar with technology
• Making modifications
• Modeling argument
• Providing scaffolding
• Writing using process approach

Collaborating

• Assessing group work versus individual responsibility
• Assessing time spent on project
• Making modifications

Enhancing/ Inhibiting Factors

Ability to Use Digital Tools in School

• Accessing digital tools
• Becoming distrated by technology
• Defining learning
• Designing in school
• Enhancing digital skills
• Expressing frustration with digital tools
• Feeling uncomfortable or unfamiliar with digital tools
• Obtaining research
• Using mobile devices
• Using social media

Defining Writing and Writing Ability

• Defining learning
• Describing student weaknesses
• Disliking writing
• Labeling student strengths
• Setting teaching goals
• Struggling with writing arguments
• Teaching argumentative writing
• Teaching literature
• Transferring skills
• Using social media
• Using digital tools in school
• Writing as previous experience
• Writing multimodally

Using Multimodal, Digital Tools as a Scaffold for Learning Argument

• Demonstrating creativity
• Obtaining research
• Transferring skills
• Writing multimodally

Unanticipated Outcomes

Engaging Learners

• Choosing social issue
• Demonstrating apathy
• Demonstrating initiative with digital tools
• Describing students and community
• Enjoying reading online
• Enjoying digital tools
• Focusing through digital tools
• Learning about social issues

Writing and Production Versus Creation and Design

• Designing with digital tools
• Enhancing digital skills
• Enjoying digital tools
• Struggling to create
• Struggling with writing arguments
• Using mobile devices
• Writing multimodally

Progress Toward Goal

Expanding Concept of Argument

• Changing written arguments
• Transferring skills
• Understanding concept of argument

Partial Success

Integrating Digital Tools into Teaching

• Changing teaching practice
• Describing typical classroom routines
• Planning collaboratively
• Receiving professional development
• Setting teaching goals
• Teaching argumentative writing
• Teaching literature
• Teaching with digital tools
• Varying success based on ability level

Figure 4.1. Coding matrix for ninth-grade case based on a retrospective analysis.

Modifications

Iterative data collection focused on refining an instructional intervention is a defining characteristic of formative experiments (Reinking & Bradley, 2008). Researchers along with collaborating partners make modifications to the intervention to improve its success in accomplishing a pedagogical goal in a particular classroom or group of classrooms. The modifications, which were made based on perceived inhibiting factors observed during the intervention, included increasing scaffolding and changing collaboration to work toward the goal of improving the quality of students' conventional and digital, multimodal arguments.

Providing scaffolding. The focused code *providing scaffolding versus allowing freedom* reflects a modification that was needed for both the students' writing process as well as their use of digital tools. The students at different points in the intervention felt overwhelmed by the scale of the infographic and PSA website projects assigned, beginning with the infographic assignment. Ms. Barrister's concern was evident in an interview reflecting upon the infographic assignment and changes she believed necessary going forward:

> I think there are times, there's a little too much for them, and it's [steps of the infographic project] not broken down enough step by step. I think they get overwhelmed, and then they don't know where to start or where to begin. (interview, December 16, 2014)

Thus, during the intervention, in between the stage one project of the infographic and the stage two PSA website project, we made modifications to include more scaffolding for

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students based upon Ms. Barrister's discussion of the inhibiting factor of students being overwhelmed by the multimodal arguments and more scaffolding being needed. I also noted in my field notes during the intervention that the students became overwhelmed when they had to write as well use the computer. For example, I noted that students had trouble with such simple technological tasks as typing while they tried to compose paragraphs and that becoming overwhelmed with digital composing caused them to lose focus by the end of a class period (observation, November 18, 2014). I noted that more scaffolding was needed for lessons that included digital tools (observation, November 18, 2014). In my discussions with Ms. Barrister, we talked about providing the students with more scaffolding, both for their writing as well as their use of digital tools. Schunk (2012) defined instructional scaffolding as "the process of controlling task elements that are beyond the learners' capabilities so that they can focus on and master those features of the task that they can grasp quickly" (p. 245). Using scaffolding in this sense, Ms. Barrister and I discussed breaking down that tasks involved in composing a digital, multimodal project into manageable chunks. For example, with the infographic the students composed the draft online. However, in the second stage with the PSA website, we decided to provide more models of argument writing, in the form of both print-based editorials as well as digital, multimodal models of PSAs, provide more steps of drafting and revisions, and start with writing at an earlier point in the writing process (interview, December 17, 2014). For instance, when we first showed the students models of what a PSA was, the students needed more time to become familiar with the purpose of a PSA and to see models of a PSA before they could imagine creating their own. For example, I

noted in my field notes that "We had to spend more time than originally planned and anticipated on the notes for the PowerPoint to introduce the PSAs. Students did not immediately understand what a PSA was or how a PSA was different from an advertisement" (observation, January 12, 2015).

To provide a scaffold for using digital tools, modifications included providing more instruction in the classroom before students worked in the computer labs with these tools. The need for this modification is exemplified in Ms. Barrister's reflection about the infographic project, where students planned and composed the infographics digitally without planning first in the classroom without the digital tool. She said, "I would spend more time and get everything together…before we went to the computer lab, and I'd make sure all their [the students'] ducks were in a row" (interview, December 16, 2014). For instance, in the infographic project, the students were given direction, via whole-group instruction and conferencing, while they were in the computer labs completing their work. In the website PSA project, we explained the directions in the classroom, allowed students to plan and draft what they thought the digital aspect should look like, gave them handouts outlining the steps needed with the respective digital tool, and then proceeded to the computer lab.

We also started with writing conventional drafts of the arguments on their social issue at an earlier point with the website PSA than was done with the infographic that was created online through the writing process. With the PSAs, the students devoted a class period in their classrooms drafting the content of their arguments through a writing assignment in which they were guided through including the elements of argument

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(observation, February 9, 2015). This more structured teaching of writing and focus on individual concepts seemed to allow the students to focus on and acquire individual skills instead of trying to acquire them holistically without differentiation. For instance, the students wrote one to two pages for their drafts on their social issue argument for their PSA websites, which was a significant amount of writing for these students (observation, February 9, 2015). Ms. Barrister viewed that approach as much more effective. She stated that: "I think the writing, the prompted [guided] writing was 100% effective" (interview, March 18, 2015).

However, occasionally the scaffolding provided for using digital tools had to be balanced with the desire to allow for students' creativity. For example, with the PSA, the students at first were not given a template of how they might create their website. Instead, they were given models of websites and given time to brainstorm and plan before going into the computer lab. However, the first day in the lab trying to create their websites was frustrating for the students (observation, February 13, 2015). To address their frustration, we began the next class period, once again, going back to the planning stage before allowing students to go to the computer labs to work on their websites (observation, February 19, 2015). This time, Ms. Barrister advised the students that they needed a template of how a website may be created. With that template, the students seemed to view the task of drafting their website as much more manageable, as noted in the following field notes:

> After Friday, Ms. Barrister and I both commented on how frustrated the students
>
> were and overwhelmed with the website, but today went much smoother with the

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students working quietly throughout the period. When I asked Ms. Barrister how she thinks it went today, she commented that she thinks the students knew what they were doing today and were less frustrated. However, I wonder how much the scaffold I gave them will limit the final creativity of their sites. (observation, February 19, 2015)

However, increasing the scaffolding of the students' writing as well as their use of digital tools extended the instructional time for the project. For instance, several class periods were added to allow the students to draft their arguments in the PSA project before going to the computer lab to compose their PSA websites digitally. Several interviews suggested that students may have wanted to decrease the days spent on the project because the length of the project inhibited its appeal (interview December 9, 2014, March 12, 2015).

Collaborating. Another modification was modifying the extent of student collaboration to allow for additional individual student accountability. In the first stage of the intervention with the infographic project, the students worked collaboratively in small groups on the infographic, with each group presenting one infographic as a culminating presentation. However, upon talking with Ms. Barrister about modifications needed for the second stage, when students would be engaged in creating their PSA websites, she was concerned with balancing the student collaboration with the desire for individual student accountability:

Still it bothers me the fact that some kids didn't contribute at all—that in the group one person did all the work while the other ones just sat there. I don't

know…but that seemed to be an issue. Even when we tried to mix the groups up,

it was still an issue. (interview, December 16, 2014)

Thus, modifications were made in stage one, such as moving students to different groups,

to address the inhibiting factor that Ms. Barrister identified as a lack of student

accountability for individual contribution in the collaborative group work (observation,

November 14, 2014). Students were at times put into different groups to see if the group

dynamic would help some contribute that had not previously (field note). In addition, in

the second stage of the project, with the PSA website, the students worked in groups to

research a topic, but created their own, individual website. They worked with the group

members to create and revise ideas, but they were solely responsible for presenting their

website.

Even though initial modifications during the intervention were made to modify

collaboration to increase accountability during times of student collaboration, a

retrospective analysis of the data showed that Ms. Barrister and the students might have

had conflicting ideas regarding student collaboration. The students naturally sought this

collaboration whereas Ms. Barrister often organized her class to avoid it as a means of

classroom management (observation, February 5, 2015). At times Ms. Barrister seemed

to value maintaining order and discipline for her students rather than supporting this

collaboration. For instance, she often assigned seats in the computer lab, physically

separating group members (observation, February 5, 2015, February 13, 2015). She often

seemed to not see advantages of allowing students to collaborate because of her focus on

discipline. For instance in her final interview, in discussing the modification of requiring

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each student to turn in a final website rather than turning one in as a group, Ms. Barrister stated, "I also think when they had to be accountable for their own work, that it improved, but, again, behavior seems to get in their way" (interview, March 18, 2015).

However, the retrospective analysis revealed students overall seemed to embrace opportunities to collaborate with one another. When asked if they preferred to work in groups or would have rather worked independently during the intervention, seven out of the eight students interviewed responded that they liked working in groups. Specifically, they seemed to see their collaboration as compensating for their individually perceived weaknesses. Cora, a student who Ms. Barrister described as being average in her writing ability, stated, "…It was easier to get more information, and some of the things you can't get it by yourself" (interview, March 12, 2015). Clark, a student who was above average in writing ability and often social in class, described his reason for enjoying working with others, "…if you don't know what to do, you can actually ask…" (interview, March 12, 2015). Students described collaborating in groups as providing them an opportunity to share information, stay engaged, ask questions, support weaknesses, compare opinions, gain multiple perspectives, and collaborate on positions. During my observations of these interactions, I noted Ms. Barrister's concern as students talked more, and it often took longer to initially gain students' attention; however, the students seemed to naturally seek out each other for guidance. For example, I noted the students' collaboration in my field notes, "I also go by and explain things to students in groups, and they talk with each other to work out details" (observation, February 11, 2015). Thus, the students and the teacher had a contrasting perspective of the value of collaboration. Retrospectively,

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initial modifications that were made to address the inhibiting factor Ms. Barrister

identified as a lack of student accountability (interview, December 16, 2014) did not

match the students' descriptions of this collaboration as beneficial and collaborating

equally. Thus, the retrospective analysis seemed to indicate that an inhibiting factor was

Ms. Barrister's reticence toward student collaboration, and future modifications may need

to address whether or not teachers are willing to allow for such collaboration.

Inhibiting Factors

In addition to the inhibiting factors identified during the intervention for which

modifications were made during this study, the retrospective analysis (Gravemeijer &

Cobb, 2006) of the data also revealed inhibiting factors that may affect the intervention of

this study in future iterations. There were two consistent factors throughout the

intervention in the ninth-grade class that the data indicated inhibited progress: *ability to

use digital tool*s *in school* and *defining writing and writing ability*.

Ability to use digital tools in school. An inhibiting factor during the intervention

was the students' inexperience and inability to use the digital tools sanctioned for school

use. However, this inability to effectively use the schools' digital tools was somewhat

surprising as the students were technologically proficient in their use of technology

outside of school. For instance, in their daily lives, the students were avid users of

mobile devices, such as smartphones. Even though I had been warned in early interviews

about students' lack of access to technology in their out-of-school lives (interview,

October 14, 2014, December 16, 2014) and had been cautioned to plan student in-school

activities around such lack of access, students seemed to have mobile Internet access and

used it frequently. Students not only had phones, but all students that I asked about their phones (six of the students interviewed) had smartphones. They used these phones for social media, texting, and talking with their friends and often had multiple social media accounts including Instagram (https://instagram.com/), Snapchat (https://www.snapchat.com/), and Facebook (https://www.facebook.com/), which they described as using many times daily (interviews, March 12, 2015, March 16, 2015). However, this use of mobile devices was often in stark contrast to how students used technology in school. For instance, phones were put away and were not often sanctioned for school use. When asked about her policy on mobile phones, Ms. Barrister replied, "I don't have a policy. I trust them not to be texting and, of course, I do catch them every once in a while…but I don't mind if they are using it for class purposes" (interview, March 18, 2015). However, using mobile devices for classroom instruction was limited, and these devices were typically used incidentally and not fully integrated into lessons as instructional tools. For instance, Ms. Barrister once had the students create text messages that Romeo and Juliet would have sent one another, but this activity did not use the actual devices, and the students once had to illustrate quotations they were finding in a novel by looking up emojis on their mobile phones (observation, February 5, 2015).

As reported in Chapter 3, there was a perception in the school that students did not have access to the Internet at home and needed to rely upon the digital tools at school (interview, December 16, 2014). Thus, most assignments that employed digital tools, including the ones of the intervention, used desktop computers with access to the Internet available at the school and software available on those computers. Students described

their use of these digital tools in school, prior to the intervention, as mainly using the Internet and Microsoft Office to type documents and create PowerPoint presentations. For instance, none of the students had used Google Sites, even though each student had a district Google email account with access to Google Applications, and many students were using Glogster EDU and Google Documents for the first time (observation, January 12, 2015). When describing their use of digital tools other than in this intervention, students often described using digital tools to publish a polished version of their research or to access and copy information, but did not describe using the digital tools throughout the writing process of multimodal composing that was done in this intervention. For example, when asked how she used digital tools in school other than in this intervention, Ellen replied that she used computers for "research…we present a lot" (interview, March 16, 2015). Jocelyn said she used computers to "look up the information" (interview, March 16, 2015). Lila described that they used digital tools for "like PowerPoints, [to] type essays, make graphs" (interview, December 9, 2014), and Ellen also said, "they [teachers] give us a website, and we go in there, and just copy down stuff about it" (interview, March 16, 2015). An assignment that Ms. Barrister did in her class during the intervention, but that she did not plan with me, was to have students type a paragraph in which she had given the students sentences that they had to fill in with missing character traits and then type the paragraph using Microsoft Word (observation, November 11, 2014). Students' seeming fluency with some technologies, such as their use of mobile devices, did not transfer to the academic use of digital tools. For instance, in this assignment in which Ms. Barrister asked students to type a paragraph, it took the students

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forty-five minutes, and they typed one keystroke at a time (observation, November 11, 2014).

Thus, students used digital tools in school, prior to the intervention, to access and type information, and their efforts to create digitally throughout the writing process in this intervention were often met with frustration, either from the school digital tools not meeting their needs or from being unfamiliar with using digital tools for multimodal composing rather than to copy, research, or publish a final copy, as noted in the previously cited student interview excerpts. For instance, it was hard at times to access the multiple modes of digital tools. The sound on school computers did not function properly, and media specialists had to find headphones for students (observation, January 12, 2015). At other times, the students seemed to think the design of a website was beyond their capabilities or an assignment reserved for a class specifically devoted to digital tools: "I signed up for English, not this! Are we in 12th grade?" (observation, February 13, 2015). Students had trouble at first with seemingly simple technological tasks such as copying and pasting, saving their work, and downloading and uploading files (observation February 11, 2015, February 19, 2015). Although the students seemed to enhance their digital skills during the intervention, this need at times added instructional time to the intervention and added to the students' cognitive load when trying to design a digital, multimodal argument (observation, December 1, 2014, February 19, 2015, March 4, 2015). Once they did gain confidence using the digital tools and creating their own arguments, the students often valued using the digital tools for the access it gave them to research information, citing obtaining research during their digital,

multimodal projects as a challenging, yet rewarding task (interviews, December 9, 2014, March 16, 2015).

Defining writing. Another inhibiting factor to the intervention was the definition of writing and writing ability. Ms. Barrister stated in her final interview that she would use this intervention again, and she described learning about digital tools during the intervention: "I think I learned as much as they did. Being kind of the foggy [one] of the group with technology and stuff. I think this benefitted me just as much in terms of technology" (interview, March 18, 2015). However, when Ms. Barrister adopted parts of the intervention for her other class sections, she used those parts that focused on conventional writing:

> And I loved the day that you did the writing. When they were writing for five
> minutes, and then five minutes more, I thought that was a great way to get their
> writing down, and they didn't realize how much they were writing. I loved that,
> and I've used it with my other classes. (interview, March 18, 2015)

However, there was some disjuncture between what Ms. Barrister defined as writing and multimodal composing. She seemed to value conventional writing with pen and pencil or words typed on a Word document as "writing," but did not consider the students' digital, multimodal composing as writing. For instance, when we debriefed after the infographic, Ms. Barrister made remarks that diminished students' multimodal composing in comparison to conventional writing: "I think they had more fun trying to make it rather than putting substance in their arguments" (interview, December 16, 2014). When asked about any change noted about the students' written arguments, she

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replied, "I don't know about writing because we haven't actually done that" (interview, December 16, 2014).

Ms. Barrister's suggestion that students had not really engaged in any writing came after students had drafted, revised, and published infographics arguing for whether or not euthanasia should be legal (see Figures 4.2 and 4.3 for examples created by different groups of students).

Figure 4.2. Example of infographic against legalizing euthanasia.
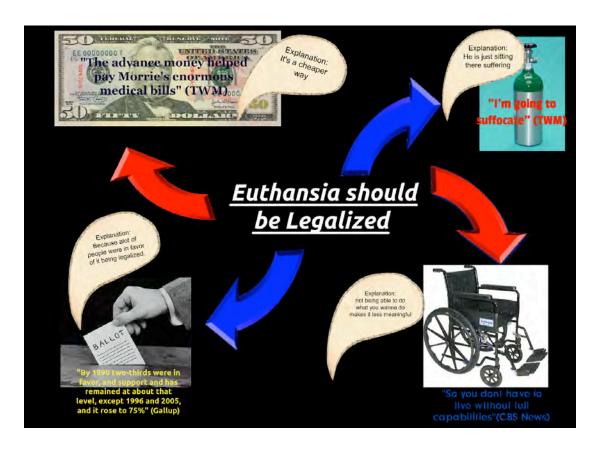
Figure 4.3. Example of infographic for legalizing euthanasia.

These figures both show arguable claims at the center of the infographic as well as

evidence from research websites, such as the Gallup poll in Figure 4.3, and research from

the novel *Tuesdays with Morrie*, such as the quotations in Figure 4.2. In addition, both

figures demonstrate attempts to elaborate on evidence. In Figure 4.2 the students used

teardrop shapes to highlight elaboration of evidence, and in Figure 4.3 the students

labeled their elaboration with the title "Explanation." These examples illustrate that,

although the students were demonstrating growth in their conventional argument writing

skills—connecting claims, evidence, and elaboration of that evidence—their teacher may

not have recognized these conventional argument skills when they were included in a

multimodal argument.

Students also seemed to pick up on their teacher's expressed disconnect between digital, multimodal composing and conventional writing skills. For example, one day in the computer lab, I observed that Denise, who had previously been engaged with the project, was particularly frustrated. When I asked her what was bothering her, she replied that she thought her PSA displayed a strong argument, but her teacher had given her the impression that it was incorrect. When I looked at the student's website, she had a claim and evidence to support it, and I wondered what Ms. Barrister found lacking (observation, February 13, 2015).

At times throughout the intervention, Ms. Barrister seemed conflicted about the value of conventional and digital tools. For instance, in multiple interviews, Ms. Barrister praised the students' reading of nonfiction texts the students did in their online research to create their infographics and websites (interview, December 16, 2014, March 18, 2015). However, she also seemed worried that her students were falling behind her other class sections doing more conventional reading and writing because they were not involved in creating multimodal projects. "It seems forever since y'all have read," stated Ms. Barrister one day before her students went into the computer lab to work on their websites; yet, the students were using research from a novel *Of Mice and Men* and research from their reading of multiple websites (observation, February 9, 2015) during their multimodal composing that day.

