Digital Storytelling as a Cultural-Historical Activity: Effects on Information Text Comprehension

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DIGITAL STORYTELLING AS A CULTURAL-HISTORICAL ACTIVITY: EFFECTS ON INFORMATION TEXT COMPREHENSION

By
Maryann E. Tatum

A DISSERTATION

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DIGITAL STORYTELLING AS A CULTURAL-HISTORICAL ACTIVITY: EFFECTS ON INFORMATION TEXT COMPREHENSION

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New literacies in reading research demand for the study of comprehension skills using multiple modalities, through a more complex, multi-platform view of reading. Taking into account the robust roll of technology in our daily lives, research suggests that educators need activities to connect students’ lack of reading skills with their growing multimodal literacy.

During the post-reading phase of a directed reading activity (DRA), students were engaged in digital storytelling, where they created digital videos and slideshows based on information text read during DRA. Previous studies highlighting the use of digital storytelling have been limited to narrative formats and the influence that participation in this activity has on self-esteem and identity. This activity has been widely recommended for improving writing among teachers and in teaching journals, but it has not been empirically studied in the classroom as a comprehension activity.

The theoretical framework that supported this study was Vygotsky’s Cultural Historical Activity Theory (CHAT). The researcher used the CHAT framework and Burke’s Pentad of Analysis (1969) to study the nature of student interactions.

Research questions for this study were answered through both quantitative and qualitative methods. The questions being asked by the researcher were:
1. What were the effects of participation in directed reading activity (DRA) modified to include digital storytelling in the post-reading phase of DRA on 6th graders’ comprehension of information text?

2. Did the interactions observed during participation in directed reading activity modified to include digital storytelling reflect the principles promoted by Cultural-Historical Activity Theory?

Eighty sixth-grade students were randomly assigned to their digital storytelling groups. The subjects participated in whole-class DRA on two information texts, with the treatment group creating digital stories based on the texts. Cloze scores indicated that there was no significant difference in comprehension due to the treatment. However, there was ample evidence to support the claim that participation in digital storytelling instantiates the principles of CHAT.

Overall, digital storytelling does show promise as a multimodal instructional activity, and the discussion expands to several implications and recommendations of future research on this instructional activity.
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For Dad
(who would’ve loved to have seen this most of all)

Love, Dr. Mimi
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td></td>
<td>LIST OF FIGURES</td>
<td>viii</td>
</tr>
<tr>
<td></td>
<td><strong>Chapter</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>1 INTRODUCTION</strong></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Statement of the Problem</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Views of Reading</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Comprehension Strategies</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Reading Lessons</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Digital Storytelling</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Purpose of the Study</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td><strong>2 REVIEW OF THE LITERATURE</strong></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>New Literacies</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Multimodal Literacy</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>A New Direction for Reading Comprehension Research</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>A History of Comprehension Research</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Challenging the Simple View of Reading</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>What Good Readers Do</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Models of Reading</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Bottom-up and Top-Down Models</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Interactive Models</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>A Stage Model</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>A Developmental Model</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Directed Reading Activity</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Digital Storytelling</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>An Introduction to Digital Storytelling</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>The Search for Literature on Digital Storytelling</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Review of the Digital Storytelling Literature</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>The Rationale for this Study</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Theoretical Framework</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Why Digital Storytelling Circles as a Treatment?</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Summary of the Review of Literature</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td><strong>3 METHODS</strong></td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Research Setting</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Participants</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>Procedures</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Treatment</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Materials and Equipment</td>
<td>50</td>
</tr>
<tr>
<td>Section summoned</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>Instrumentation</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>Summary of Methods</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Quantitative Design</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Qualitative Design</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Data Collection and Archiving</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>4 RESULTS AND DISCUSSION</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Descriptive Statistics</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Quantitative Findings</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Summary of Quantitative Findings</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>Qualitative Findings</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Description of the Data Collection Setting</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Analysis of Qualitative Data</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Analysis of Digital Storytelling Circle A</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Vignette 1: Improvising with Microsoft Paint</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Vignette 2: Hugging the Earth</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Vignette 3: An Inconvenient Truth</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Multimodal Literacy at Work</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>Vignette 4: A Glitch</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>Vignette 5: An Agent Creeps In</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Vignette 6: Another Agent Enters</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>Vignette 7: Tools Galore</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>Summary and Discussion of Digital Storytelling Circle A</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>Analysis of Digital Storytelling Circle B</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>Vignette 8: Arguing About Torches</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>Vignette 9: Fire Drill</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>Summary of Findings</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td>5 CONCLUSION</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Limitations</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Length of the Treatment</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Instrumentation</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td>Researcher and Teacher Biases</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>Texts</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>Implications for Future Research</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>APPENDIX A: Parental Permission Form</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>APPENDIX B: Student Assent Form</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>APPENDIX C: Planet in Distress Cloze Assessment</td>
<td>103</td>
<td></td>
</tr>
</tbody>
</table>
LIST OF TABLES