This lack of association between conventional reading and writing and multimodal composing inhibited the intervention in several ways. First, Ms. Barrister seemed less likely to adopt the digital tools into her teaching practice, as evidenced by

her adoption of only the conventional writing, such as the guided writing strategy. Furthermore, she appeared worried that this class was not "on track" with her other class sections (observation, February 9, 2015). In addition, Ms. Barrister's perception that multimodal composing was not as legitimate or useful as conventional writing may have prevented the students from integrating and transferring these skills. The negative effect Ms. Barrister's perception had upon her students was displayed not only in Denise's frustration with a lack of validation (previously described), but also in the students' comments, such as the student who commented, "I signed up for English, not this [multimodal composing in computer lab]! Are we in 12th grade?" (observation, February 13, 2015). This student seemed to believe that projects, such as the infographic and the website, belonged in a media class rather than an English class and that this work was difficult. Other students were frustrated not by using the digital tools in their English class, but with their inability to use the digital tools to achieve the desired outcomes for their multimodal projects (observation, February 13, 2015) including seemingly simple tasks such as typing (interview, March 18, 2015). Ms. Barrister's inability to connect the skills displayed in the students' multimodal arguments, done in the infographic and website, to more conventional writing, and acknowledge that this multimodal composing might be beneficial to her students, seemed to perpetuate the notion and student experience that digital tools are reserved for classes only supplemental to the core curriculum rather than something to be integrated into the English curriculum.

Enhancing Factor

An enhancing factor was the students' view of digital, multimodal arguments as providing them a scaffold for learning argument. The social practice of creating argument using the digital tools and semiotic resources of the current digital era aligns with both perspectives of multiliteracies and social semiotics. These views are based on digital tools and the semiotic resources they afford: "All learning is mediated by tools such as language, symbols, and signs. Children acquire these tools and then use them as mediators of more advanced learning (i.e., higher cognitive processes such as concept learning and problem solving)" (Schunk, 2012, p. 252). The students used the digital, multimodal tools in both the infographic and PSA website project as a mediator for learning the concept of argument. For instance, when asked if composing multimodal arguments using digital tools was useful and transferrable for their conventional writing, students responded that these tools helped them visualize arguments:

> Interviewer: Do you think writing this argument online with the infographic and the website will help you later if someone asked you to write an argument using pencil and paper?
>
> Jocelyn: Yes
>
> Interviewer: What about it do you think would help you?
>
> Jocelyn: As I said, I am a visual person, so I like seeing things.
>
> Interviewer: So seeing how an argument is laid out will help you?
>
> Jocelyn: Yes. (interview, March 16, 2015)

I also asked Jocelyn, a student who was not one who seemed particularly engaged in her

English work in other aspects of the English class, whether she preferred writing a

conventional or digital, multimodal argument; she replied that she liked the multimodal

"because it's usually visualized, the information" (interview, March 16, 2015). Other

students talked about the digital tools helping them specifically to organize arguments: "I

liked it [the website project] because it helped you organize stuff like lay it out the way

you want to…" (interview, March 12, 2015). Other than helping them to visualize

arguments, the digital tools also helped students connect to the subject of their argument

on a deeper level. For instance, one student described why she would rather create a

website than write a more conventional essay: "Getting into research and learning more

about special needs people and getting to see all the pictures…and watch the videos to

know them" (interview, March 16, 2015). The multimodality of the research seemed to

provide a way for this student to connect, engage, and structure her research for argument

in a more authentic way. Other students commented that the digital, multimodal

arguments gave them "more ideas on how to write it [argument]," suggesting the digital

tools helped them create content for arguments (interview, December 9, 2014). Of the 11

interviews where students responded to being asked whether they thought their digital,

multimodal composing would transfer to their more conventional writing, all 11

responses indicated a belief that their digital, multimodal arguments would aid their more

conventional arguments. Ms. Barrister also seemed to think that the intervention helped

students to mediate argument: "I think they had more creativity, and they were able in

their minds to get a structure and a design. And, they could see the big picture before

they started" (interview, March 18, 2015). Nonetheless, Ms. Barrister contradicted this statement as she at times during the intervention discounted the students' multimodal composing as not including the skills of conventional writing (previously described).

Unanticipated Outcomes

Two of the unanticipated outcomes were that the intervention seemed to engage learners and that the creation and design of multimodal composing was challenging for students in comparison to the production of writing that they were accustomed to in school. Nystrand and Gamoran (1991) distinguished between two forms of student engagement: procedural and substantive, and both seemed evident in my data related to engagement. Substantive engagement is engagement with academic content and has been shown to have a strong connection to student achievement, and procedural engagement is defined by following classroom rules. Engagement in both cases is thinking of the "cognitive phenomenon having to do with the extent to which students are mentally involved" (Nystrand & Gamoran, 1991, p. 269). However, substantive engagement involves a "personal commitment" to academic content whereas procedural engagement reflects paying attention, completing assignments, and not being disruptive (Nystrand & Gamoran, 1991, p. 262).

Engagement. The finding that this intervention, which is focused on argumentative writing and using digital tools, was engaging for these students is particularly unexpected when one considers the context of this case. The principal described the students of this school as having limited access to technology and the Internet (interview, December 16, 2014). Furthermore, Ms. Barrister described writing as

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one of these students' distinct weaknesses (interview, October 30, 2014). Exacerbating each of these factors is that Ms. Barrister thought this class was her least disciplined and was proud of the mere fact that in trying this intervention with this class "that they were not mean or rude or did not curse you out because that's the big thing with them" (interview, March 18, 2015). However, students went beyond merely tolerating this intervention; many stated they preferred the digital, multimodal argument assignments to the conventional essays that Ms. Barrister would have typically done in her teaching of argumentative writing, showing their substantive engagement (interview, October 30, 2014). For example, in eight different student interviews, I asked students which they preferred, creating a website or writing a conventional essay, and all eight students replied that they would rather create the website (interviews, March 12, 2015, March 16, 2015). Students gave different reasons for their preference for the digital, multimodal arguments including helping them to visualize the information (interview, March 16, 2015) and that these assignments allowed them to express themselves more freely (interviews, March 12, 2015). Manny, a student that Ms. Barrister described as having a medium level of writing ability, said, "Well, I liked that we had to put our own ideas where we had put the images that we wanted…and what I didn't like is that we only made the one website-I wish we could have made like two, so we could put more stuff that we thought would be good for people" (interview, March 16, 2015). His comment suggests a substantive engagement in expressing his own ideas and in his willingness to pursue this type of writing to a greater degree.

The relevance of the digital, multimodal argument assignments also engaged students, especially the PSA website in which they could choose a social issue to champion through an argument. Students repeatedly described picking topics that were relevant and personally significant to them. For example, Cora said she picked poverty "because I really think about it" (interview, March 12, 2015), and Ellen described picking special needs "because my friend has a little sister with special needs, and I wanted to know more about them [those with special needs], so when I hang out with her, I probably know more about what they do" (interview, March 16, 2015). Once again, the students demonstrated more conformity with class rules and a greater willingness to complete tasks and assignments, suggesting procedural engagement, but also a significant investment in the academic task of creating multimodal arguments, suggesting substantive engagement.

Students also demonstrated their procedural engagement by choosing to be less disruptive. An initial code labeled *focusing through digital tools* suggested that students were more willing to complete assignments and were less disruptive, both signs of procedural engagement, when they were working with the digital, multimodal tools in the computer lab (Nystrand & Gamoran, 1991). Further, Ms. Barrister described this class as her most challenging in terms of maintaining discipline and control (interview, March 18, 2015), yet fewer difficulties in that area occurred when students were in the computer lab completing their digital, multimodal projects. Clark, who often had to be separated from certain members of his class, described being more focused in the computer lab "because we had something to do all the time, like putting stuff on there, finding stuff, finding

pictures" (interview, March 12, 2015). Ellen suggested that being with her friends in the

group work allowed her to focus on the academic tasks and learn more than in the

classroom (interview, March 16, 2015). One student did mention becoming distracted by

the talking occurring in the computer lab because she thought other students were

"overexcited" there (interview, March 12, 2015). Overall, the different types of

engagement shown in this case are important, as procedural engagement has an impact

when students are engaged in substantive academic tasks, and substantive engagement

has a strong, positive association with literacy achievement (Nystrand & Gamoran,

1991).

Writing production versus creation and design. Another unexpected outcome

was the struggle students had when engaging in what I refer to as *creation* and *design* of

texts, when compared to more familiar writing activities such as writing answers to

prompted questions and taking notes, what I refer to in this section as *production* of

writing. The literature characterizes adolescents as digital natives, 95% of them being

online and 57% creating content online (Lenhart & Madden, 2005; Madden et al., 2013;

Prensky, 2001). Thus, it might be expected that the students in the present study would

be proficient in creating and designing online and would be accustomed to using the

skills necessary to create online, for instance, uploading and downloading files; posting

content online in social media, blogs, or websites; and manipulating basic operations,

such as copying, pasting, and editing. However, the students in this case lacked

proficiencies and experience with the digital tools available in school (previously

described), and they also were unaccustomed to being asked to use these tools to create and design.

Although the students in this class may have been users of mobile devices as previously discussed, they were unaccustomed to and frequently challenged by assignments that asked them to create their own content online. Instead, students seemed to be accustomed to tasks such as locating information in novels used in their class and using that information to answer questions (observation, October 7, 2014, October 15, 2014). For example, students were practiced in finding quotations to support a topic, as this was part of their class routine in reading literature (observation, January 26, 2015). However, students did not know how to use these quotations to support their own claim in an argument (observation, January 26, 2015). In addition, students were accustomed to finding answers to questions predetermined by the teacher (observation, October 7, 2014, October 15, 2014). However, when students had to research a claim that they had to create and defend in their digital, multimodal arguments, there were multiple steps that were difficult for them. For example, determining different sides to an argument, rather than being told to represent one side or another, was a challenge (observation, January 28, 2015). In addition, once students had a claim, they tended to frame the task as finding answers from their research rather than evidence that might support their point (observation, January 28, 2015). Students discussed this struggle to create and design their arguments: "Then the hardest was coming up with like all the reasons and stuff" (interview, December 9, 2014). Several students noted this struggle, including students ranging in levels of writing ability.

Another indication of students' struggle to create and design their own arguments was their ranking of the digital tools used in the project according to both my observations and their answers to interview questions regarding which digital tools they preferred. Overwhelmingly, the students preferred Glogster EDU to Google Sites (observation, February 11, 2015). When asked why they liked Glogster EDU, students preferred its ease of use, as it comes with more templates than Google Sites: "Probably Glogster. That's the favorite. It is probably the easiest one to do" (interview, March 12, 2015). Denise liked the templates provided for inserting text and images in Glogster EDU: "I enjoyed Glogster…because you got to choose your layout and then I liked the special ways where you can put the text and then you could put your pictures" (interview, December 9, 2014). In contrast when using Google Sites, students spent a day planning their website, and even after this initial planning had to be given an extra day of direct instruction of how they might organize their arguments using Google Sites (observation, February 19, 2015). They enjoyed creating a website more than writing a conventional essay, but also preferred Glogster EDU to Google Sites, perhaps because of the variety of templates available in Glogster EDU as opposed to Google Sites (interviews, December 9, 2014, March 12, 2015). In contrast to Glogster EDU, Google Sites "was confusing a little bit" (interview, December 9, 2014) because the students had to "figure out" (interview, December 9, 2014) the design rather than the digital tool providing templates of design the students could choose to represent their arguments.

Progress Toward the Goal

Students' *expanding concept of argument* was a focused code that had multiple points of evidence including student and teacher interviews, observations, students' pre- and post- questionnaire, and students' pre- and post- multimodal-argument reflection. Specifically, *expanding concept of argument* included evidence that students were attaining a greater understanding of what argument is, how to express multimodal arguments, and learning the elements of argument. Students explained in their interviews that their concept of argument had changed:

> Cora: …I've learned that they [arguments] help you express how to change something.

> Clark: I know how to write one [argument] instead of just writing facts.

> Denise: We used to just put your opinion and not compare it against someone else's…But now, …I will put it the way I think about it and then compare it to what other people think. (interviews, December 9, 2014, March 12, 2015)

These representative examples illustrate how the students' knowledge of the purpose and structure of argument was progressing. In addition, looking at 10 students' pre- and post-responses to a questionnaire, in Figure 4.4, shows that the students thought argument was more creative, was composed of more modes than written language alone, and that there were differences between conventional and digital arguments after the intervention. In addition, when compared to their responses before the intervention, more students had complex definitions of argument in the post-questionnaire, citing a need to present

evidence and to identify multiple sides of an argument. Before the intervention, they mainly defined argument as stating one's own opinion.
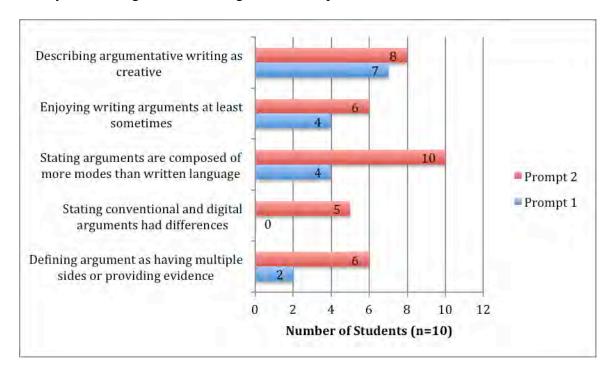
Figure 4.4. Ninth-grade changes in concept of argument: Student questionnaire.

Six students, as opposed to four students, also described using multimodal forms of argument in their multimodal-argument reflection after the intervention compared to their multimodal-argument reflection prior to the intervention. This reflection (described in Chapter 3) asked students to think about how they would use technology and argument to solve a problem.

However, even though the students did increase their awareness and understanding of argument, this understanding did not necessarily transfer to their conventional writing of arguments. Ms. Barrister expressed confirmation that students' understanding of argument had increased: She stated in an interview, this "class is now

better with providing support and evidence with their ideas than the other classes"
(interview, March 18, 2015). However, she qualified that it was their knowledge of
elements of argument, referred to as logic in the subsequent interview example, and not
necessarily their writing that had grown:

> Interviewer: So, from what you said, would you say that their ideas and their
> ability to argue improved but not necessarily their writing skills?
>
> Teacher: Yes, verbal communication of their ideas.
>
> Interviewer: And, their logic?
>
> Teacher: Right. And their thinking and logic improved drastically. (interview,
> March 18, 2015)

The quantitative scoring of the students' pre- and post- intervention attempts to
write a conventional argument responding to prompts are consistent with Ms. Barrister's
observation that there seemed to be little change in her students' ability to write
conventional argument. Likewise, as shown in Table 4.1, a Wilcoxon matched-pairs
signed-rank test on the pre- and post- conventional writing prompt responses found no
statistically significant differences. The median score is used in the Wilcoxon procedure
because the data were ordinal and nonparametric. Nonetheless, although not statistically
significant, all of the categories for conventional argument writing increased when
assessed before and after the intervention.

Table 4.1

Quantitative Results for Ninth Grade

Case	Category	Initial Median Score[1]	Final Median Score	Z Score	Median of Difference Increase (+) or Decrease (-)[2]	p-value
Ninth	Focus	2.86	3.00	-1.01	+.33	.32
	Organization	2.31	2.38	-.41	+.25	.68
	Evidence	1.80	1.70	-.06	+.10	.95
	Elaboration	1.57	1.75	-.75	+.17	.45
	Clarity	1.60	1.92	-1.2	+.33	.22
	Overall	1.83	1.83	-2.7	+.07	.69

Note. Values are from a 5-point scale where 0 represents no evidence of the respective trait, and 4 represents clear establishment of the respective trait of argument.

[1] Medians are reported, because analyses used a Wilcoxon matched-pairs signed-rank text, a nonparametric approach due to a small sample size that cannot be assumed to have a normal distribution (Hinkle et al., 2003).

[2] The median of the difference may not be the same as the difference between medians (Peers, 1996).

The students' Google Sites were analyzed for elements of argument, including whether or not students conveyed an argument by writing a claim, supported the argument with evidence, and used digital, multimodal tools to include multimodality, which were all elements of the intervention (see Appendix M for coding). Figure 4.5 demonstrates that in their digital, multimodal arguments, the majority of students included these elements. An example of a student homepage containing elements of claim, evidence, and multimodality can be seen in Figure 4.6. Thus, the students seemed to improve their concept of argument and the quality of their digital arguments, shown by the analysis of their digital, multimodal arguments and the responses of increased multimodality in their questionnaires. However, in this class, although there was

evidence of increased concept of argument and the ability to create digital, multimodal

arguments, there was little evidence of transfer to the writing of conventional arguments.
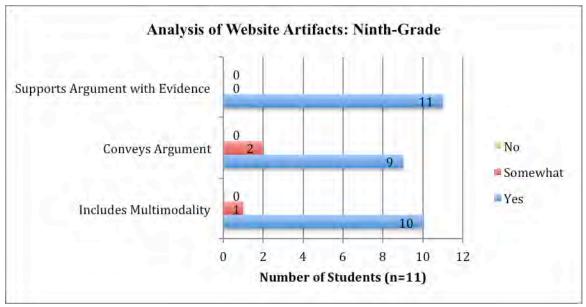
Figure 4.5. Analysis of website artifacts: Ninth-grade.

Figure 4.6. Example of ninth-grade student website.

Partial Success

Looking retrospectively at the content of Ms. Barrister's lessons before the intervention and during the intervention, there was change in Ms. Barrister's lessons over the course of the intervention, but she seemed unlikely to maintain these changes on her own. Before the intervention, she described her typical classroom instruction as being devoted to vocabulary instruction followed by reading and guided reading activities and some attempts to include writing, mainly centering upon their current work of literature (interview, October 30, 2014). However, at the end of this intervention, her students had created digital infographics and websites. Ms. Barrister reported that she believed her learning about digital tools had grown with the students' learning: "Yes, and I think it helped me too. I think I learned as much as they did…I think this benefitted me just as much in terms of the technology" (interview, March 18, 2015). However, when asked about what she had implemented in her other class sections, Ms. Barrister had only implemented one of the strategies used in the intervention that dealt with drafting more conventional writing (interview, March 18, 2015; observation, November 24, 2014). Throughout the intervention, Ms. Barrister at times promised to incorporate elements of the intervention, but never seemed to follow through with these attempts unless I was there to support or lead the instruction (observation, January 7, 2015). For example, on one occasion Ms. Barrister and I had planned on her implementing the intervention while I was not in the classroom. When I returned the following class period, Ms. Barrister described that she hesitated to explain argument to students. She was concerned that she

had not answered students' questions about their claims and evidence well and wanted me to review it with them (observation, February 4, 2015).

In addition, during our final interview, when discussing the challenges of teaching students how to write arguments and whether those elements of argument or the technological aspects would be harder to teach in the future, Ms. Barrister once again focused on the conventional areas of teaching literacy, such as reading, rather than either the conventional or digital, multimodal arguments of the intervention. For instance, rather than responding that either the technical aspects of the intervention or the conventional argument elements would be a challenge in the future, she stated, "I think the argument, I'd probably find a different novel…" (interview, March 18, 2015). Thus, she seemed to at times ignore important elements of the intervention—the construction of arguments using digital, multimodal tools—and, instead, focus on what was familiar to her—teaching literature. Ms. Barrister seemed excited about the digital tools she had learned about and teaching with those tools, to the point that she made repeated promises to incorporate them into her teaching. Yet, both her actual teaching of the intervention and her planning for modifications in the future demonstrated reliance upon conventional literacy skills, such as reading novels and writing with paper and pencil, rather than on using digital tools to enable students to construct multimodal arguments. However, Ms. Barrister did express a desire in her final interview to use Glogster EDU in an upcoming research project she was going to design for students (interview, March 18, 2015).

Other than the experiences Ms. Barrister seemed to believe she had gained regarding digital tools through our implementation of the intervention, she received little

help through her school integrating digital tools or multimodality into her curriculum. The media center specialists led some professional development on digital tools, but these professional development sessions were in-services on how to use specific tools, such as Google Docs, rather than how to integrate these tools into curriculum, especially to teach specific skills, such as argumentative writing (observation, November 18, 2014). In fact, even though Ms. Barrister mentioned being familiar with Google Docs prior to the intervention, the first time she tried to access Google Docs, she did not know how to sign into her school Google email account to access Google Docs (observation, November 12, 2014). In addition, Ms. Barrister talked about planning with the media center specialists in the future, but this planning consisted of having the media center specialists find resources for students to use with topics that related to the literature she already taught rather than creating new curriculum units integrating digital tools or multimodality (interview, March 18, 2015).

Tenth-Grade Case Results

The tenth-grade case had 56 initial codes, listed alphabetically in Appendix J. Representative examples of data representing frequently referenced initial codes are given in Appendix L. Although some of these tenth-grade initial codes varied from the initial codes of the ninth-grade, the majority of these initial codes were the same. Thus, the emerging focused codes for the tenth-grade case were the same as those found in the ninth-grade case. However, even with the same focused codes, each case had nuances in the degree to which the initial codes applied in each case and the initial codes that formed the focused codes, which will be highlighted in the following sections. The quantitative

data, student artifacts, and pre- and post- reflections and student questionnaires will be included where they support the qualitative coding. A coding matrix is shown below in Figure 4.7 listing initial codes in bullet points, focused codes in bold, and their fit in the formative framework in boxes at the top of the figure.

Modifications	Enhancing/ Inhibiting Factors	Unanticipated Outcomes	Progress toward Goal	Partial Success

Providing Scaffolding Versus Allowing Freedom

- Assessing time spent on project
- Expressing frustration with digital tools
- Feeling uncomfortable...with technology
- Making modifications
- Modeling argument
- Needing classroom management or structure
- Providing more writing time
- Providing scaffolding
- Writing using process approach

Collaborating

- Assessing group work versus individual responsibility
- Making modifications

Ability to Use Digital Tools in School

- Accessing digital tools
- Becoming distracted by technology
- Designing in school
- Designing with digital tools
- Disliking digital tools use
- Expressing frustration with technology
- Feeling uncomfortable or unfamiliar with digital tools
- Obtaining research
- Teaching with digital tools
- Typing written information
- Using mobile devices
- Using social media
- Using digital tools in school

Defining Writing and Writing Ability

- Citing sources
- Describing student weaknesses
- Describing typical classroom routines
- Disliking writing
- Engaging in writing
- Struggling with writing arguments
- Teaching argumentative writing
- Teaching with digital tools
- Writing as previous experience

Using Multimodal, Digital Tools as a Scaffold for Learning Argument

- Focusing through digital tools
- Designing with digital tools
- Transferring skills
- Understanding concept of argument

Engaging Learners

- Choosing social issues
- Demonstrating creativity
- Demonstrating initiative with digital tools
- Enjoying ownership of activities
- Enjoying reading online
- Enjoying digital tools
- Focusing through digital tools
- Learning about social issues
- Writing about social issues

Writing and Production Versus Creation and Design

- Designing in school
- Designing with digital tools
- Struggling to create
- Struggling with writing arguments
- Writing multimodally
- Writing relying on text

Expandng Concept of Argument

- Changing written arguments
- Transferring skills
- Understanding concept of argument

Integrating Digital Tools in Teaching

- Receiving professional development
- Teaching argumentative writing
- Teaching creative writing
- Teaching different levels
- Teaching narrative writing
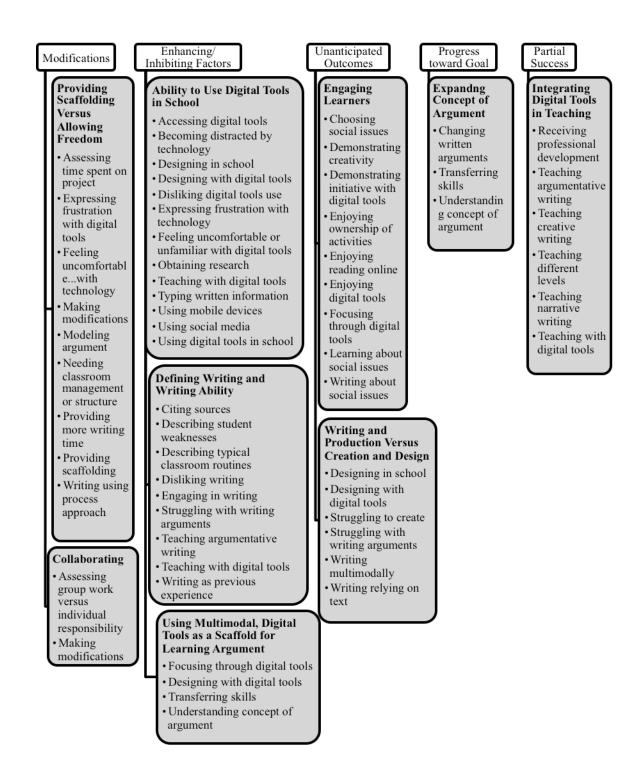- Teaching with digital tools

Figure 4.7. Coding matrix for tenth-grade case based on a retrospective analysis.

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Modifications

The subsequent sections discuss modifications made to the intervention as a result of inhibiting factors that occurred during the intervention. Modifications were made in two categories, providing increased instructional scaffolding and changing student collaboration, as in the ninth-grade case. However, in the tenth-grade case inhibiting factors that led to the modification of scaffolding were student frustration with using the digital tools and their tendency to become overwhelmed by the multidimensional nature of their multimodal arguments (i.e., that they had to attend to writing arguments and operating digital tools). Retrospectively, Ms. Tucker's limited teaching experience also seemed to inhibit this modification. As did Ms. Barrister in the ninth-grade case, Ms. Tucker, the tenth-grade teacher, perceived a lack of student accountability as an inhibiting factor that led to modifications for student collaboration.

Providing scaffolding. Similar modifications were made in the tenth-grade case as in the ninth-grade case to provide more scaffolding for the students' use of digital tools, which meant increasing instructional time to familiarize students with the digital tools and directions for using these tools to make a digital, multimodal argument. Including more time to familiarize students with how to use digital tools meant, specifically, adding more class periods for students in the computer lab, providing handouts to guide students through using digital tools, and using more models of writing and explicit directions for students. For instance, the teacher added a class period for the students to use the digital tools to obtain research for their PSA website (observation, January 27, 2015). In addition, the teacher planned more time during the PSA website

project than in the infographic project to explain directions to students, using class

discussion of the assignment and models as well as detailed handouts going over the

directions for the assignment (observations January 7, 2015, January 9, 2015). These

handouts included a scaffold for students taking notes on their online research as well as

handouts for how to create a Google Site; see Appendix D (observation January 21, 2015;

February 4, 2015). Taking more steps to scaffold students digital, multimodal arguments

was done based upon observations that students struggled to contend with both the

technical functions of the digital tools, such as creating a Google website, as well as

using multimodality (especially, using modes other than text) to design their arguments.

For example, I noted in my field notes, "[We] need to make sure directions are explained

slowly and repeated. Students need more time to figure out technology, had to figure out

technology and didn't have as much time needed for content" (observation, January 23,

2015).

In this case, the need for such scaffolding was also due to the inhibiting factor of

the students' frustration with digital tools. In the tenth-grade case, two initial codes were

frequently coded that were not as commonly coded in the ninth-grade case: *expressing*

frustration with digital tools and *feeling uncomfortable or unfamiliar with digital tools*.

The tenth-grade students were more prone to frustration with digital tools with which

they were not familiar. For instance, Alanzo, a student Ms. Tucker described as having

average writing ability, but who wrote short stories outside of class, became frustrated by

the digital tools used in the PSA website, such as Google Sites: "I couldn't get it to do

what I wanted it to do" (interview, March 11, 2015). Yet, Alanzo owned multiple digital

devices for his own personal use including a desktop computer, a laptop computer, a tablet, and a smartphone. However, he said he was unfamiliar with using the digital tools of this intervention, Google Sites, Google Docs, and Glogster EDU, for academic tasks, and, in this case, designing an argument was challenging for him despite his proficiencies in his personal use of digital devices. Students were not familiar with the digital tools being used in the assignment even though two of these tools were a part of the Google Applications assigned to each of their district email accounts, and the school had an initiative to introduce Google email and applications. For example, most students interviewed had never used the digital tools used in this intervention including Google Docs, Glogster EDU, and Google Sites, and most students described their use of digital tools in school as limited to using the Internet for research or using Microsoft Word and PowerPoint (interviews). Thus, more time and scaffolding were needed to alleviate students' frustrations and prevent them from becoming disengaged with the assignment. Gabby illustrates this need for scaffolding: "…like I said I am not a good designer, and I never used that website [Glogster EDU] before so I was not okay. It took like five minutes to figure out how to write something" (interview, January 15, 2015).

In the tenth-grade case, modifications to the intervention were also made to provide more scaffolding for writing as well as the digital tools, so that students would not become overwhelmed by the multiple tasks involved in digital, multimodal composing (interview, December 17, 2014). Thus, this modification was also made for the inhibiting factor of students' frustration with digital tools and their tendency to become overwhelmed by the multidimensional nature of multimodal composing

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(interview, December 17, 2014; observations November 25, 2014, December 8, 2014). For instance, in my field notes I noted that students were overwhelmed with learning both how to operate Google Docs, a technology that was not familiar to them, as well as analyzing texts for evidence to use in their arguments (December 8, 2014). These modifications included providing more models of writing (e.g., editorials showing students the elements of argument), starting with conventional writing rather than having students compose while they designed digitally (e.g., the students wrote their drafts of their PSA websites with pen and paper), and adding more time for that writing (e.g., additional class periods added for finding research for their arguments and drafting the content of their arguments). Ms. Barrister, in the ninth-grade class, enjoyed the conventional writing components of the intervention and adopted those in her teaching of other classes. However, Ms. Tucker, in the tenth-grade class seemed overwhelmed with aspects of classroom management, which interfered with her attention to writing instruction in general, and specifically to elements of the process approach to writing. This inhibiting factor was identified retrospectively and did not occur in the ninth-grade case with Ms. Barrister, who had been teaching at the school for 23 years. Although the ninth-grade students in Ms. Barrister's class also exhibited discipline problems, these behavior issues did not affect Ms. Barrister's teaching to the extent they seemed to in Ms. Tucker's case.

When Ms. Tucker and I met in December to review the first round of infographic writing toward making modifications for the next round of PSA websites, she wanted the students to have more models of writing (interview, December 17, 2014). In the

infographic assignment, the students had used Google Docs to explore links of model arguments that included articles, videos of news stories, as well as infographics. However, based on Ms. Tucker's suggestion, beginning with the PSA stage, the students started with printed text sets of editorial arguments from newspapers as models of argumentative writing (interview, December 17, 2014). In addition, I provided Ms. Tucker a PowerPoint that included previous student examples of creating a PSA website. I developed this PowerPoint for Ms. Tucker using the examples of student-created websites from the previous, smaller-scale study to accommodate Ms. Tucker's request for increased models of student writing to provide her students with more scaffolding (interview, December 17, 2014). However, at times, Ms. Tucker did not use these models as planned. Ms. Tucker became overwhelmed with teaching the process of writing, while also attending to students using digital tools in the intervention (observation, February 4, 2015). For instance, one day when I arrived, the students were in the lab with Ms. Tucker working on their websites. The students were asking many questions that made it clear that they had not seen the rubric for the PSA assignment or the models of writing Ms. Tucker and I had discussed showing them prior to them going in the lab. When I asked Ms. Tucker about this, she responded, "Oh, I forgot to do that!" (observation, February 4, 2015).

Prior to the intervention, Ms. Tucker was often overwhelmed by student behavior in her classroom and classroom management (observation, October 14, 2014). During the intervention, Ms. Tucker seemed to be overwhelmed by teaching the multiple dimensions of a multimodal argument project. For example, when she did forget to

scaffold student learning, it was instruction that led her students through the writing process, such as not providing models of writing though she had indicated an intention to do so and not giving students adequate time to revise their writing, though that was her original plan (observation, February 12, 2015). She seemed to forget this instruction because she was focused on getting her students to the computer lab and organizing their use of digital tools. For instance, in her interview after the infographic project, she said that she wished she had taken the time to provide more models of argument writing for the students before engaging students in using Glogster EDU (interview, December 17, 2014), and this modeling was the same step she did not include, even when we had discussed and planned for it, because she was intent on getting students to the computer lab with the PSA website to begin using Google Sites (observation, February 12, 2015). Thus, the modification to provide increased scaffolding to students was, at times, hampered by Ms. Tucker's limited teaching experience and her tendency to become overwhelmed when attending to multiple factors in the classroom, in this case both writing instruction and instruction on digital tools.

Collaborating. Ms. Tucker summarized the categories of modifications:

…The only thing I'm concerned about is if we go into [a] much larger scale project reassessing the partners or even working in partners, reassessing the amount of time I am giving each thing, and the amount of steps because I think it needs to be smaller steps. (interview, December 17, 2014)

In addition to modifying for scaffolding, Ms. Tucker also was concerned with student accountability (i.e., how she would assess each student's individual work in group

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collaborations and ensure that each student contributed equally to group work). Ms.

Tucker identified a need to modify the collaboration done in the infographic project for

what she believed was the inhibiting factor of holding students accountable during

collaborative work (interview, December 17, 2014). This need for student accountability

was also recorded in my field notes in discussing the assessment of the students'

infographics as Ms. Tucker stated that she struggled to assess these assignments not

knowing how much each individual student had contributed to the infographic completed

by each student group (observation, December 8, 2014). Thus, in the second stage of the

intervention with the PSA website, each student collaborated within a group to research a

common topic, but each student was responsible for completing his or her own website.

However, the modification to limit group collaboration to increase individual

student accountability was met with varying critiques of the modification from Ms.

Tucker. When asked in her final interview about modifying student collaboration, Ms.

Tucker thought having more individual work was helpful in the PSA website project

versus the infographic project, but seemed to consider further limiting, or eliminating,

student collaboration: "Personal responsibility, I definitely think helped more, it's

just…because it really helped me actually see who is doing the work. But I almost think

that with that group [the class] we shouldn't have even let them work on the same

thing…" (interview, March 6, 2015). She expressed a belief that the students became

confused by working on the research together during the website stage, but then

submitting individual websites for their grade. The students appeared to enjoy working

in groups more in the beginning when they all worked on one assignment (in the

infographic stage) as opposed to when each student completed his or her own website, and group collaboration was limited to research of the assignment (when developing their PSA website). In the interviews after the infographic stage, in which students worked in a group on one assignment, four out of six students expressed a preference for working in groups as opposed to working individually. However, in the interviews following the PSA website, where their group efforts were less central to the assignment, five out of six students asked preferred working independently. Whatever the design of the group work, students seemed to naturally gravitate toward working with one another. For example, on several occasions, students asked to work together or worked together despite being instructed to work independently (observations, October 30, 2014, November 11, 2014).

Despite Ms. Tucker's eventual move toward having students work independently instead of in groups, when I met with her prior to the intervention, she expressed a desire to see students work in pairs (observation, October 20, 2014). However, throughout the intervention, she had to cope with issues with student collaboration, such as holding students individually accountable for their work, managing classroom behavior, and discussing students' relationships within their groups (observation, January 21, 2015). Digital tools may have compounded the need to balance accountability and working in groups. For example, when the students worked in groups using Google Docs, their document was shared between group members. However, if one group member missed class and another group member wanted to substitute, that member didn't automatically have access to the original group document, often resulting in confusion for students and for Ms. Tucker: "Because some of our groups we just couldn't, we needed to switch

people…and throw in another group [member] and that's just going to mess everything up" (interview, January 15, 2015). This confusion and frustration with group work contrasts the ninth-grade case, in which the majority of students enjoyed working together in groups.

Inhibiting Factors

Just as in the ninth-grade case, there were two inhibiting factors that emerged retrospectively: *ability to use digital tools in school* and *defining writing and writing ability*. Although the focused codes are the same in both cases, the tenth-grade students seemed to have a more distinct contrast between their personal use of mobile devices and their ability to use digital tools available to them in school. Regarding the definition of writing and writing ability, both case teachers hesitated to connect digital, multimodal composing with "writing," but the ninth-grade teacher's resistance is perhaps more surprising considering her willingness to teach and her own familiarity with digital tools.

Ability to use digital tools in school. If one were to sit in Ms. Tucker's room while students came into class, they would see students arrive and look for outlets before finding their seat, needing to recharge smartphones they had used consistently all day assuming their use of these smartphones in Ms. Tucker's class and their constant need for battery charge were reliable indicators (observation, January 10, 2015). The initial codes *using social media* and *using mobile devices* were initial codes that occurred frequently for each case. When asked about their personal use of technological devices, the tenth-graders asked all responded that they had smartphones. Alanzo reported collecting devices-a tablet, laptop, desktop, and smartphone-to pursue his gaming (interview, March

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11, 2015). Students were users of multiple social media platforms: Facebook (https://www.facebook.com/), Twitter (https://twitter.com/), Tumblr (https://www.tumblr.com/), Instagram (https://instagram.com/), Snapchat (https://www.snapchat.com/), and Vine (https://vine.co/) were all mentioned when students were asked what social media accounts they held (interviews, March 5, 2015; March 11, 2015; March 19, 2015). Often, the students seemed preoccupied with these accounts and their mobile devices during class. Two students discussed Snapchat in class one day as one of them yelled, "25 people saw that Snapchat" (observation, January 21, 2015). On a separate occasion with another student, Madison interrupted class to tell others, "Okay, everyone, go look at my Snapchat" (observation, February 27, 2015). However, their use of these applications and mobile devices—all of which involve typing, uploading and downloading files, and designing content—did not translate when using digital tools in school neither in using school digital tools for design nor in students' technical skills operating various digital tools.

Once again, as in the ninth-grade case, the tenth-graders described using digital tools in school for primarily typing, researching, and publishing content. Students did not design and create content online using digital tools in school. For instance, when asked about how they used digital tools in school, students responded:

Alanzo: Not much, computer mainly. Just look up information…. (interview, January 13, 2015)

Allen: We do documents in Word and just Office. (interview, December 10, 2014)

Catherine: Mostly for research…. (interview, January 15, 2015)

Eliza: Research and stuff…[nothing] other than typing. (interview, March 19, 2015)

When students did mention designing using digital tools, it was either for a class specifically on digital tools, such as Image Editing (interview, January 13, 2015), or website creation for a content area class other than English (interview, January 15, 2015). At times, projects in school using digital tools may be limited, as in this intervention, because of designing assignments that students can access at school rather than home because of concern for students without Internet connectivity at their homes (interview, October 14, 2014, December 16, 2014). However, even applications, such as the Google Applications, which every student at the school had access to seemed to rarely be used in students' classes, as most students were using these digital tools for the first time during this intervention (interviews). In addition, digital tools that were free or of limited cost, such as Glogster EDU, seemed to rarely be used at school as the majority of students were unfamiliar with this digital tool used in the intervention.

Perhaps from this lack of associating designing with digital tools in school, students in this case were particularly frustrated by digital tools and seemed unfamiliar with how to operate them. *Expressing frustration with digital tools* was a frequently occurring initial code, not necessarily because students did not like the digital tools, as another initial code *enjoying digital tools* was coded more frequently, but because they could not operate these tools to their expectations. For instance, when asked what he disliked about creating his PSA website, one student expressed frustration with Google

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Sites: "Yeah, could not figure it at all" (interview, March 11, 2015). Darla, an above-average student in writing, described using Glogster EDU: "It's really hard to navigate" (interview, December 10, 2014). The students' frustration at times may have been do to the utility of the digital tools; however, Glogster EDU, referenced in the previous remark, has won awards for its use in education (http://blog.edu.glogster.com/2011/12/13/award-winning-glogster-edu-projects/) and is intended for grades Kindergarten-12. Students had other problems with digital tools, such as logging into their email accounts and accessing websites (observation, February 12, 2015), that suggest that at least part of their frustrations stemmed from their own struggle to familiarize themselves with and use digital tools to design rather than type or publish. For example, the students had little difficulty accessing research online, represented by a student who explained, "The research was probably the easiest part" (interview, March 19, 2015).

Defining writing. When students discussed their writing experience in school, they discussed writing informational or creative pieces, but the writing of this intervention, conventional argumentative writing and digital, multimodal composing, was absent from their descriptions (interviews, December 10, 2014, January 13, 2015, January 15, 2015). The students viewed writing as limited to words and text and defined argument as "stupid drama" or something to "agree or disagree with," but did not mention multiple perspectives nor providing and supporting evidence (student questionnaires). See Figure 4.8 for the students' responses on their pre- and post-intervention student questionnaire. This figure shows that few students prior to the intervention thought of arguments as including more than written language. Thus,

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argument and digital, multimodal composing were not included in students' definition of

school writing. This may have inhibited the intervention because students had little

background for writing arguments, so this intervention, which combined both

conventional and multimodal aspects of argument in addition to both conventional and

multimodal texts, including digital PSAs and infographics, may have challenged

students' perception of argument.

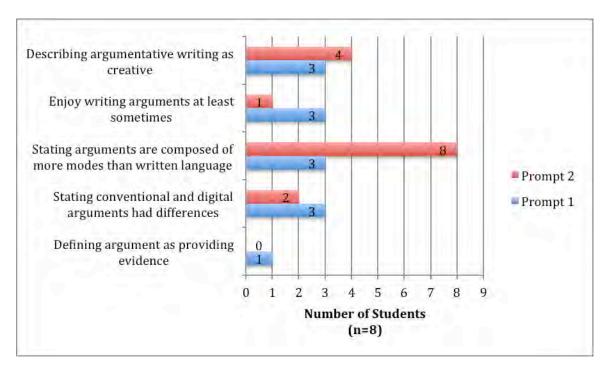*Figure 4.8.* Tenth-grade responses on student questionnaire.