TABLE 1: Treatment Timeline and Procedures .......................................................  45

TABLE 2: Mean Stanine Scores for Verbal Reasoning, Vocabulary, and Comprehension, Sample Size, and Standard Deviation of CTP-4 Scores for Treatment and Control Groups……………………………………………………. .......................................  60

TABLE 3: Analysis of Variance for the Main Effect of the Treatment……………….  61
LIST OF FIGURES

FIGURE 1: Blanton, Pilonieta, and Wood’s Development Reading Model .......... 21
FIGURE 2: Burke’s Pentad (1969) ................................................................. 57
FIGURE 3: Modified Burke’s Pentad ............................................................ 66
FIGURE 4: Improvising with Microsoft Paint ............................................... 69
FIGURE 5: Hugging the Earth ................................................................. 72
FIGURE 6: An Inconvenient Truth ............................................................ 74
FIGURE 7: A Glitch ................................................................. 78
FIGURE 8: An Agent Creeps In ................................................................. 80
FIGURE 9: Another Agent Enters ............................................................... 82
FIGURE 10: Tools Galore ................................................................. 85
FIGURE 11: Arguing About Torches .......................................................... 89
FIGURE 12: Fire Drill ..................................................................... 92
Chapter 1

Introduction

This investigation sought to explore a directed reading activity, modified to include digital storytelling in the post-reading phase, as an effective literacy activity, engaging students in the production and manipulation of meaningful representations of the information texts they have read. The chapter begins with an overview of the current problems in reading instruction, followed by a discussion of the views of reading and a brief overview of the framework for reading lessons. Next, the chapter presents digital storytelling as a promising literacy activity than can be incorporated into a modified reading lesson. The chapter concludes with the purpose of the study.

Statement of the Problem

According to the most recent NAEP Report Card (National Assessment of Educational Progress, 2008), only three out of every ten eighth-grade students can read at or above grade level. Previous NAEP Report Cards have shown that this trend has been consistent since the late 1980s, when middle-school students first started showing the greatest deficit in reading comprehension. In particular, a majority of middle-school students have difficulty interpreting, understanding, and analyzing complex information texts (NAEP, 2000). They also fail to demonstrate proficiency in using metacognitive reading strategies - the ability to plan, monitor, and evaluate their comprehension of information text (National Institute of Child Health and Human Development, 2000; Neufeld, 2005; Pressley, 2002; Stanovich & Stanovich, 1997). The persistence of these findings over time illustrates the need for instruction aimed at improving the reading ability of middle-school students and their comprehension of information texts.
Adolescents who fail to receive adequate reading instruction in the elementary grades are likely to struggle with comprehension at the upper grade levels (Biancarosa & Snow, 2006). As a result, many of these students lack proficiency in applying metacognitive strategies to reading tasks (Duke, 2004). There is a need for research to examine new instructional tools, as well as how their use may assist the development of reading strategies that transfer to the reading and understanding of texts.

Views of Reading

Duke (2007) argues that there are two views of reading, a simple view and a more complex view. The simple view of reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) proposes that the comprehension of text is compromised of a number of small processes, such as letter recognition, word identification, decoding, fluency, and language comprehension. The simple view of reading assumes that if a reader can successfully master the smaller reading processes, comprehension will be achieved. Within the simple view, the act of reading is understood as a matter of decoding text to achieve reading comprehension. However, there is sufficient evidence suggesting that the simple view of reading is inefficient (Riddle-Buly & Valencia, 2002; Duke, 2007, Pressley, et al, 2008) for understanding the acquisition of reading and reading instruction.

Riddle-Buly and Valencia (2002) studied fourth graders who failed to pass a typical reading assessment by examining the students’ phonemic awareness, word identification, reading rate, fluency, and comprehension. They found that student limitations actually fell into six categories of reading problems – “automatic word callers,” “word callers,” “struggling word callers,” “slow word callers,” “word stumblers,” and “slow comprehenders.” Each category represents a set of several small
processes that, according to the simple view, should result in successful comprehension. Their results suggest that although students may demonstrate proficiency in the smaller reading processes, such as decoding and word identification, they may still have difficulty passing grade-level standardized reading comprehension assessments. According to Riddle-Buly and Valencia’s (2002) conclusions, there is a disconnect between the simple view of reading’s claim that reading comprehension is achieved by accomplishing several small processes and their findings that reading difficulties can be categorized into a diverse set of reading processes.