In addition to the students having little experience learning about or writing

conventional or digital arguments, Ms. Tucker did not seem to define her students'

multimodal arguments as including argument writing. For example, in our interview to

debrief about the infographic in which students argued about whether or not different

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prejudice issues had improved since the time of *To Kill a Mockingbird*, Ms. Tucker made

the following assessment:

> They [the students] don't know how to construct it [evidence] into a well-
>
> developed thought, or idea, or paragraph. Then I would say the citing of the
>
> evidence, like the articles and the book is just a skill that they still have not really
>
> learned. So therefore having to put it on the infographic was difficult for them.
>
> (interview, December 17, 2014)

However, the students had created infographics in their groups that seemingly

demonstrated claims and evidence and their organization of that evidence to convey an

argument. Figures 4.9 and 4.10 are two infographics created by student groups. Both of

these examples show students placing a claim at the top and center of their infographic as

well as providing evidence below this claim, suggesting both their knowledge of the

elements of argument and how to organize such elements.

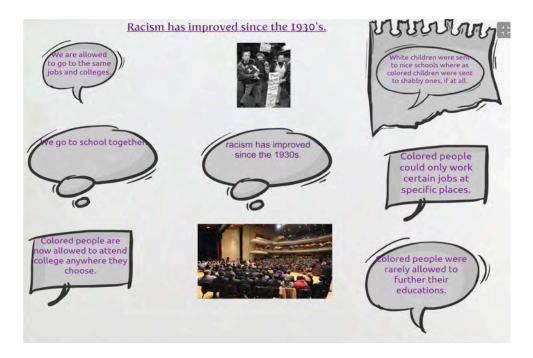*Figure 4.9.* Example of tenth-grade student infographic representative of higher-quality submissions.

Figure 4.10. Example of tenth-grade student infographic representative of lower-quality submissions.

Ms. Tucker may have been more accustomed to assessing conventional writing as she described her typical classroom instruction as involving journal entries, worksheets, and vocabulary instruction (interview, October 20, 2014). As Ms. Tucker was a first-year teacher, she explained her previous teaching experience with argumentative writing was based upon her student teaching. Ms. Tucker had taught argument in the past as a conventional argumentative essay about a topic in a novel (interview, December 17, 2014). Thus, her lack of experience may have been an inhibiting factor as Ms. Tucker had little practice with teaching either conventional or digital, multimodal arguments and may not have known what to expect from students' digital, multimodal arguments. This limited knowledge of and experience with teaching argument as digital, multimodal composing may have hampered her ability to clearly communicate expectations with students, recognize skills demonstrated in the digital, multimodal arguments, or give the guidance needed in crafting their writing. For example, Ms. Tucker discussed these limitations: "…I'll admit it was hard. It was even hard for me to have to explain it to them because they just don't have that skill at all. They don't have that, 'Let me have an opinion about something but let me make sure I have evidence.' They don't have that skill" (interview, December 17, 2014).

Enhancing Factors

The tenth-grade students, like the ninth-grade case, described the digital, multimodal tools as providing a method to mediate their learning of arguments. In this section I use the definition of mediate, discussed previously in the ninth-grade case, as helping to build "more advanced learning (i.e., higher cognitive processes such as

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concept learning and problem solving)" (Schunk, 2012, p. 252). However, in the tenth-grade case, the particular way the digital tools mediated their learning varied. For some students in the ninth-grade case, digital tools helped them create content; for others, the tools helped them to visualize argument. The tenth-grade students agreed that the digital, multimodal creation of arguments would help to mediate their writing of arguments, even conventional writing of arguments. More specifically, they believed that using digital tools helped them to structure and organize concepts of argument. For instance, Eliza described structuring ideas on separate webpages as more effective than the conventional structure of paragraphs: "Because I mean you could recognize things because you can put your ideas on like separate pages on the website instead of paragraphs on paper, and that's more clear to me" (interview, March 19, 2015). Alanzo, despite at times being frustrated using the digital tools for design, acknowledged that digital tools helped him mediate the organization of argument: "It's given me a better idea of how to write it out and help people understand it better…how to organize everything" (interview, March 11, 2015). Darla also described creating multimodal arguments with digital tools, "Yeah, I think it makes it easier to kind of organize the information" (interview, March 5, 2015). Allen described the multimodal composing as helping him to visualize the concept and structure of argument: "You will see like with the pictures…you'll see what's going on, what's right in the picture or what's wrong" (interview, December 10, 2014). Overall, the tenth-grade students saw the digital, multimodal composing as being effective because it allowed them to visualize and organize their arguments, and they believed that their new understandings of and ability to construct arguments with digital tools would

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transfer to their more conventional writing. To illustrate that confidence, nine of ten students responded affirmatively to the interview question, "Do you think creating multimodal arguments online will help your ability to write more conventional arguments?"

Unanticipated Outcomes

Two unanticipated outcomes that were somewhat contradictory were coded: *engagement* and *struggle to create*. This intervention was clearly engaging to students; yet, the students often struggled with the intervention due to their inability to use the digital tools for academic tasks and their unfamiliarity with design and creation rather than production. These focused codes were more prominent in the tenth-grade case than in the ninth-grade case based upon the initial codes they are comprised of and how frequently they were coded. There were several students that demonstrated initiative in this intervention that previously were admonished for their behavior during each class period or were apathetic to any classroom activity during the period, often keeping their heads down, wearing headphones, and otherwise ignoring other students and what was happening in the classroom. *Focusing through digital tools* was coded more frequently in this case than in the ninth-grade case. In addition, *demonstrating initiative with digital tools* was also a frequently coded initial code in this case that was rarely coded in the ninth-grade case. However, there was also increased student frustration in the tenth-grade case when compared to the ninth-grade case. For example, the codes *struggling to create* and *expressing frustration with digital tools* were more frequently coded in the tenth-grade case than in the ninth-grade case. The focused codes *engaging learners* and

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writing and production versus creation and design are discussed in the following sections.

Engaging learners. When Ms. Tucker was asked to compare the class employing the intervention to her other classes, she replied:

> Okay, they are definitely my lowest sophomore class-reading ability, writing ability. Behavior is also a huge issue with that class…I also think just them not being able to do some of the work because they don't understand and also gets them frustrated so they don't do the work. (interview, March 6, 2015)

My earliest observational notes of Ms. Tucker's class revealed that maintaining discipline was a challenge. She discussed that she had considered different seating arrangements for students to address that challenge and had also engaged in on-going discussions with school administrators regarding students' behavior (field notes, October 28, 2014). Discipline problems did not completely disappear during this intervention; however, several students showed initiative that had not been evident before the intervention, and others seemed to be more engaged when they were given the opportunity to work with digital tools. Thus, the tenth-grade students demonstrated different forms of engagement, procedural and substantive, during the intervention (Nystrand & Gamoran, 1991). Procedural engagement, with the students doing the assigned tasks, was prevalent much more in the computer lab than in the classroom. Students, who had previously not participated in class activities, seemed more engaged and attentive in the computer lab. For instance, I recorded in my observational notes: "I talked with [Ms. Tucker] about him, and she explains that he is more engaged with this activity in participation and

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interest than he usually is in his work" (observation, January 23, 2015). Allen, another male student, discussed the computer giving him a tool with which to focus his attention, thus becoming at least procedurally engaged: "Normally in the classroom it's like I stare in space, and then when in the computer lab, I have the computer screen to look at and then I can read what I have" (interview, March 5, 2015). This tendency to stay engaged with tasks reoccurred in multiple observations, typically noting students who were exceptionally disruptive in the classroom becoming more focused, engaged, and attentive when using digital tools for their multimodal designs (observations, January 13, 2015, January 27, 2015, February 4, 2015, February 12, 2015).

For some students, the engagement did not extend beyond the procedural. For instance, in talking with Kevin, a student who was frequently reprimanded in class for disrupting instruction, about why he struggled less with this assignment than with his more conventional assignments, he replied, "Because I finished it" (interview, March 11, 2015). This quote seems to demonstrate that he was motivated to complete assignments rather than become more substantively engaged. Aside from the procedural engagement of completing tasks, some students also seemed to enjoy the assignment and take interest in their research, suggesting a higher level of substantive engagement (Nystrand & Gamoran, 1991). For example, Madison consistently focused on creating her multimodal arguments in the computer lab, even becoming a leader during group work, which was a stark contrast to her behavior in the classroom, where she was often reprimanded and asked to change seats as Ms. Tucker tried to mitigate her class disruptions (observations, January 23, 2015, February 4, 2015, February 12, 2015). Ms. Tucker characterized her as

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being below average in writing ability. When I asked Madison why she had shown more leadership and involvement with this assignment than was typical of her classroom behavior, she responded that she felt she needed to at times make up for others in her group who were not doing the quality of work she desired and that she enjoyed the creativity of the assignment: "…I like computers, because I like when you can…put your own stuff in it, when you are just writing, it's harder to do it" (interview, December 10, 2014). Madison said she did not often have assignments in school that fostered creativity (interview, December 10, 2014). Thus, Madison went beyond just following directions and trying the task; she enjoyed the multimodal arguments and tried to lead others in creating their arguments. She even told her other teachers about the Glogster EDU digital tool (interview, December 10, 2014). Ms. Tucker also thought her students were engaged with the assignment: "I think they were proud to like make something" (interview, March 6, 2015). Thus, students were not just focused on completing the tasks, but they were taking ownership and demonstrating pride in their work, suggesting both procedural and substantive engagement with the digital, multimodal arguments.

However, this engagement in the tenth-grade case was more tempered by the students' frustration with operating the digital tools, when compared to the ninth-grade case. For example, in the ninth-grade case all students that were asked whether they would choose a digital, multimodal argument assignment or a conventional argument assignment said they preferred the digital, multimodal project. However, in the tenth-grade case, seven students were asked this same question with more varied results. Although three students responded that they preferred a digital, multimodal argument

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assignment to a more conventional argument essay, three students said that given the choice, they would choose the more conventional essay, and one student was ambivalent stating the website was more fun, but the conventional writing was a faster process for her. The three students preferring the conventional essay stated that the digital assignment was more complex due to working with both multimodality and technological glitches, and this complexity contributed to student frustration. However, two of these three students were engaged with the social issue of their multimodal argument or the creativity they could use in making these multimodal arguments despite their frustration with the digital tools. For instance, Alanzo liked the creativity of the PSA, and Darla was engaged in the social issue she argued for in her PSA. Those who preferred the digital, multimodal arguments explained several reasons for their preference: that the digital was faster for them to create, that they didn't enjoy conventional writing, and that they believed the digital, multimodal composing allowed them to more freely express themselves (interviews, January 15, 2015, March 5, 2015, March 11, 2015, March 19, 2015). Overall, the students' engagement in this case seemed to override their frustration with digital tools. The code *enjoying digital tools* was a highly occurring initial code in the data sources, occurring more often then the initial code *expressing frustration with digital tools*.

Several of the students seemed to exhibit substantive engagement in creating their PSA despite their frustration in using the digital tools to create a digital, multimodal argument because this project was framed as addressing a social issue. The students were allowed to pick their social issue from a list that Ms. Tucker provided, and most students

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seemed to pick a personally relevant issue. For instance, Darla, who was at times

frustrated by the technological difficulties in designing a multimodal argument,

persevered because she was personally invested in the issue of homosexual rights,

especially pertaining to marriage and adoption. She explained, "I think it was easier to

write about the social issue…because it's stuff we deal with everyday" (interview, March

5, 2015). She also explained the relevance of that issue to her personally and her surprise

to learn that it was less accepted by others (interview, March 5, 2015). Other students

who enjoyed doing the website and preferred the multimodal composing to conventional

writing also liked that the project allowed them to argue for a topic that was relevant and

interesting to them. For example, Kevin was a student who was particularly disruptive in

the classroom, but he seemed to focus more on this project and preferred digital,

multimodal composing to conventional writing. He picked the legalization of marijuana

because it was a topic that interested him (interview, March 11, 2015). Madison, another

student who showed initiative in the PSA assignment that was not displayed in her typical

classroom behavior, also explained that she enjoyed her social issue because of its

personal relevance: "I picked gun rights…but the reason I wanted it [the issue] was

because like that's pretty much all I hear my dad and uncle talking about" (interview,

March 5, 2015). Thus, pursuing a topic that was socially relevant to students seemed to

substantively engage both students who were favorable toward using digital, multimodal

tools as well as those who were not.

   Writing production versus creation and design. The tenth-grade students

seemed to struggle with what I discuss as *creation and design*, rather than writing

answers to questions asked or preparing documents to exact specifications, what I refer to in this section as *production*. This distinction was demonstrated by the initial code *struggling to create*, which was frequently coded in tenth-grade case, more so than in the ninth-grade case. The students and Ms. Tucker discussed this hurdle to create and design. After the initial infographic project, Ms. Tucker reflected:

> …They did not understand that after reading this article [texts on an argument topic] they're supposed to have an opinion. They felt like they had the question in their mind so they felt like somewhere in the article it would literally say, 'You should be for or against this.' I don't think they understand fully how to make an opinion after reading something because for the most part they're used to, like on the media and stuff, just being told what you should think about something. So it's hard for them to make their own opinion based on facts. (interview, December 17, 2014)

Although the students seemed to enjoy the freedom to design in their multimodal composing, this design did not come easily to them: "…You got to create it yourself, but I am just not good with putting stuff places and yeah just not good at that" (interview, January 15, 2015). This student illustrates the sense that the multimodal argument projects were opportunities to create and design, "you got to create it," but ones the students were unaccustomed to and struggled with, "I am just not good." Despite their struggle to create and design text, students did persevere in designing infographics and websites, with the websites demonstrating more students designing multimodally, including arguable claims, and supporting those claims with evidence than not, shown in

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Figure 4.11. Thus, the students struggle with creation and design seemed due to a lack of

practice rather than with inability. Ms. Tucker suggested that she was aware of this

inexperience when we first began the intervention, "…they don't understand that English

is not really always a right answer…" (interview, October 20, 2014). Students verified

her sentiment, explaining that in school they typically used digital tools for production, or

providing answers based on information directly asked of them. For example, when

asked if they had opportunities to design in school, Darla responded, "No, usually not.

Other classes, they kind of dumb it down and make us do exactly what we should"

(interview, March 5, 2015). However, students seemed conflicted about their willingness

to try such design in the future. Students seemed proud of their creations, especially the

ability to create a website: "I thought it was pretty cool that you could make your own

website, pretty easy" (interview, March 11, 2015). However, other students thought the

options inherent in such multimodal composing were overwhelming: "There is [*sic*] so

many different things that people could do that [it] is just confusing to some people…."

(interview, March 5, 2015).
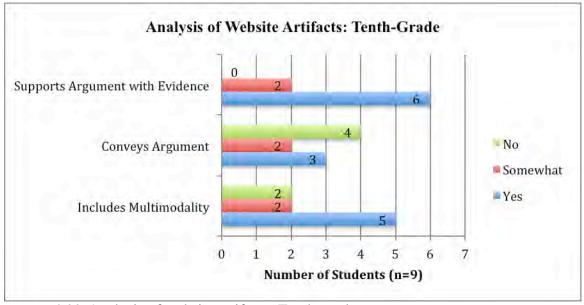
Figure 4.11. Analysis of website artifacts: Tenth-grade.

Progress Toward Goal

The teacher and the students both discussed an increased concept of argument after the intervention; although, this increased concept of argument did not necessarily transfer to their writing of conventional arguments. Specifically, as in the ninth-grade case, *expanding concept of argument* included evidence that students were attaining a greater understanding of what argument was, how to express multimodal arguments, and learning the elements of argument. For instance, interviews with the teacher and questionnaires filled out by the students revealed that the students did not have experience with writing arguments or awareness that arguments could be multimodal before the intervention. Ms. Tucker described their writing as mainly reliant upon written language, rather than multimodality, prior to the intervention: "A lot of their writing in class [is] on paper with a pencil. Not a whole lot of it is typing or copy and pasting or things like that" (interview, October 20, 2014). In fact, this discussion by Ms.

Tucker of her students' writing experience prior to the intervention suggests that not only had students not been given opportunities for multimodal composing, but they had limited experience with writing using digital tools, even tools as popular and pervasive as word processing. In addition, Figure 4.8 shows that the students thought arguments consisted of written language alone prior to the intervention as opposed to after the intervention when the majority of students described arguments as including more modes than written language alone. Figures 4.12 and 4.13 show that the students did include multimodality in the PSA websites they created.

Other than growing in their conception of the design of argument and the realization that arguments can be multimodal, students also grew in their knowledge of the elements of effective arguments. Ms. Tucker described the students' writing prior to the intervention focusing upon their own opinions. However, after the intervention, she said students "know the parts of an argument" and "understand…there is [*sic*] other ways to write about something just not opinion…you have to find reasons why" (interview, March 6, 2015). In addition to Ms. Tucker's observation of students' growth in understanding the elements of arguments, the students also described how their knowledge of these elements grew. Students discussed learning about using evidence to support claims, writing about multiple sides of an argument, and evaluating evidence (interviews, December 10, 2014, January 15, 2015, March 5, 2015, March 19, 2015). Allen's quote summarized this change: "I learned things…that there is like more steps to an argument than just one thing" (interview, December 10, 2014).

The students demonstrated their growth in knowledge of the elements of argument and multimodal arguments in their website artifacts. Figure 4.13 shows a screenshot from the bottom half of the homepage of a student's PSA website. Ms. Tucker described the student who authored this homepage as having high writing ability. Figure 4.12 shows a screen shot of the homepage of a PSA website designed by a student described as having low writing ability. These websites demonstrate that students of varying writing abilities were able to convey claims and provide evidence through a multimodal design. Although the students who authored these websites were of varying ability levels, both of their websites included multimodality, a clear claim, and evidence from sources to support this claim. For example, in Figure 4.12, this student of low writing ability (identified by his teacher), states his claim at the top of the website, "I believe marijuana should be legal in the state of South Carolina." He also places the claim at the top of the page, perhaps to suggest its importance. Further, he uses both a picture and text to support his claim, thus using both visual and linguistic modes to support his argument. In addition, in Figure 4.13 a student identified by Ms. Tucker as having a high writing ability level, states a claim in her opening paragraph, that homosexual parents should not be denied their right to parent, and also suggests the counterclaim. She then provides evidence for this claim with a discussion of the counterclaims as well as facts about legislation in different states. In addition to using the linguistic mode, she uses the visual mode with a picture at the top of her homepage and uses website hyperlinks at the bottom of the page to direct her reader to further sources on the topic, suggesting her evaluation of how to use the space of her site to include

evidence for her claim, either providing evidence directly with the words on the page or referring her audience to other sources, providing evidence indirectly. For the tenth-grade case, most students had not created websites before, and no students described previously designing and creating arguments online throughout the writing process. Thus, these websites, represented by the figures below, show a shift in their ability to design digital, multimodal arguments.
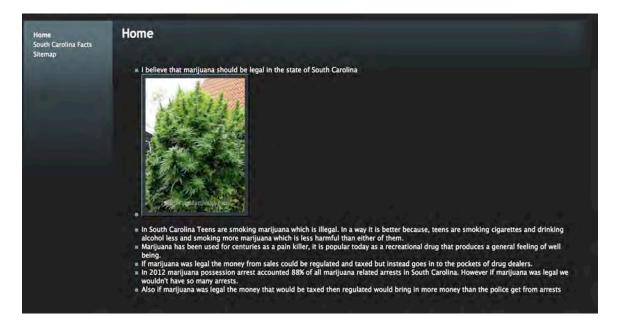
Figure 4.12. Page of website from student with low writing ability.

Figure 4.13. Page of website from student with high writing ability.

Although the students had a greater understanding that arguments could include

multimodality and a greater knowledge of what elements constitute an effective

argument, this increased concept of argument did not necessarily transfer to their writing

of conventional arguments. Teachers in both cases thought their students' understanding

of argument had grown. Specifically, they both discussed that students better understood

the elements of argument (interviews, March 6, 2015, March 18, 2015). However, they

were less certain that this understanding transferred to improvement in students' writing

of conventional arguments. Ms. Tucker stated, "But I don't think it was [as] effective as

I would have liked it to be on their writing [of conventional arguments]…" (interview,

March 6, 2015). Ms. Tucker's description of the intervention not transferring to their

conventional argument writing is supported by the differences in students' written

arguments in response to the pre- and post- conventional writing prompt (see Table 4.2).

Table 4.2

Quantitative Results for Tenth Grade

Case	Category	Initial Median Score[1]	Final Median Score	Z Score	Median of Difference Increase (+) or Decrease (-)[2]	p-value
10th	Focus	2.50	2.75	-.68	+.25	.50
	Organization	2.00	2.00	-.51	+.25	.61
	Evidence	2.00	1.33	-1.2	-.40	.24
(n=8)	Elaboration	1.67	1.25	-.53	-.20	.60
	Clarity	1.50	1.75	-.14	+.10	.89
	Overall	1.75	1.75	-.34	-.17	.73

Note. Values are from a 5-point scale where 0 represents no evidence of the respective trait, and 4 represents clear establishment of the respective trait of argument.

[1] Medians are reported, because analyses used a Wilcoxon matched-pairs signed-rank text, a nonparametric approach due to a small sample size that cannot be assumed to have a normal distribution (Hinkle et al., 2003).

[2] The median of the difference may not be the same as the difference between medians (Peers, 1996).

These results show that the intervention produced no statistically significant change in

any category using the Wilcoxon signed-rank test. In both cases the median of

differences shows an increase in focus, organization, and clarity, although not significant. The tenth-grade case showed a decrease in evidence, elaboration of evidence, and overall score.

Partial Success

Ms. Tucker's adoption of this intervention was a partial success in that she was able to teach the intervention elements independently throughout the intervention, and grew in her experience teaching argument as a result of the intervention (interviews, December 17, 2014, March 6, 2015). However, after the intervention, she was unsure of her ability to teach this intervention in the future with less advanced students.

Ms. Tucker's teaching prior to the intervention mainly consisted of teaching creative and narrative writing, exemplified in the initial codes, *teaching narrative writing* and *teaching creative writing*. She explained a change in focus to argumentative writing, "Yeah, I mean I definitely think teachers should teach argument in their writing [instruction]" (interview, March 6, 2015). However, she indicated that other than this intervention, she had received little to no professional experiences in teaching argumentative writing (interview, March 6, 2015). In addition, she seemed to have little training on how to instruct students with the digital tools available at the school (observation, February 12, 2015). Although Ms. Tucker initially described herself as comfortable with using digital tools (interview, October 20, 2014), she often became overwhelmed when teaching with digital tools, at times forgetting to include elements of argumentative writing instruction because of the integration of digital tools with this instruction (observation, February 4, 2015).

Even though Ms. Tucker explained that she had learned about teaching argument in the intervention and felt confident to teach the intervention again on her own, she questioned whether she would teach it with her students at a lower writing ability:

"…I don't know—they need more explicit, like me literally providing them the information and then just writing from the information…. It's almost like that's about as good as it gets with some of those students just because the writing and the reading is what they struggle with" (interview, March 6, 2015).

However, Ms. Tucker acknowledged that the intervention was effective for challenging students to create and design an argument rather than writing that resembled production, or writing merely to respond to teachers' prompts or questions:

I think it was effective to show them you know you don't just like look up topics just to talk about. I mean you need to really try to figure it out; you need to question yourself of why you are arguing for / against something more than just like stating your opinion. (interview, May 13, 2015)

However, Ms. Tucker seemed to contradict herself regarding how she valued assignments that would challenge students. For example, in the previous quote, Ms. Tucker expressed that she thought the intervention was beneficial to students in that it challenged them to question themselves and contemplate evidence in their arguments. Yet, she also questioned whether she would teach this intervention again because it was challenging, especially for students who had a lower writing ability level. In addition, she questioned teaching the intervention again because the digital, multimodal composing did not clearly contribute to enhancing students' ability to write a conventional written argument

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(interview, March 6, 2015). Ms. Tucker thought that the students had learned about the elements of argument without necessarily improving their conventional writing of arguments (interview, March 6, 2015). Regarding the digital, multimodal composing, Ms. Tucker only mentioned that she liked the "concept" of the Google Sites and Glogster EDU, but believed these might be better reserved for honors or higher academic level students (interview, March 6, 2015). Instead, Ms. Tucker seemed to appreciate the elements of argument she had learned to teach rather than the digital, multimodal composing. She described that instructing students with digital tools became easier once modifications for more scaffolding were made, but she still described that "the digital tools was [*sic*] difficult to teach" (interview, March 6, 2015). In addition, Ms. Tucker thought teaching the technical aspects of the intervention, such as teaching students to use Google Sites, in combination with teaching the elements of argument, was challenging: "Contents of an argument, the contents themselves weren't that hard to teach, but I still think how they all play together was something that didn't really go well" (interview, March 6, 2015). Despite gains in learning about teaching argument and teaching with digital tools, Ms. Tucker stated that she would be reluctant to teach the intervention with students other than honors or more advanced students, and she seemed to focus on the value of teaching conventional argument rather than pursuing digital, multimodal arguments.

Summary

In this chapter, I discussed the modifications made during the intervention for each case, which dealt with scaffolding and collaboration. Each case demonstrated

retrospectively that students' ability to use digital tools in school as well as the teachers' definition of writing precluding to some extent multimodal composing were inhibiting factors to the success of the intervention. In contrast, the students' belief that their creation of multimodal arguments using digital tools helped scaffold their learning of argument was an enhancing factor of the intervention. Unanticipated outcomes of the intervention for each case included the students' engagement with the intervention as well as their struggle to create and design texts.

Progress toward the goal of improving students' conventional and digital, multimodal arguments was seen in each case because the students' and both teachers' responses as well as the student artifacts suggested that the students had expanded their concept of argument, both in understanding that arguments could be multimodal as well as learning the elements of argument. The teacher, in each case, showed partial success in her adoption of the intervention. Although both teachers discussed learning about teaching argument and teaching with digital tools from the intervention, the ninth-grade teacher resisted opportunities to implement the intervention independently, and the tenth-grade teacher seemed only willing to adopt this intervention in the future with more advanced students. In Chapter 5 I discuss the cross-case analysis of the focused codes described in this chapter, which led to theoretical assertions meant to develop instructional implications of this intervention (Gravemeijer & Cobb, 2006).

CHAPTER FIVE

DISCUSSION

This chapter reports seven theoretical assertions developed from a retrospective, cross-case analysis of the data (Gravemeijer & Cobb, 2006; Stake, 2006). Gravemeijer and Cobb (2006) explained that the purpose of a retrospective analysis is to develop local instructional theory, which discusses "both the process of learning and the means designed to support that learning" (p. 18). The design of this formative experiment was based upon the perspectives of multiliteracies and social semiotics. However, this study sought to implement those perspectives in specific classroom contexts and develop assertions that will further the localized, pedagogical understanding and application of the present study's intervention (Gravemeijer & Cobb, 2006; Reigeluth & Frick, 1999).

In this formative experiment, an intervention was implemented in which students constructed arguments including claims, evidence, and elaboration of evidence; used digital tools suitable for producing digital, multimodal arguments; and utilized a process approach to writing. The goal of this intervention was to improve the quality of digital, multimodal arguments as well as conventional arguments. This intervention was enacted in a ninth- and a tenth-grade English class. Overall, there was qualitative evidence that this intervention improved the students' digital, multimodal arguments and expanded their knowledge and concept of argument. The students believed their knowledge of multimodal arguments would transfer to their more conventional writing of argument. However, the quantitative results provide no evidence that there was such transfer.

Theoretical Assertions

This section presents seven theoretical assertions that were developed retrospectively using a cross-case analysis (Gravemeijer & Cobb, 2006; Stake, 2006). This cross-case analysis not only considers the ninth- and tenth-grade case of this study, but also includes findings from a previous, smaller-scale study that the present study replicated. This cross-case analysis and the respective application of these assertions to each case as well as the previous, smaller-scale study can be found in Appendix N. These findings, discussed across three contexts, aid case-to-case transfer (Firestone, 1993), which contributes to generalizability while not ignoring the context of each case. With each assertion, I discuss the *effectiveness, efficiency,* or *appeal* of the intervention studied in this formative experiment (Reigeluth & Frick, 1999). A summary of the theoretical assertions and the data that led to these assertions are found in Figure 5.1.

1. Appropriate scaffolding is needed for multimodal composing, which is complex and multifaceted.	• Focused Code: Providing Scaffolding Versus Allowing Freedom • Focused Code: Writing and Production Versus Creation and Design
2. Teachers may help students' transfer of skills and engagement by discussing how technologies and multimodality translate across different contexts.	• Focused Code: Ability to Use Digital Tools • Focused Code: Defining Writing and Writing Ability
3. Teachers may struggle with teaching the multifaceted nature of multimodal composing regardless of their experience levels, which may inhibit its adoption, especially with students who are in less advanced classes.	• Focused Code: Integrating Digital Tools into Teaching • Focused Code: Writing and Production Versus Creation and Design • Focused Code: Defining Writing and Writing Ability
4. Teachers may not recognize the value of multiliteracies, particularly in contexts where production of writing is emphasized over creation and design of texts.	• Focused Code: Writing and Production Versus Creation and Design • Focused Code: Defining Writing and Writing Ability • Focused Code: Ability to Use Digital Tools • Focused Code: Integrating Digital Tools into Teaching • Student Artifacts
5. Opportunities for collaboration when creating arguments may be needed for students, though resisted by teachers.	• Focused Code: Providing Scaffolding Versus Allowing Freedom • Focused Code: Collaborating
6. Focus on socially relevant projects that encourage student creation and authentic use of digital, multimodal tools may improve student engagement with argument.	• Focused Code: Writing and Production Versus Creation and Design • Focused Code: Engaging Learners
7. Digital, multimodal composing may provide a scaffold for students to learn argument.	• Focused Code: Expanding Concept of Argument • Focused Code: Using Multimodal, Digital Tools as a Scaffold for Learning Argument • Student Artifacts

Figure 5.1. Theoretical assertions and data leading to those assertions.

Scaffolding

    Assertion: Appropriate scaffolding is needed for multimodal composing, which is complex and multifaceted. According to the New London Group (1996), multimodal composing is an intricate system in which multiple modes form "quite remarkably dynamic relationships" (p. 80). Because of the typical complexity of multimodal composing, both teachers in these cases found it necessary to scaffold technological and writing tasks for their students. As discussed in Chapter 4, this scaffolding was defined using Schunk's (2012) definition of instructional scaffolding as "the process of controlling task elements that are beyond the learners' capabilities so that they can focus on and master those features of the task that they can grasp quickly" (p. 245). This unanticipated modification was necessary to promote the *effectiveness* of the intervention. This scaffolding required teachers to provide students extra time to complete tasks that were designed in the PSA website project to be smaller and more focused, and also include more explicit directions. Students often needed to pursue one task at a time, though they would eventually combine these tasks in their culminating design. For instance, both teachers allowed the students at first to compose their arguments as they were designing them with digital tools during the infographic project. However, the data indicated that students experienced difficulty in creating text for their arguments, combining modes conveying those arguments, and learning the technological functions of the digital, multimodal tools in both cases. Thus, with the PSA website project, tasks were designed to be more manageable for students. For example, the students composed text and planned their design in the classroom before going into the computer lab and

instantiating those designs with the digital tools. In addition, technological functions, such as uploading images and files, needed to be explicitly taught before students could integrate the more complex elements of their website designs into a final product.

Teachers may inappropriately assume that students have acquired such digital literacies because of false dichotomies created when the current generation of students is assumed to be digital natives (cf., Alvermann, 2011; Bennett et al., 2008; Prensky, 2001). However, students in the rural context of this ninth- and tenth-grade case were, prior to the intervention, accustomed to tasks using digital tools for more prescriptive assignments, such as finding specific information online or typing information they had already written, where they were not expected to synthesize information to create their own texts. Thus, they were unfamiliar with using digital tools for the multimodal composing of the present study, especially for academic tasks such as designing multimodal arguments. Scaffolding—through drafting in class before designing online in the computer lab, explaining instructions explicitly for digital tools and including handouts, and modeling examples of texts created with these digital tools before having students create their own digital, multimodal texts—helped to ease students' frustration with the digital tools and their tendency to become overwhelmed by the multifaceted and complex skills necessary to design multimodal arguments. However, this scaffolding also required balancing explicit instructions and more structured tasks with encouraging students' creativity. For instance, in the ninth-grade case, the students at times wanted so much explicit direction and templates to guide their thinking that it threatened the creativity and ownership of their multimodal design. For example, in the ninth-grade

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case when the students' first drafted their PSA websites, we gave the students models of student-created PSAs and asked them to plan their own PSA before going to the computer lab. However, once in the computer lab attempting to draft their PSA websites, the students became overwhelmed by combining their written ideas with creating the digital components of a website (observations, February 13, 2015, February 19, 2015). Thus, Ms. Barrister asked that I give her students more specific directions and a template to follow to create their PSA. However, by providing this template, the students' websites seemed to conform to this template rather than follow their own design.

Although the New London Group (1996) addressed a need to provide appropriate scaffolds in a pedagogy of multiliteracies, they did not address this tension between the desire to promote creativity and design while providing appropriate scaffolds for students to follow. This study adds nuance to this perspective by suggesting that with younger high-school students, such as the ninth-grade students, teachers may need to lean toward providing scaffolding, even if it means sacrificing some creativity, to prevent students from becoming cognitively overwhelmed. This study also helps teachers to realize that such scaffolding may entail elements of prewriting before students attempt digital, multimodal composing. For example, this prewriting included having students draw on paper the different elements to include in the webpages of their website. This prewriting may, however, need to be integrated into the multimodal composing process rather than becoming an isolated component, which was a finding in the previous, smaller-scale study. For example, in that study rather than integrate the elements of conventional writing with the digital, multimodal assignment, the teacher required students to write a

conventional essay and a digital, multimodal website. This isolation of these components was an inhibiting factor that led to the recommendation in that study for a future modification of blending the conventional and digital process approach to writing.

The tenth-grade students did not need as much scaffolding of their multimodal design as the ninth-grade students, but the tenth-grade teacher became at times overwhelmed with teaching both the elements of writing and the digital tools necessary to provide such scaffolding, forgetting to include necessary steps, such as modeling writing for the students. Teachers may need to attend to tasks aimed at scaffolding, such as providing models of writing and including steps of the writing process in creating multimodal arguments, thus addressing students' frustration with becoming overwhelmed by the scope of these assignments. Care may also be needed to provide multiple lessons necessary to explicitly instruct students on their available resources, to show how these resources might be employed using representative models, to explain how they might apply these models to their own multimodal composing, and likewise to explain how multimodal composing will eventually be assessed. This multilayered scaffolding is a dynamic process that may require integration of multiliteracies and conventional literacies, an integration with which teachers may be unaccustomed (Hutchison & Reinking, 2011). For instance, in the ninth- and tenth-grade cases, each teacher's instruction prior to the intervention was more teacher-centered, required less student creation, and had fewer inter-related components. Scaffolding seemed to be less relevant to the somewhat more advanced high-school students in a previous, smaller-scale iteration of this study. For example, modifications to provide more scaffolding were

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needed in the ninth- and tenth-grade case of this study, but did not as directly apply to the

previous, smaller-scale study with eleventh-grade students. Instead, in the previous,

smaller-scale study, more attention was needed to integrating strategies of the

conventional process writing approach with multimodal composing.

Transfer

Assertion: Teachers may help students' transfer of skills and engagement by

discussing how technologies and multimodality translate across different contexts. One

of the tenets to the multiliteracies perspective is that teachers and students need to discuss

how meaning is created across modes and media, especially as society becomes

increasingly dependent upon and interconnected through the use of digital tools (New

London Group, 1996). This belief is also conveyed by social semiotics with its emphasis

on understanding semiotic resources and the various meanings they convey. However, in

the tenth- and ninth-grade cases of this study, students seemed proficient with technology

for social purposes, such as texting and using social media, yet these skills were not

effectively transferred to the academic tasks that utilized these same skills. This

disconnect was seen in the ninth- and tenth-grade cases through the focused code *ability*

to use digital tools in school. For example, in the tenth-grade case, Alanzo expressed his

frustration with his inability to operate the digital tools of school to create his website

(interview, March 11, 2015). Yet, he was a student who outside of school owned

multiple devices and used these devices for both social media and gaming (interview,

March 11, 2015). The social media accounts he used, Facebook and Instagram, require

users to frequently post multimodal messages by uploading images and supporting those

images with written language. However, Alanzo did not transfer multimodal practices to his academic use of digital tools requiring multimodal design. Similarly, in the ninth-grade case, students were also accustomed to using social media, such as Facebook, Instagram, and Snapchat, all platforms designed to allow users to incorporate multimodality, on a daily basis (interviews, March 12, 2015, March 16, 2015). However, the ninth- and tenth-grade students were unaccustomed to their use of digital tools in school requiring the same multimodality as they typically used these tools in school to access information or type previously written information (interviews, January, 13, 2015, March 16, 2015, March 19, 2015). This lack of multimodal composing in school may have been due to the finding in the ninth- and tenth-grade cases that the teachers did not seem to recognize the students' multimodal composing as having academic value as illustrated in both cases through the focused code *defining writing and writing ability*.

Alvermann (2011) suggested, "that classroom teachers may be missing out on opportunities to observe firsthand what their students are capable of accomplishing informally in a digital environment" (p. 112). Such was the finding in the ninth-grade and tenth-grade case in that the teachers did not recognize the students' social practice with digital tools and, therefore, did not apply those skills to more academic projects. If teachers' had recognized the multimodality and technical proficiencies students were using with their digital devices outside of school, skills students struggled with in their multimodal arguments, teachers may have been able to connect such skills with those needed in students' multimodal arguments. In these cases, the teachers did not utilize the digital skills their students displayed socially, as students' personal use of digital devices

at times disrupted class rather than furthering class instruction. In addition, the students did not seem to connect the skills they used in their social use of these devices with the academic tasks that also asked them to use digital tools for multimodal composing.

If the teachers had been able to recognize and discuss the practices students were using outside of school, such as creating multimodal texts as well as using technical skills such as uploading files, they may have been able to discuss these skills with students and help students apply them when needed in this study to academic tasks such as multimodal arguments. However, such discussion was not done in this study and thus may be a needed future modification. Future research may focus on how teachers can both identify digital skills students may have outside of school and discuss how such skills transfer to academic use of digital tools. Further, research may also be needed on the finding in both cases in this study that students were unaccustomed to using digital tools for creating and designing multimodal texts in school and were, instead, accustomed to using such tools for accessing information and typing information. Although there is other research that confirms this same use of digital tools in school (Hutchison & Reinking, 2011; Peterson & McClay, 2012), more research may be needed as to *why* teachers are not using these digital tools to have students implement multimodality in classrooms, despite calls to do so, such as NCTE (2005) and IRA (2009).

In both cases students were avid users of mobile devices, which were thought of as something to put away once in the classroom. Or, particularly in the ninth-grade case, these devices were used for inauthentic tasks. For example, Ms. Barrister allowed the students to use their mobile devices, but only to illustrate quotations found in

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conventional texts. This type of task is inauthentic in that it does not practice the technical skills needed with technology, such as uploading files, and it does not give students practice designing online, which requires them to think not only about the content of their text, but how to implement this content using technology. These types of inauthentic tasks are examples of a failure to fully integrate technology (Herrington & Kervin, 2007) and seemed to compound students' inability to recognize that their technological proficiencies and the semiotic resources available with technology used in social endeavors could also apply to more academic pursuits, such as argumentative writing.

The teachers seemed to not consider students' use of technology outside of school as a potential strength to use in school because of their focus on students' limited technological access, specifically Internet access outside of school, and confined their academic assignments to technologies available at the school (interviews, October 14, 2014, October 20, 2014, December 16, 2014). However, this belief was not consistent with the proficient use of mobile devices that students exemplified to their teachers on a daily basis. Instead, the teachers may have benefitted by more accurately surveying their students' technological skills and access and using that knowledge to explicitly discuss with students how these skills might translate to more academic tasks.

A similar conclusion might be reached in considering how digital, multimodal skills might transfer to more conventional writing. For instance, in both cases in this study, the students believed that their digital, multimodal composing would benefit their more conventional writing. However, their quantitative scores of conventional argument

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writing did not show significant improvement (described in Chapter 4). Students may have needed more explicit instruction on how their digital, multimodal assignments, such as the infographic and PSA website, were developing skills that they could apply to their writing of conventional arguments.

This assertion applied in the ninth- and tenth-grade case of this study, and also, to some extent, the previous, smaller-scale study. Whereas in the cases of the present study, the students did not transfer their personal use of technology to their academic use, and teachers did not seem to recognize digital, multimodal skills as relevant to conventional writing (seen in the focused code *defining writing and writing ability*), the smaller-scale study revealed a need to explicitly link the construction of multimodal arguments to conventional writing of arguments. Both the cases of the present study and the previous, smaller-scale study suggest the "metalanguage" the New London Group called for in 1996 is still needed to connect conventional and multiliteracies as well as social and academic technological practices (p. 77). The New London Group (1996) defined metalanguage as "a language for talking about language, images, texts, and meaning-making interactions" (p. 77).

More research may be needed on how such language can be developed and incorporated into pedagogical interventions such as the one investigated here, especially considering the contingency of its development with teachers' value and recognition of multiliteracies. The New London Group emphasized that this language should help students use tools for their own purposes rather than placing strictures of use on certain modes of communication. Teachers may need training to recognize the multimodal and

technological practices students are using in their social communication so that they can help students apply these skills to more academic tasks. The effective use of this metalanguage to connect the social and academic as well as conventional literacies and multiliteracies would potentially enhance the *efficiency* of this intervention.

Struggle Despite Experience Level

Assertion: Teachers may struggle with teaching the multifaceted nature of multimodal composing regardless of their experience levels, which may inhibit its adoption, especially with students who are in less advanced classes. Both teachers in the ninth- and tenth-grade case had taught argument before mainly as a form of debate rather than as a form of multimodal composing. Both teachers also focused much of their instruction on literature units, and writing was often limited to what can be described as producing responses rather than creating and designing (Applebee & Langer, 2013). For example, students wrote responses to reading comprehension questions or completed vocabulary exercises, but students had little experience creating and designing texts, especially extended or multimodal compositions (interview, October 20, 2014). Teachers in both cases described their students' writing prior to this intervention as limited to writing conventional texts. The focused code *writing and production versus creation and design* illustrates this description.

Thus, when these teachers tried to implement multimodal argument projects, they became overwhelmed with the multifaceted aspects of engaging their students in designing multimodal texts. Ms. Barrister was hesitant to implement the technological components of the multimodal project without the researcher's support. When she did

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adopt elements of the intervention, it was limited to the components of conventional writing, such as guiding students through drafting the conventional text for their multimodal arguments. Ms. Tucker, on the other hand, who was confident teaching the intervention independently, was at times overwhelmed by providing the scaffolding her students needed to effectively create multimodal arguments, at times forgetting to include agreed-upon components of the writing process in her instruction. Although she saw value in the intervention, she expressed ambivalence about using it in the future with students who were in less advanced classes. The teacher in the previous smaller-scale study taught the intervention in an average-ability class, and she too was often concerned with the multiple components of a multimodal argument project. She expressed a concern that she was neglecting conventional writing when pursuing projects that entailed multiliteracies. Thus, this study and the smaller-scale study revealed that two experienced teachers and one-novice teacher, Ms. Tucker in the tenth-grade class, struggled to implement a digital, multimodal intervention. This finding is consistent with Russell, O'Dwyer, Bebell, and Tao's (2007) finding that "…past experience with technology may not influence use for teaching as much as is popularly believed" (p. 414). This finding may have implications for the professional development of teachers, as discussed in the subsequent assertion.

A partial explanation may be that English teachers believe that their primary focus should be on conventional literacies, with attention to multiliteracies being only secondary, for example, only being viable if time, students' capabilities, and the curriculum permit what may be considered to be a distraction from the primary focus.

Teachers may benefit from more research, such as this study, that focuses on what abilities projects based in the multiliteracies perspective promote, if any, and whether these transfer to more conventional literacies. For example, this study suggested that creating multimodal arguments expanded students' concept of and engagement with argument (described in subsequent assertions). If findings from future research also corroborated such positive academic gains from multimodal composing, that research may encourage teachers to include multimodality more in their classrooms. Such findings may be necessary to prompt teachers to integrate multimodality into their classrooms, which often requires teachers to learn new practices, as in these cases, and address concerns that by including multimodality, they will neglect conventional literacies, which have been the traditional focus of school curriculum and standards (Alvermann, 2011). Teachers in the smaller-scale study and in both cases of this study expressed concerns that by including the multimodal argument projects they were not attending to conventional writing. For example, the ninth-grade teacher, even after her students had created multimodal infographics, believed her students had not practiced "writing" (interview, December 16, 2014).

Even if the development of multiliteracies does not always produce clear gains for conventional writing, as the absence of significant quantitative change in students' conventional argument responses (discussed in Chapter 4) suggests in this study, teachers would benefit from a clear understanding of what academic advantages students do gain by pursuing such projects-research that is currently lacking at least in multimodal composing research (Jocius, 2013). For example, Ms. Barrister, despite her

disassociation between multimodal composing and conventional writing, demonstrated by the focused code *defining writing and writing ability*, still said she would enact components of this intervention in the future. When asked whether or not she would enact the PSA website project again with her classes in the future, she responded that she would because "they [students] read more and researched more than I normally would have [with them] in my class during a lesson" (interview, March 18, 2015). This response shows that Ms. Barrister valued some academic gains students made through the intervention despite her disconnect between multimodal composing and conventional writing.

The present study suggests that for this intervention to be *effective*, teachers must be willing to teach often complex and multifaceted digital, multimodal projects. However, even if teachers have this will, they may still need training and a belief in the value of multiliteracies. This study demonstrated that teachers might need additional training for interventions that include digital, multimodal composing to be effective. Such training may need to help teachers recognize the academic value of interventions based in multiliteracies and understand how to teach such interventions to students of various ability levels. In addition, teachers may need understanding of the significance of multiliteracies for their students to prevent multiliteracies from becoming supplemental rather than integral to their curriculum. Furthermore, teachers in each of the cases of this study were not practiced in teaching their students to write extended pieces of writing. Both teachers described their teaching routine prior to the intervention as focusing on reading with writing being auxiliary (interviews, October 20, 2014; October 30, 2014).

This inexperience with teaching extended writing may have been a contributing factor to their becoming overwhelmed by projects that entailed extended multimodal composing. Future research may need to explore factors that help teachers successfully integrate multimodality into their classrooms and how to support such factors with teacher training and professional development.

Valuing Multiliteracies

Assertion: Teachers may not recognize the value of multiliteracies, particularly in contexts where production of writing is emphasized over creation and design of texts. The New London Group (1996) made a distinction between "mere literacy," a set system focused on language alone that is practiced by following a governing set of rules (p. 64), and multiliteracies (see Table 2.1). Their concept of multiliteracies deviated from such a system by embracing multiple modes whose design depended on social practice and thus did not conform to a standardized system. Social semiotics also hinges on semiotic resources and their social use (Jewitt & Kress, 2010). In this intervention, which sought to enact such a belief system in a pedagogical context, the teachers did not always recognize the value of such practice. This assertion was seen in the ninth- and tenth-grade cases in the focused codes *writing and production versus creation and design, defining writing and writing ability*, and *ability to use digital tools in school*. Both teachers, for instance, made comments about their students' weaknesses with writing and not knowing how to construct developed arguments even after the students had seemingly shown this evidence with their infographic projects. The teachers' perspectives seemed to reflect a question that has been argued in literature: Does digital, multimodal

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composing entail the same level of thinking that is involved in conventional writing? Skaar (2009) argued that conventional writing entailed higher levels of thinking than did multimodal composing; Adami (2011) rebutted Skaar that cognitive skills were developed in multimodal, digital creations, but they may be different from those used in conventional writing. Alvermann (2011) suggested "reifying monolithic categories" (p. 114) is needless and potentially detrimental to students. In other words, Alvermann discussed the need to focus less on dichotomies between conventional and online spaces of learning and more on understanding each particular space, or, applying this concept to this study, multimodal and conventional writing.

The teachers in the ninth- and tenth-grade case seemed to unwittingly be engaged in the same debate internally. On one hand, they wanted to participate in an intervention based in multiliteracies. On the other hand, their statements during the intervention expressed a concern that such an intervention precluded conventional literacies. In fact, the tenth-grade teacher expressed that even though she thought her students had learned about argument from the intervention and enjoyed making websites, she was resistant to repeat the intervention with students in less advanced classes because she did not see a direct impact on their conventional writing (interview, March 6, 2015). Likewise, Ms. Barrister seemed to demonstrate her belief that conventional writing was more important than digital, multimodal composing as she only adopted elements of the intervention that pertained to conventional writing in her other classes, despite affirming she grew in her knowledge of integrating digital tools in her teaching as a result of the intervention (interview, March 18, 2015; observation, November 24, 2014). The teachers' higher

valuation of conventional literacy compared to multiliteracies may have inhibited the *efficiency* of the intervention. Because teachers may not have recognized or valued the multiliteracy skills students demonstrated, they could not build upon those skills successfully. For example, the students demonstrated creativity, multimodal design, and knowledge of the elements of argument in their infographic as well as their PSA website, yet Ms. Barrister questioned whether she had seen them write, and Ms. Tucker still focused on her students' struggle with writing and thought multimodal composing was something limited to higher academic-level students. However, it would have been more *efficient* if teachers' recognized the skills demonstrated in designing multimodal arguments, for instance with the first stage of the infographic, and used these skills to further strengthen both conventional and multiliteracies with the second stage of the PSA website and with the students' responses to the conventional argument prompt.

Without a clear sense of the value of including multiliteracies in classroom teaching, teachers may succumb to external pressures, such as focusing on educational standards that help students to perform well on standardized testing, and preclude multiliteracies from their classroom curriculum, as was a finding in the smaller-scale study and has also been identified as a concern in the existing literature (Siegel, 2012). The focused code *integrating digital tools into teaching* in the present study suggested that, although each teacher had grown in their professional knowledge about argument and digital tools, they were still hesitant to integrate such learning into their future teaching. Ms. Tucker bemoaned the complexity of integrating content knowledge, about argument writing, with more technical knowledge, teaching students to use the digital,

multimodal tools. Ms. Barrister claimed to learn about digital tools through the intervention, but only showed evidence of adopting the conventional writing components of the intervention, suggesting her growth of technological knowledge did not lead to an equal increase in her self-efficacy with teaching using digital, multimodal tools. Although the teacher in the smaller-scale study did value multiliteracies, she also had a concern that integrating an intervention based in multiliteracies caused her to neglect instructional goals related to conventional writing. Thus, these three teachers expressed an interest in integrating multiliteracies into their curriculum by participating in the study, yet, in each case in this study and in the smaller-scale study, the teachers became uncomfortable with such a commitment when it seemed to deflect from their perceived need to focus on conventional literacy. In each case in this study, this discomfort occurred despite both teachers practicing little extended writing instruction prior to the intervention (interviews, October 20, 2014, October 30, 2014). Future research may focus on whether other teachers experience such conflict when integrating multiliteracies-based interventions and if this conflict does exist, how it can be resolved.

To improve the *effectiveness* of this intervention, these teachers seemed to need more professional development, particularly in the area of integrating digital tools with teaching content knowledge. The ninth- and tenth-grade case teachers' in-services at their school were limited to learning digital tools, such as Google Documents, and Ms. Tucker had these difficulties despite recently graduating from a teacher education program. Thus, due to the difficulty of integrating digital, multimodal tools into content curriculum, discussed in a previous assertion, and the importance of recognizing the

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value of such integration, discussed in this one, the data in this investigation support Russell et al.'s (2007) suggestion "that both pre-service teacher education programs and programs that schools establish for new teachers should increase their efforts to introduce new teachers to instructional uses of technology" (p. 414). However, it may also be beneficial to support experienced teachers' efforts to integrate digital tools into their specific content area objectives, such as teaching argument writing in this study. Despite this assertion that both teachers in this study may not value multiliteracies, both the teachers in the ninth- and tenth-grade case exhibited some learning regarding digital tools and teaching argument during this study, which attempted to integrate digital tools into their curriculum (interviews, December 17, 2014, March 6, 2015, March 18, 2015). This growth may suggest that formative experiments, which are collaborative learning experiences, may be helpful in aiding teachers with integrating digital tools into their curriculum. This finding supports the suggestion by Reinking and Bradley (2008) "that a natural and important by-product of conducting formative and design experiments is professional development" (p. 80).

Collaboration

Assertion: Opportunities for collaboration when creating arguments may be needed for students, though resisted by teachers. The perspective of multiliteracies is based on a belief in the situated practice of literacy:

> Our view of mind, society, and learning is based on the assumption that the
> human mind is embodied, situated, and social. That is, human knowledge is
> initially developed not as 'general and abstract,' but as embedded in social,

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cultural, and material contexts. (New London Group, 1996, p. 82)

Thus, this assertion that teachers should encourage students to collaborate while creating arguments fits within the multiliteracies perspective, as the New London Group (1996) believed knowledge was developed during "collaborative interactions with others" (p. 82). However, the results of this study suggest a tension between the students' and the teachers' valuation of this collaboration. Students seemed to gravitate toward constructing their arguments during collaboration with others even when they were not instructed to do so. Difficulties the teachers associated with classroom management, student accountability, and assessment of student work inhibited this student collaboration. This study found in the ninth- and tenth-grade case that opportunities for collaboration when creating argument were valued more by students than by teachers. Furthermore, restricting such collaboration led students to appreciate this collaboration less, potentially because it became less authentic once teachers placed strictures on its use. This assertion emerged from the focused codes *providing scaffolding versus allowing freedom* and *collaborating*.

Ms. Barrister perceived that in the first stage of the intervention, in which the students created infographics, that some students were not accountable for individual participation toward the final infographic turned in by each group; thus, in the second stage, with the PSA website, students worked in groups to discuss and attain information on a group topic, but each student made his or her own website. However, in the second stage, Ms. Barrister seemed to forego collaborative group work to maintain disciplinary control, separating group members to manage their behavior in the computer lab

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(observation, February 5, 2015, February 13, 2015). In discussing modifications made to the intervention for collaboration, Ms. Barrister described student behavior as still "getting in their way" (interview, March 18, 2015). Thus, Ms. Barrister seemed to think that the modification made to improve student accountability for individual work during group collaborations led to some improvement, but she was still concerned with managing student behavior. The students, on the other hand, did not see collaboration in their groups as an unequal work load, suggesting Ms. Barrister's concern with individual contributions to group collaborations was not as troubling to students as it was to their teacher. Students also did not emphasize disruptions interfering with these group collaborations, another concern of Ms. Barrister's demonstrated by her need to separate students. Instead, the students viewed this opportunity to collaborate with one another in a manner consistent with the New London Group's (1996) perspective that knowledgeable peers and teachers contributed to their learning. Students in the ninth-grade case stated that they would rather work in groups than individually. They discussed the benefits of relying on their more knowledgeable peers as sources of helpful information and technological assistance as they worked on their multimodal arguments (interviews, March 12, 2015).

Similarly, in the tenth-grade case, Ms. Tucker seemed to value personally holding students accountable for their work more than allowing them to create their multimodal arguments collaboratively. For instance, in her final interview, she said she would have taken the modification to have each student publish his or her website even further, potentially not allowing them to work in groups in the future (interview, March 6, 2015).

The tenth-grade students, however, seemed to experience detrimental consequences as a result of limiting their collaboration. For example, in the infographic project where students created their final project as a group and collaborated on the topic, the majority of students preferred collaborative rather than individual work. However, after the more limited collaboration with the PSA website, these students said that they preferred working individually. Thus, the more limited collaborative work seemed to be less appealing to the students. Ms. Tucker supported this interpretation when asked about the modification of group collaboration, stating changing the group collaborations to be more limited in the second stage, with the PSA website, helped individual student accountability for work, but may have confused students about whether or not they were truly working collaboratively (interview, March 6, 2015).

The New London Group (1996) discussed that design is a "co-engagement" not consisting of "independent processes" (p. 76). This study seemed to affirm that perspective. Students valued the co-creation of their digital, multimodal writing, and limiting this collaboration, even if to improve student accountability or classroom management, seemed to diminish the students' engagement in such collaboration. When facing the unfamiliar and multifaceted tasks of creating multimodal arguments, seen in the focused code *providing scaffolding versus allowing freedom*, collaboration may have been particularly important to students as they discussed valuing their peers as resources for information and assistance. Thus, it seems imperative for this intervention to be *appealing*, especially to students, that constructing multimodal arguments is instantiated pedagogically as a collaborative practice consistent with the New London Group (1996)

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perspective. For the intervention to be appealing to teachers, on the other hand, they may

need more professional development on how to support these student collaborations

while also addressing concerns of classroom management and assessment. Assessment,

particularly in relation to multimodality and digital writing, is an area where more

research is needed (see Hicks, 2009; Matthewman et al., 2004).

Engagement

    *Assertion: Focus on socially relevant projects that encourage student creation
and authentic use of digital, multimodal tools may improve student engagement with
argument.* Alvermann (2011) discussed that there is a conception in schools that digital,

multimodal texts distract from teaching more conventional texts. This sentiment is

relevant to my second assertion in that teachers tended to ignore the students' social use

of digital devices, seemingly viewing them as a distraction. However, when digital tools,

allowing students to create multimodal texts, were used for academic purposes, the

results for argument were positive because they were engaging rather than distracting for

students. This study found that *focus on socially relevant projects that encourage student
creation and authentic use of digital, multimodal tools may improve student engagement
with argument.* Contributing factors to this engagement were the digital, multimodal

design of argument and the relevance of the social aspects, and thus authenticity, of

students' arguments. These factors made this intervention *appealing* to students and may

lead to what the New London Group (1996) described as *transformed practice*, or

students' ability to carry out "new practices embedded in their own goals and values" (p.

87). This *transformed practice* in this study was the students' design of multimodal

arguments. Specifically, in this study this design of multimodal arguments allowed

students to advocate for a social stance when creating their infographics and PSA

websites. This engagement was seen across both cases in this study and in the previous,

smaller-scale study.

The ninth- and tenth-grade students often struggled with creating their own

content in their digital, multimodal arguments. Although this may seem surprising of

students who research has described as daily users of digital tools (Rideout et al., 2010)

and content creators (Lenhart & Madden, 2005), it is not that surprising when one looks

at the conventional academic tasks and the demands in completing them that the students

in this study faced. Further, designing these multimodal arguments may have been

particularly transformative for the students in the present study as their school was

located in a district classified as *Rural, Distant*. In the Lenhart and Madden (2005) study,

rural areas typically had lower percentages of content creators in comparison to students

in suburban and urban areas. In the ninth-grade case, when I observed Ms. Barrister

directing students' use of digital tools, she had students fill in blanks in a paragraph or

assign emojis to conventional quotations—tasks that did not require students to

authentically create digital, multimodal texts. Similarly, in the tenth-grade case, the

students described using digital tools for typing, research, and publication rather than

creation (interviews, December 10, 2014, January 15, 2015, March 19, 2015). In both

cases, the students were not only unaccustomed to creating their own content, but they

were also described as being disruptive in their classroom behavior. However this

intervention seemed to alleviate that disruptive behavior as the focused code *engaging*

learners emerged from initial codes such as *focusing through digital tools* and *enjoying*

digital tools, codes with examples of students becoming more engaged and less

disruptive when they worked in the computer lab with digital tools. This intervention

seemed to not only engage students, despite their unfamiliarity and at times frustration

with the tasks, but it also allowed them to, at times, demonstrate focus and initiative that

was previously absent.

In the ninth-grade case, the students overall seemed to prefer digital, multimodal

arguments to conventional argumentative writing. They stated various reasons for this

preference. For example, they stated that creating multimodal arguments helped them to

visualize argument and allowed them to more freely and creatively express themselves.

They described not only enjoying the digital, multimodal tools, but they felt the social

issues they wrote about were personally relevant to them as well. Students in the tenth-

grade case showed particular initiative with the digital, multimodal arguments, becoming

engaged in the intervention when they were otherwise disengaged and disruptive in their

other classroom activities. However, the tenth-grade students' engagement was tempered

with more student frustration with mastering the digital tools, suggesting the importance

of scaffolding the use of digital tools especially when these tools are used to create texts

dependent on their content knowledge, such as argument.

Especially in the tenth-grade case where students were more frustrated with

learning about and using new digital tools, the influence of using socially relevant

projects was apparent. Those students who may have become disengaged by their

frustration remained engaged in the projects, it seems because of these students'

association with their chosen social issue. In the previous smaller-scale study, as well, students appreciated being able to choose a social issue and valued the chance to represent it using digital tools to create a multimodal argument. Although focus on a social issue was not an essential element of this intervention, the students' engagement with choosing a social issue that was important to them and arguing for some aspect of this issue using digital, multimodal tools was an important unanticipated outcome of the present study. That engagement was apparent in both cases of this study and in the previous study, suggesting that this digital, multimodal intervention may be *appealing* especially when students are allowed to create content on socially relevant topics, even to rural students who do not as readily identify as digital-content creators (Lenhart & Madden, 2005). More research is needed, however, to understand how this content creation impacts students in varying contexts.

Learning Argument

Assertion: Digital, multimodal composing may provide a scaffold for students to learn argument. This finding is supported by the qualitative data in this study, though the quantitative data, students' responses to the conventional argument pre- and post-prompts, did not achieve statistical significance. The qualitative data not only showed student belief in the application of their digital, multimodal arguments, but it also showed that prior to this intervention students were unaware of what the New London Group (1996) called the "Available Design" (p. 75) or the resources available that make multimodal composing possible. Instead, students, prior to the intervention, thought argument was limited to written language. After the intervention, students in the ninth-

and tenth-grade case showed an increased awareness that arguments could include multimodality rather than just written language. This increased awareness of multimodality is shown in Figures 4.4 and 4.8.

Students were aware of more modes of design and thought this multimodal composing was applicable to their more conventional argumentative writing. Multimodal composing seemed particularly relevant to helping students structure their concept of argument. For example, the teachers in the ninth- and tenth-grade case thought their students' knowledge of the elements of argument had grown (interviews, March 6, 2015, March 18, 2015). In addition, the students in both cases discussed learning that argument was multidimensional, and the tenth-grade students, in particular, discussed that the digital, multimodal composing of arguments helped to scaffold their organization of argument. The students also demonstrated knowledge of the elements of argument in their digital, multimodal websites, with more students than not conveying an argument with a claim and supporting this argument with evidence in the ninth-grade and tenth-grade case (see Figure 4.5 and Figure 4.11).

In this study, despite the qualitative data in both cases suggesting that the students' digital, multimodal design of arguments did improve their knowledge of the elements of argument and helped scaffold their ability to organize such elements, which they believed would transfer to their writing of conventional arguments, the quantitative data did not support these findings. There was no statistical significance in the change between the students' responses to the pre- and post- conventional argument prompt. Statistical significance may not have been attained in this study for conventional

argument writing because this writing was not the sole focus of the intervention. Thus, this assertion suggests the *effectiveness* of this intervention for helping students learn the elements of argument and understand that its design can be multimodal. However, the goal of this study was to improve both students' digital, multimodal arguments as well as their conventional arguments through an intervention in which they created digital, multimodal arguments. If teachers are focused on improving just conventional arguments, they may achieve more success with that goal teaching exclusively about conventional argumentative writing. Yet, this teaching of conventional writing must be balanced with students' engagement with multimodal composing, discussed in the previous assertion. This study demonstrates a need to teach *both* conventional argument writing, which may have been needed more explicitly to increase gains in the quantitative data, and multimodal argument writing, which helped students become engaged with argument and learn the elements of argument and its multimodal design. In future iterations of this study, teachers may want to capitalize on students' learning of the elements of argument and their engagement with argument that occurred with the multimodal argument projects and follow these assignments with more focused instruction on conventional argument writing. More research is needed on how to integrate multimodal and conventional writing instruction as this study demonstrated that this merger is difficult.

Future Iterations and Recommendations for Classroom Practice

Formative experiments seek to provide explicit guidance for educators to improve instruction (Reinking & Bradley, 2008). Thus, this section will review recommendations

to inform teachers interested in implementing a similar intervention in their classrooms.

In addition, these recommendations may be helpful for future iterations of this research.

Replication, as previously discussed in Chapters 1 and 2, is needed not only for education

studies (Makel & Plucker, 2014), but also in formative experiments. Reinking and

Bradley (2008) stated, "When formative and design experiments are replicated across

diverse instructional contexts, they may reveal generalizations and theoretical findings

that transcend the complex variability across classrooms and the teachers and students

that inhabit them" (p. 42). Based on the findings of this study, I have the following

recommendations to those interested in replicating a similar intervention:

1. To aid students' transfer of skills, teachers might focus on assessing students'
   writing and digital practices, and explicitly discuss how those skills transfer
   between conventional and digital, multimodal composing. As discussed in
   Chapters 4 and 5, the teachers in this study did not seem to understand or integrate
   students' practices with digital devices, and it was not until the retrospective
   analysis of data that I realized that these skills may have been more effectively
   discussed with the students' design of multimodal arguments, helping students'
   build upon digital practices they may have had outside of school in academic
   projects. Similarly, students in both this study and the smaller-scale study may
   have benefitted from a more overt focus on discussing how the digital,
   multimodal composition transferred to their conventional writing. This
   recommendation fits with the multiliteracies perspective and the New London
   Group's (1996) discussion of metalanguage.

2. Teachers might focus on controlling task elements of multimodal projects so that they do not become overwhelming to both their teaching and the students' learning. In Chapter 4 and 5, I discussed that we made modifications to provide scaffolding to make tasks for students more manageable. These modifications included scaffolding students' digital writing with conventional writing in the classroom and providing handouts for using the digital tools so that students would not become overwhelmed when trying to master digital tools, multimodal composing, and elements of argument. This control of tasks was also necessary so that the teachers could focus on instructing all the needed elements of the multimodal arguments, including instruction on multimodality, the writing process, and elements of argument.

3. It may be productive to organize multimodal projects so that students work collaboratively. As discussed in Chapters 4 and 5, this collaboration was important to students as they saw their peers, for the most part, as a resource rather than a distraction. The teachers in this study seemed to resist such collaboration because it increased demands on their classroom management and assessment of student work. However, students seemed to gravitate toward this collaboration even when the teacher did not encourage it. Such collaboration may also prevent students from becoming overwhelmed with multimodal composing, which may be an unfamiliar academic task for them, as it was in this study. This collaboration also supports the New London Group's (1996) perspective that multimodal design is a process of "co-engagement" (p. 76).

4. Seeking connections to social issues may be beneficial to students' engagement. As discussed in Chapters 4 and 5, the digital tools used in creating multimodal arguments as well as the social issues these arguments developed engaged students. In fact, for the tenth-grade case, students who may have otherwise become disengaged, due to their frustration mastering digital tools, remained engaged because of the relevance and connection to social issues.

5. For this intervention to be successful, it may need to be preceded by professional development. As discussed in Chapters 4 and 5, both teachers in this study and in the former smaller-scale study struggled with teaching the multifaceted nature of multimodal composing despite their experience level. In addition, the teachers in this study did not seem to value multiliteracies as much as conventional literacies. This professional development would need to help teachers integrate elements such as digital tools and multimodality into their curriculum. Thus, this professional development would need to be closely tied to teachers' content knowledge and include active learning that is related to their classroom practice as is recommended in the relevant literature on professional development (Desimone, 2009; Garet, Porter, Desimone, Birman, & Yoon, 2001).

Conclusion

The New London Group (1996), in their perspective of multiliteracies, and professional organizations (IRA, 2009; NCTE, 2005) have argued that teachers should not just value, but develop, students' creation of multimodal texts; however, there is a dearth of research discussing the process and means of effectively integrating such

multimodality into the classroom (Graham & Benson, 2010; Sewell & Denton, 2011).

This formative experiment investigated the practical pedagogical modifications,

enhancing and inhibiting factors, and unanticipated outcomes that accompany enacting

such an intervention in the context of high-school classrooms. It reported the

implementation of an intervention grounded in a multiliteracies perspective and found

progress toward the pedagogical goal of improving students' arguments. Progress was

made, as students were engaged with the digital, multimodal composing of argument and

seemed to think such engagement would benefit their conventional arguments. Yet, it

also identified, through a retrospective analysis (Gravemeijer & Cobb, 2006), further

modifications that are needed in future iterations to be investigated in future studies. This

study responds to the call by Newell et al. (2011) for researchers to bridge the artificial

divide between the cognitive and social practice of argument. This intervention

incorporated the cognitive structure of argument—claims, evidence, and elaboration of

evidence—and encouraged students to design and mediate these arguments using the

semiotic resources and digital tools available in a manner that encouraged social practice.

In the assertions described in this chapter, I discuss that using this intervention, students

seemed to grow in their understanding of the elements of argument and that arguments

can be designed multimodally. However, I also discuss in these assertions that the appeal

of such an intervention and the likelihood of its adoption by teachers seem dubious unless

teachers receive professional development that not only helps them to recognize and

value multiliteracies, but also effectively integrate them into the teaching of their

respective content with students of varying ability levels. This professional development

as well as the value and integration of multiliteracies were all areas of future research discussed in the previous assertions. This study gives teachers attempting to integrate concepts of the multiliteracies perspective needed practical guidance, yet future research in this area is still needed.

APPENDICES

Guiding Questions for Semi-Structured Interviews

Teachers

- How many years have you taught prior to this year?
- What grade(s) are you currently teaching?
- What is your educational background?
- What goals do you set for yourself as an English teacher? For your students?
- How would you describe a typical day in your class?
- What are your students' strengths, overall? What are their weaknesses?
- How often do you use technology in your classroom? What types of technology do you use? Describe your comfort level with using technology in the classroom.
- Can you describe your students' familiarity with argument?
- How much of student writing relies solely upon text? How much incorporates other modes, such as pictures or audio clips?
- Can you describe your students' familiarity with using technology in school?
- Is there a particular student, or several students, you feel will be engaged by this project? Why?
- Which student or students will excel at this project? Why did you think of this student(s)?
- Are there students who will not enjoy this project? Why?
- What would you like us to know about you or your students?
- What seems to be working/not working with this project? Any idea why?
- What would you do differently or the same next time?
- What do you think the students like/don't like about this activity? Why?
- Could the activity be handled more efficiently in any way? What suggestions would you have for moving forward? For other teachers who might consider using this activity?
- Do you see any evidence that students have a greater understanding of argument?
- How would you compare the activity, thus far, with what you have done in the past or would have done if you hadn't been involved in this activity?
- At this point, do you imagine yourself using this activity again in the future?
- Has anything particularly impressed you or surprised you (positively or negatively) about your own or your students' involvement in this activity?
- Do you have any worries or concerns?

Students

- What do you like/not like about this project?
- How would you improve it?

- Do you think you are thinking about writing arguments any differently now? Have you learned anything new? What?
- What has been the easiest or hardest thing to do in this project?
- What technologies have you enjoyed or found useful to writing arguments? Why?
- Do you think creating multimodal arguments online will help in any way your ability to write conventional arguments (e.g., using only a word processing application or paper and pen/pencil)?
- Would you rather work independently on this activity or with a partner/small group? Why?
- Do you think about arguments any differently now than before you started this activity?
- Has the project had any effect on your writing, reading, viewing of arguments in other classes and/or outside of school?

Administrators

- How long have you been an administrator? How long have you been at this school?
- What is your educational background?
- What is your teaching background?
- What are your goals for the school curriculum this year?
- What are the goals for student writing this year?
- How much is technology emphasized for learning in the school? How? Why?
- Is argument writing a priority in the school curriculum?
- How does the administration support teachers using technology in the classroom?
- How does the administration support writing instruction in the classroom?
- Describe your student population.
- How would you rate your district's use of technology?
- What is the community like around the school?
- What is distinctive about your school?
- Has the community changed or in the process of changing in the past few years?
- Describe the parental participation.

Media Specialists

- What is your professional role in the district?
- How long have you been working in this role?
- What technology is available to schools in your district?
- How are teachers supported in their use of these technologies?
- How often do teachers request different technologies?
- Is there a need for any technologies at the schools in your district?

- Do you have any technology initiatives in your schools?
- How has the technology policies/usage in your district changed since you have been working in the district?

Intervention Calendar, Ninth Grade

Week	Goal	Essential Element of Intervention	Activity	Student Use of Technology
1	Students learned language of argument	Argument	Learned elements of argument and practiced an activity in which students solved a mystery using parts of argument (Smith et al., 2012)	No technology
2	Students learned language of argument	Argument; Digital, multimodal tools; Writing process	Students created an advertisement using parts of argument (Smith et al., 2012). Students made their ad with Glogster EDU.	Glogster EDU
3	Holiday and students read *Tuesdays with Morrie* (Text for Infographic)	Argument	Reading	No technology
4	Students read *Tuesdays with Morrie* (Text for Infographic) and euthanasia text set and analyzed for elements of argument	Argument; Digital, multimodal tools	Read; Analyzed text set for argument and multimodality	Google Docs

5	Students discussed infographics and introduction of infographic assignment	Argument; Digital, multimodal tools; Writing process	Analyzed infographics online and infographic assignment was introduced	No technology
6	Student construction of infographic and holiday at end of week	Argument; Digital, multimodal tools; Writing process	Students crafted infographics on Glogster EDU. Students worked in groups to create infographics.	Glogster EDU
7	Students revised and published infographic	Argument; Digital, multimodal tools; Writing process	Students revised and published infographics using Glogster EDU	Glogster EDU
Two weeks of interviewing and planning with teachers and students as class finished fall semester and took exams. Students were reading *Of Mice and Men* during this time, which is the text used for their next argumentative project.				
Two weeks away for holiday break				
8	Review of parts of argument	Argument	Students reviewed a text set including editorials on whether students should have homework (Gallagher, 2006). They annotated the articles for claim and evidence.	No technology
9	Introduction of Public Service Announcements (PSA)	Argument; Digital, multimodal tools	Students were introduced to what PSAs are and the PSA assignment. They then explored PSAs (Selfe & Selfe,	Google Docs

			2008) for both elements of argument and multimodal design working in groups using Google Docs.	
	Reading *Mice and Men*; Exploration of potential topics for PSAs	Argument; Digital, multimodal tools; Writing process	Students used library websites to explore social issues pertaining to *Mice and Men*. They explored several topics thinking of how they would take a stance on these topics and provide evidence for that stance. In looking at each topic, students looked at multimodal resources for each topic.	*Opposing Viewpoints in Context* website (http://scdiscus.org/discus-resources)
10	Students finishing *Mice and Men*	Reading	Students finished reading novel.	No technology
11	Learning about evidence	Argument; Writing process	Students did activity in which they evaluated various pieces of evidence (Smith et al., 2012) and found evidence to support their topic from novel.	No technology

	Research of evidence and citing evidence	Argument; Digital, multimodal tools; Writing process	Students used Google Docs to research topics in groups, focusing on written research as well as other modes of research.	Google Docs, *Opposing Viewpoints in Context* website (http://scdiscus.org/discus-resources), and other websites
12	Students read *Romeo and Juliet* and continued to research topics	Argument; Writing process	Students used double entry journal note taking to record evidence and source information on the left side and to elaborate on that evidence in the right column.	Research using websites; Continued to use Google Docs to record research.
13	Students drafted arguments	Argument; Writing process	Students used a prompted writing assignment (Bernabei & Hall, 2012) to draft arguments about their PSA issue.	No technology
	Students drafted Glogster EDU poster for their website	Argument; Writing process; digital, multimodal tools	Students were shown models of Glogsters and created Glogster EDU posters of their evidence from the novel *Mice and Men*.	Glogster EDU
	Students brainstormed, drew, and started Google Sites for their	Argument; Writing process; Digital, multimodal	Students looked at examples of PSAs in the form of websites and	Google Sites

	PSAs	tools	drew their visions for their sites using paper and crayons. Then, students used computers to start their Google Sites. Students were given handouts on features of Google Sites and how to embed Glogster EDU poster into website.	
14	Drafted websites	Argument; Writing process; Digital, multimodal tools	Students returned to drawing and planning sites and then continued with making sites using Google Sites. Students were given handouts on how to include images in websites.	Google Sites
Students did not do elements of intervention for a week due to inclement weather.				
15	Revised websites; Published websites	Argument; Writing process; Digital, multimodal tools	Students worked to finish websites. They worked with a partner to revise site and used a reflection sheet to revise and edit their own work. At the end of the week students	Google Sites

			published their websites before their class.	

Appendix C

Intervention Calendar, Tenth Grade

Week	Goal	Essential Element of Intervention	Activity	Student Use of Technology
1	Students learned language of argument; Students started novel *To Kill a Mockingbird* (*TKAM*)	Argument	Students learned the parts of argument and practiced with activity in which students solve a mystery using parts of argument (Smith et al., 2012); Students were also reading *To Kill a Mockingbird*, which was the basis for their infographic argument.	No technology
Week off for holiday and finishing prior unit on poetry				
2	Students learned language of argument	Argument; Digital, multimodal tools; Writing process	Students created an advertisement using parts of argument (Smith et al., 2012). Students made their ad with Glogster EDU.	Glogster EDU
3	Students read text sets and analyzed for elements of argument	Argument; Digital, multimodal tools	Students read and analyzed text sets on issues in *TKAM* such as age, race, and gender discrimination for argument	Google Docs

			and multimodality.	
4	Students gathered evidence for infographic argument	Argument; Digital, multimodal tools; Writing process	Students found evidence using a text set on chosen issue to argue for infographic; Students worked in groups to create infographic.	Google Docs
5	Students edited and revised infographic	Argument; Digital, multimodal tools; Writing process	Students revised their own group's infographic and used a reflection sheet to review other groups' infographics	Google Docs / Glogster EDU
6	Students revised and published infographic	Argument; Digital, multimodal tools; Writing process	Students revised and published infographics using Glogster EDU.	Glogster EDU
Students take a week break for exam review and exams.				
Two weeks away for holiday break.				
7	Review of parts of argument	Argument	Students reviewed editorials on whether students should have homework (Gallagher, 2006). They annotated the articles for claim and evidence.	No technology
	Introduction of Public Service Announcements	Argument; Digital, multimodal	Students were introduced to what PSAs are	Google Docs

	(PSA)	tools	and the PSA assignment. They explored PSAs (Selfe & Selfe, 2008) for both elements of argument and multimodal design working in groups using Google Docs.	
8	Exploration of potential topics for PSAs	Argument; Digital, multimodal tools; Writing process	Students used library websites to explore three social issues they wanted to argue about in a PSA. They explored and thought of how they would take a stance on these topics and provide evidence for that stance. Students looked at multimodal resources for each topic.	*Opposing Viewpoints in Context* website (http://scdiscus.org/discus-resources)
	Learning about evidence	Argument; Writing process	Students did activity in which they evaluated various pieces of evidence (Smith et al., 2012).	No technology
9	Research of evidence and citing evidence at national level.	Argument; Digital, multimodal tools; Writing process	Students researched their chosen research issue individually. Students used double entry journal note	*Opposing Viewpoints in Context* website (http://scdiscus.org/discus-resources), and other websites

			taking to record evidence and source information on the left side and to elaborate on that evidence in the right column.	
	Research of evidence and citing evidence at state level.	Argument; Digital, multimodal tools; Writing process	Students used Google Docs to research topics in groups, focusing on written research as well as other modes of research. Students focused on finding information about their topic as it applies to their state. The media center specialists had placed research sources on the school's media center website for each student topic. Media center specialists also taught students about how to get multimodal research such as sound clips and pictures through library resources.	Google Docs, *Opposing Viewpoints in Context* website (http://scdiscus.org/discus-resources), and other websites
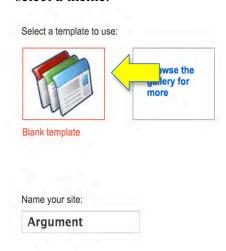
10	Research for PSA issue	Argument; Digital, multimodal tools; Writing process	Students researched in the computer lab, finding resources for their chosen PSA issue. Students found multimodal resources, including text, pictures, hyperlinks, audio clips, etc.	Google Docs, *Opposing Viewpoints in Context* website (http://scdiscus.org/discus-resources), and other websites
	Students drafted arguments	Argument; Writing process	Students followed a guided writing assignment (Bernabei & Hall, 2012) to draft arguments about their PSA issue.	No technology
11	Students revised drafts	Argument; Writing process; Digital, multimodal tools	Students did a revising activity for inserting quotations into their drafts. They also discussed how to include citations for quotations.	No technology
	Students drafted Glogster EDU poster for their website	Argument; writing process; digital, multimodal tools	Students used their evidence from the state level of their PSA topic to create a Glogster EDU poster that was included on their PSA website.	Glogster EDU
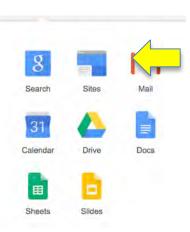
	Students finished Glogster EDU posters and started Google Sites for their PSAs	Argument; Writing process; Digital, multimodal tools	Students finished and revised their Glogster EDU posters and were instructed on how to use Google Sites. Students began their Google Sites.	Glogster EDU; Google Sites
12	Drafted websites	Argument; Writing process; Digital, multimodal tools	Students drafted and revised Google Sites. Handouts were given out on how to include multimodal aspects in websites and how to embed the Glogster EDU poster into the site.	Glogster EDU; Google Sites
Students did not do elements of intervention for a week due to inclement weather.				
13	Revised websites; Published websites	Argument; Writing process; Digital, multimodal tools	Students finished websites. They worked with a partner to revise site and used a reflection sheet to revise and edit their own work. At the end of the week, students published their websites before class.	Google Sites

Appendix D
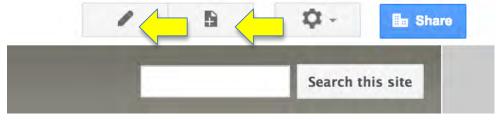
Handout for Using Google Sites

1. Go to mail.google.com and sign in using your login information.

2. In the top right, click on the square. Select Sites.

3. Click Create

4. On the following screen, select blank. Then, name your site (This name will appear on your site, so choose a name that represents your issue). Finally, select a theme.

Select a template to use:

Blank template

Name your site:

Argument
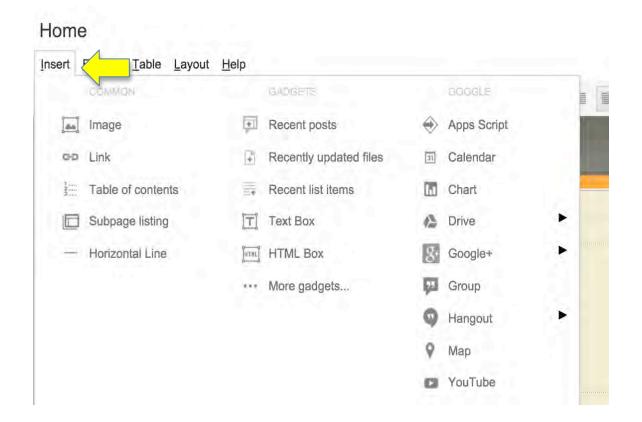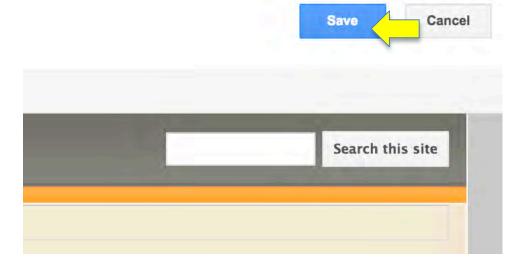
5. Then click create.

6. The toolbar in the top right allows you to edit the page you are on or to create new pages.

7. When you want to add content to a page, select the pencil for editing. Then use the toolbar on the top left to add pictures and other content.

8. Make sure when you are done editing a page, to save in the top right corner.

Appendix E

Student Questionnaire

1. What is argument writing?

2. When is the last time you wrote an argument for school? Describe this assignment.

3. Do you write arguments outside of school? Please describe.

4. Do you write arguments for classes other than your English class? If so, please describe.

5. When you write arguments for school, do you write with paper and pencil/pen or do you use a computer or any other technology?

6. Are their any differences in writing an argument with pencil and paper and writing an argument online? Please describe.

7. When you compose arguments in school, which of the following do you use to form your argument? Circle all that apply.

    a. Words and text
    b. Visuals, images, and/or arrangement of space and color
    c. Sounds and audio files
    d. Video
    e. Hyperlinks
    f. Gestures or body movements
    g. Other: Please list_____

8. Do you enjoy writing arguments for school? Why or why not?

9. Do you think argumentative writing is creative? Why or why not?

Appendix F

Student Multimodal-Argument Reflection

Constructing an Argument

Situation:
　　You want to build a campaign to improve your neighborhood park. This park has been in your neighborhood for the last ten years, but has multiple problems including the following: overgrown shrubbery, a rundown playground, an abandoned atmosphere, and constant litter. You want to return this park to its original state, which was clean, safe, and a place where the community gathered.

Task:
　　Describe how you might use technology to compose an argument to convince your neighbors to reinvest in the park. Consider not only what you would say, but how you would present this information in a convincing manner.

Rubric for Conventional Writing Prompt

Student ID Number:_____

Argumentative Writing Rubric (Score Range 4-0)

Score	Focus	Organization	Evidence	Elaboration of Evidence	Clarity of Expression
4	Clearly established claim that is well maintained throughout the response.	Exceptionally clear, unified, and effective organizational structure.	Highly convincing evidence supporting claim and drawing on sources, facts, and/or details.	Evidence provided is elaborated upon thoroughly.	Clearly, coherently, and effectively expressed ideas with clear sense of audience.
3	Established a claim that is maintained throughout the response.	Consistent organizational structure.	Adequate evidence supporting claim that includes the use of sources, facts, and/or details.	Evidence provided is elaborated upon adequately.	Adequately expresses ideas, with a sense of audience.
2	The claim is marginally clear, and is inconsistently sustained.	Inconsistent organizational structure.	Some marginal evidence.	Evidence is not consistently elaborated upon.	Some ideas not clearly expressed and/or marginal sense of audience.
1	The claim is unclear, and is not sustained.	Little discernible organizational structure	Minimal evidence	Minimal elaboration of evidence.	Ideas are expressed vaguely with little sense of audience.
0	Offers no claim.	No recognizable	No evidence	No elaboration of	Ideas are unclear,

		organizational structure.		evidence.	incoherent, ineffective and expressed with no sense of audience.
0-4 Holistic Score	Write in Score: _____				

Directions for Scoring: For each **student identification number**, circle the score you assigned the prompt for each category. In addition, fill in a holistic score (0-4) for the prompt based on how you think the prompt response scores overall. For each category and the holistic score, please assign whole numbers (0-4). Fill out one rubric for each prompt response.

Appendix H

Formative Observation Protocol

Date:

Class and teacher:

What factors enhance or inhibit the intervention to reach the goal?

What modifications may be needed?

What are the unanticipated outcomes?

Describe any transformations in the teaching of learning environment.

Evidence of progress toward the goal:

Other observations:

Initial Coding of Ninth-Grade Case

Initial Codes, Listed Alphabetically
1. Accessing digital tools
2. Assessing group work versus individual responsibility
3. Assessing time spent on project
4. Becoming distracted by technology
5. Changing teaching practice
6. Changing written arguments
7. Choosing social issue
8. Citing sources
9. Defining learning
10. Demonstrating apathy
11. Demonstrating creativity
12. Demonstrating initiative with digital tools
13. Describing student weaknesses
14. Describing students and community
15. Describing teaching experience or background
16. Describing typical classroom routines
17. Designing in school
18. Designing with digital tools
19. Disliking digital tool use
20. Disliking writing
21. Engaging in writing
22. Enhancing digital skills
23. Enjoying digital tools
24. Enjoying reading online
25. Expressing frustration with digital tools
26. Feeling uncomfortable or unfamiliar with digital tools
27. Focusing through digital tools
28. Grading student writing
29. Labeling student strengths
30. Learning about social issues
31. Making modifications
32. Modeling argument
33. Needing classroom management or structure
34. Obtaining research
35. Planning collaboratively
36. Providing scaffolding
37. Receiving professional development

38.	Setting teaching goals	
39.	Struggling to create	
40.	Struggling with writing arguments	
41.	Teaching argumentative writing	
42.	Teaching literature	
43.	Teaching with digital tools	
44.	Transferring skills	
45.	Understanding concept of argument	
46.	Using digital tools in school	
47.	Using mobile devices	
48.	Using social media	
49.	Varying success based on ability level	
50.	Writing as previous experience	
51.	Writing multimodally	
52.	Writing using process approach	

Initial Coding of Tenth-Grade Case

Initial Codes, Listed Alphabetically
1.   Accessing digital tools
2.   Assessing group work versus individual responsibility
3.   Assessing time spent on project
4.   Becoming distracted by technology
5.   Changing written arguments
6.   Choosing social issue
7.   Citing sources
8.   Demonstrating creativity
9.   Demonstrating initiative with digital tools
10.   Describing student weaknesses
11.   Describing teaching experience or background
12.   Describing typical classroom routines
13.   Designing in school
14.   Designing with digital tools
15.   Disliking digital tool use
16.   Disliking writing
17.   Engaging in writing
18.   Enjoying ownership of activities
19.   Enjoying digital tools
20.   Enjoying reading online
21.   Expressing frustration with digital tools
22.   Feeling uncomfortable or unfamiliar with digital tools
23.   Focusing through digital tools
24.   Grading student writing
25.   Labeling student strengths
26.   Learning about social issues
27.   Making modifications
28.   Missing class
29.   Modeling argument
30.   Needing classroom management or structure
31.   Obtaining research
32.   Planning for college and beyond
33.   Planning instruction
34.   Providing more writing time
35.   Providing scaffolding
36.   Receiving professional development

37.	Setting teaching goals
38.	Struggling to create
39.	Struggling with writing arguments
40.	Teaching argumentative writing
41.	Teaching creative writing
42.	Teaching different levels
43.	Teaching narrative writing
44.	Teaching with digital tools
45.	Transferring skills
46.	Typing written information
47.	Understanding concept of argument
48.	Understanding information and reading
49.	Using digital tools in school
50.	Using mobile devices
51.	Using social media
52.	Writing about social issues
53.	Writing as previous experience
54.	Writing multimodally
55.	Writing relying on text
56.	Writing using process approach

Appendix K

Coding Examples for Frequently Referenced Initial Codes: Ninth-Grade Case

Initial Codes	References	Representative Example
1. Disliking writing	11	"I would not write as much" (interview, December 9, 2014).
2. Becoming distracted by technology	11	"Because I see my phone light up and check it" (interview, March 12, 2015).
3. Demonstrating creativity	12	"Because it was a creative way to express and show facts" (interview, March 12, 2015).
4. Writing using process approach	13	"We talked about adding more steps of revision and production of their writing to get more quality work" (field note, November 6, 2014).
5. Struggling with writing arguments	14	"Yeah, in the beginning I struggled more because I didn't know where to put my information and how to lay it out…" (interview, March 12, 2015)
6. Assessing time spent on project	15	"But it was too long; it was a lot of work" (student interview, March 12, 2015).
7. Learning about social issues	15	"Yeah, I learned how farmers are using less chemicals…" (interview, March 12, 2015).
8. Providing scaffolding	18	"Some of the students…need each step of technology broken down into the simplest of steps" (observation, March 4, 2015).
9. Using social media	18	"…Snapchat, I Snapchat all the time-I am on that like every day" (interview, March 16, 2015).
10. Obtaining research	19	"The research that we had to do-we had to get a lot more stuff than we usually would" (interview, March 16, 2015).
11. Teaching with digital tools	23	"[Ms. Barrister] had never opened her Gmail account, so we had to get her password and download Google Drive before beginning" (observation, November 12, 2014).
12. Using mobile devices	23	"[Ms. Barrister] doesn't say anything about the student sitting on the floor playing on his phone" (observation, February 9, 2015).
13. Focusing through digital tools	25	"Because we had something to do all the time, like putting stuff on there [the website], finding stuff, finding pictures" (interview, March 12,

		2015).
14. Changing written arguments	28	"I've learned how to write my words fluently…and how to put them in order where it makes more sense" (interview, March 12, 2015).
15. Transferring skills	28	"Yeah, now when people talk about something in a certain way, it makes me think of it in their perspective and my perspective also before stating my perspective about it" (interview, March 12, 2015)
16. Teaching literature	28	"[Ms. Barrister] starts the period, and the students are reading *Romeo and Juliet*. She pauses every now and then during the reading to ask the students to write notes" (observation, February 9, 2015).
17. Making modifications	32	"[Ms. Barrister] discussed the problem of lumping students at one computer and expressed desire to have each student responsible for a part of the website" (observation, December 1, 2014).
18. Writing as previous experience	45	"Yeah, we had to do like five paragraph essays" (interview, March 12, 2015).
19. Choosing social issue	46	"Because my friend has a little sister with special needs, and I wanted to know more about them" (interview, March 16, 2015).
20. Writing multimodally	53	"I liked the Glogster because we could put images; we could write our claim in there with links, video, and argument" (interview, March 16, 2015).
21. Understanding concept of argument	55	"As far as arguing and discussions and debate, I think they're [students] a lot stronger, but I've yet to see any real strength on paper" (interview, December 16, 2014).
22. Assessing group work versus individual responsibility	56	"Because it is not just using your information; you get it compared to what other people think and so you have more of a variety of choices there to come up with a solution" (interview, December 9, 2014).
23. Using digital tools in school	75	"They gave us one website, and we go on there, and just copy down stuff about it" (interview, March 16, 2015)
24. Designing with	80	"I did write that because that's how I see a lot

digital tools		of other websites, and I felt that was the best organized way" (interview, March 12, 2015).
25. Enjoying digital tools	98	"I liked Glogster…kind of made stuff a little simpler" (interview, December 9, 2014).

Coding Examples for Frequently Referenced Initial Codes: Tenth-Grade Case

Initial Codes	References	Representative Example
1. Feeling uncomfortable or unfamiliar with digital tools	13	"I mean they are all supposed to be familiar with typing and Gmail accounts, but they're not" (interview, October 20, 2014).
2. Learning about social issues	13	"Yeah, I learned a lot. They're going to make new bullets…" (interview, March 5, 2015).
3. Using social media	13	"I use Facebook, and Instagram, and Vine, and Snapchat, …and Twitter, and I mean that's it right now" (interview, March 5, 2015).
4. Struggling to create	14	"I don't think they understand fully how to make an opinion after reading something…" (interview, December 17, 2014).
5. Transferring skills	14	"Yeah, I think it [digital arguments] makes it easier to kind of organize the information" (interview, March 5, 2015).
6. Making modifications	14	"We discussed different ways to present the text sets to students" (observation, November 14, 2014).
7. Changing written arguments	15	"I think it [argument] is easier to do now" (interview, March 5, 2015)
8. Demonstrating initiative with digital tools	15	"As soon as she is allowed to work on her own, she is typing the facts and statistics for her group, even when her group members…are wandering the room" (observation, January 23, 2015).
9. Choosing social issue	15	"I took texting and driving because there is a major problem nowadays" (interview, March 11, 2015).
10. Struggling with writing arguments	17	"They just don't have that skill at all, they don't have that, 'Let me have an opinion about something but let me make sure I have evidence.' They don't have that skill" (interview, December 17, 2014).
11. Providing scaffolding	19	"I would have made templates a little bit easier to understand and use" (interview, March 11, 2015).
12. Designing in school	25	"We go step by step from a book" (interview, March 11, 2015).

13. Engaging in writing	27	"Just like short stories, like mysteries, adventures, something like that" (interview, January 13, 2015).
14. Using mobile devices	28	"…tablet, I like sharing my games and everything I know" (interview, March 11, 2015).
15. Becoming distracted by technology	32	"[student] talking about Snapchatting other student during the class" (observation, January 7, 2015).
16. Designing with digital tools	33	"…I put hyperlinks to different websites, so people could gather their own information about it" (interview, March 5, 2015).
17. Focusing through digital tools	34	"I talked with H about him, and she explained his is more engaged in this activity in participation and interest than he usually is in his work" (observation, January 23, 2015).
18. Writing multimodally	42	"I guess with pictures, I feel like pictures are telling better than words" (interview, January 15, 2015).
19. Needing classroom management or structure	51	"Student is called out for talking, not listening once again, and says, 'I hate school!'"(observation, October 20, 2014).
20. Understanding concept of argument	53	"I never really included sources and everything else, the backup, my opinion and others" (interview, March 11, 2015).
21. Expressing frustration with digital tools	53	"I had to start my project over like five or six times because of it" (interview, March 5, 2015).
22. Writing as previous experience	55	"We typically…write about poems, free writing" (interview, December 10, 2014).
23. Enjoying digital tools	61	"I liked the Google Docs site-that was pretty cool" (interview, March 11, 2015).
24. Using digital tools in school	64	"I guess we're just used to using PowerPoint more" (interview, January 13, 2015).
25. Assessing group work versus individual responsibility	67	"I don't work well by myself. I get off topic by myself, surprisingly" (interview, January 13, 2015).

A Priori Coding of Students' Google Sites

Student	Criteria from Assignment Matching Goals of FE	Does Student Meet Criteria (Yes, No, Somewhat)? How?	Topic	Notes
H02	• Multimodal*	**Yes,** student includes multiple pictures to illustrate a point, and the text elaborated on the pictorial evidence using Glogster EDU poster on homepage. On second page of site, student gives pictures, texts, and a hyperlink to further reading.	Gun Control	
	• Conveys argument	**Somewhat,** It is clear through information provided that the student does not support gun control, but the claim is never clearly stated on the site.		
	• Supports argument with information about this issue using evidence at the state and national level.	**Yes,** The student uses examples about population and self-defense to discuss gun control on home page and cases of emergency on "Facts" page.		Student doesn't distinguish between state and national evidence. Sources are not provided for evidence given.

				Student uses examples as reasons for evidence, but doesn't provide specific facts, statistics, etc. from sources.
H03	• Multimodal	**Yes,** the student has a colorful background to site as well as multiple pictures, text, and hyperlinks for further information.	Homosexual Rights of Adoption and Marriage	Student does not include Glogster EDU poster on site even though student has created this poster.
	• Conveys argument	**Yes,** claim is clearly stated at the top of the Homepage.		
	• Supports argument with information about this issue using evidence at the state and national level.	**Yes,** Student gives reasons such as avoiding purely religious basis of arguments and freedoms of US citizens and supports with evidence of states that have implemented relevant laws at both the state and national level.		Provides specific evidence but does not give source for evidence.
H04	• Multimodal	**Somewhat,** student gives a green background and provides a hyperlink to sign a petition on issue, but most pages include text. The state page of the	Legalization of Marijuana	

		website is the one that includes the Glogster EDU page, which is the only multimodal aspect of site. Even the Glogster page only includes two pictures at the top.		
	• Conveys argument	**Yes,** student has claim at the top of their "Argument" page, which is bolded and underlined.		
	• Supports argument with information about this issue using evidence at the state and national level.	**Yes,** student provides several reasons supporting legalization such as stopping kids from doing illegal things and bringing cash to the state. These reasons are supported with quotations from sources. Does distinguish evidence at both the state and national level.		
H05	• Multimodal	**No**, the student has one page of site, the Homepage. This page contains one paragraph of text.	Texting and Driving	Website does not include Glogster EDU poster even though student did create the poster.
	• Conveys argument	**No**, the student provides several reasons not to text		

		and drive, but does not have an arguable claim.			
	• Supports argument with information about this issue using evidence at the state and national level.	**No,** the student has a few general statements about why people should not text and drive, but no concrete evidence or sources.			
H11	• Multimodal	**No,** the site only includes one page of text	Gang Violence	Created a Glogster EDU poster, but it is not on the site.	
	• Conveys argument	**No,** although the student provides information on gangs, the student does not give a claim.			
	• Supports argument with information about this issue using evidence at the state and national level.	**Somewhat,** although the student provides evidence including a source for the evidence about gangs, the student is not clear how this evidence supports a stance. The student does not distinguish between state and national evidence.			
H12	• Multimodal	**Yes,** both pages of the site include color schemes, pictures, and text. The Glogster EDU also includes symbols.	Legalization of Marijuana		
	• Conveys	**Yes,** the student's			

	argument	first statement on the Homepage is a claim supporting legalization of marijuana in the state.		
	• Supports argument with information about this issue using evidence at the state and national level.	**Yes,** the student provides evidence supporting legalization such as potential revenue, decreasing arrests, and benefits of usage. The student does distinguish between state and national evidence.		Student does not cite information provided.
H15	• Multimodal	**Yes,** Glogster poster on Homepage includes text, symbols, pictures, and a color scheme.	Texting and driving	
	• Conveys argument	**No,** no claim is stated.		
	• Supports argument with information about this issue using evidence at the state and national level.	**Somewhat,** site includes one statistic about texting and driving and one description of laws, but is very limited in the information provided. The student does not distinguish between the state and national level.		Has an argument page that is left blank.
H16	• Multimodal	**Yes**, the website has five different	Gun Rights	

		pages. Each page contains text, hyperlinks, and pictures.		
	• Conveys argument	**Somewhat**, the website gives evidence that seems to show reasonable gun laws should exist, but not excessive gun laws, but this claim is never explicitly stated.		
	• Supports argument with information about this issue using evidence at the state and national level.	**Yes,** the website provides multiple hyperlinks to information as well as explanation of reasons for gun campaigns and rights. Does distinguish between state and national level.		
H23	• Multimodal	**Somewhat**, does provide color scheme and differently shaped callouts to surround text, but mainly relies upon text with no pictures, clips, or hyperlinks provided.	Texting and driving	
	• Conveys argument	**No,** claim is not provided.		
	• Supports argument with information about this issue using	**Yes,** does provide statistics about state laws on texting and		

		evidence at the state and national level.	driving and number of people who text and drive, distinguishing between state and national level.		

*Multimodal included spatial, audio, linguistic, visual, and gestural elements of design as portrayed by the New London Group (1996, p. 83).

Cross-Case Analysis

Assertion	Ninth Grade Case	Tenth Grade Case	Previous, Smaller-Scale Study
1. Appropriate scaffolding is needed for multimodal composing, which is complex and multifaceted.	H	H	L
2. Teachers may help students' transfer of skills and engagement by discussing how technologies and multimodality translate across different contexts.	H	H	H
3. Teachers may struggle with teaching the multifaceted nature of multimodal composing regardless of their experience levels, which may inhibit its adoption, especially with students who are in less advanced classes.	H	H	H
4. Teachers may not recognize the value of multiliteracies, particularly in contexts where production of writing is emphasized over creation and design of texts.	H	H	L
5. Opportunities for collaboration when creating arguments may be needed for students, though resisted by teachers.	H	H	L
6. Focus on socially relevant projects that encourage student creation and authentic use of digital, multimodal tools may improve student engagement with argument.	H	M	H
7. Digital, multimodal composing may provide a scaffold for students to learn argument.	M	M	L

Note. Each case is rated "H=high utility; M= middling utility; L=low utility. High utility means that the Case appears to be one of the most useful for developing this" assertion (Stake, 2006, p. 49).

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