Research grounded in a more complex view of reading has moved from the idea that reading comprehension is the ability to understand standard paper-based material to the idea that reading tasks are accomplished on multiple platforms, including digital environments. Proponents of the complex view argue that students must process a great deal of nonverbal material, utilize prior knowledge, and make access decisions, such as searching and navigating information (Coiro & Dobbler, 2007; Duke, 2007). Powerful search engines for knowledge access and accumulation are presently available, literally, in the palm of one’s hand.

The simple view of reading has been challenged by researchers who support a more complex view of reading and reading instruction that includes authentic texts and literacy activities. Also, the simple view of reading does not take into account the varying sources of reading, although the upcoming NAEP will assess technological literacy and the understanding of sources of information beyond traditional printed text (NAEP, 2009). In addition, the simple view of reading does not account for the comprehension of non-linear texts, such as illustrated texts and hypertexts (Oakhill &
In contrast, the complex view of reading proposes a new definition of reading that extends beyond traditional printed text to include reading as a multimodal activity incorporating emerging technologies into daily literacy instruction. Research is needed that increases the understanding of ways and means to organize reading lessons to include emerging technologies multimodal activities that focus on information (Stuart, Stainthorp, & Snowling, 2008).

What once was considered foundational literacy – the printed page, existing independently of other things and revolving around the book culture – should now be understood in terms of information literacy. Information literacy includes the ability to access, organize, read, understand, and apply information from a variety of sources (Alvermann, Phelps, & Ridgeway, 2006). Another term, multimodal literacy, represents the combined representations of written, oral, visual, and gestural systems of communication (Heath & Street, 2008; Kress, 2000). Hartman (2007) describes these differences as “little ‘l’ and big ‘L’ literacy, whereby little ‘l’ literacy is the traditional paper-based view and big ‘L’ literacy is the literacy of the “cyber culture.”

It is now a common understanding that students must read and understand increasingly complex information presented in formats other than narrative texts (Rubenstein, 2006). After third grade, the reading of narrative texts is de-emphasized and the reading of information texts is given priority. Consequently, there is an increase in the percentage of test items assessing the reading and understanding information texts included in high-stakes testing after third grade. For example, in the state of Florida, 30% of all comprehension passages on the third-grade level of the Florida Comprehensive Assessment Test (FCAT) are information texts (Florida Department of
Education, 2001). By tenth grade, the percentage of information texts increases, with 70% of test items measuring the comprehension of information texts. Given that a growing percentage of comprehension passages on high school level high-stakes tests are informational in nature, it is reasonable to expect that middle school readers should be exposed to information texts. However, this is not always the case. Often curriculum practices are not aligned with testing practices, and students are held accountable in areas to which they have had limited exposure to (Duke, 2007).

Comprehension Strategies

Researchers have explored a number of specialized instructional strategies to aid in information text comprehension, such as reciprocal teaching (Palinscar & Brown, 1984), KWL (Ogle, 1986), think-alouds (Davey, 1983), question-answer relationships (Raphael, 1986), Questioning the Author (Beck, McKeown, Hamilton, & Kugan, 1997), and class-wide peer tutoring (Delquadri, Greenwood, Whorton, Carta, & Hall, 1986). Strategy instruction is often explicit and decontextualized. Critics, however, have proposed that explicitly teaching strategies may direct readers’ attention on making decisions during reading and not on understanding the text at hand (Winograd & Johnson, 1987). Strategies taught independent of content may be less effective than those embedded in content and authentic literacy activities (Duke, Purcell-Gates, Hall, & Tower, 2006/2007). It is, therefore, vital to engage students in acquiring metacognitive reading strategies during engagement in real-world reading tasks to accomplish specific goals. As an illustration, Leu (2006) adapted reciprocal teaching (Palinscar & Brown, 1986) for use online and found success in improving the reading comprehension skills of at-risk adolescents. The increasing demand for multimodal literacy tools calls for more
research exploring ways and means of arranging reading lessons to include emerging technologies.

*Reading Lessons*

Effective reading lessons are composed of three phases – pre-reading, during reading, and post-reading (Snow, Burns, & Griffin, 1998). The Directed Reading Activity (DRA) is one of the most common three-phase reading lesson structures. The DRA has undergone a significant metamorphosis since it first came to be accepted as a successful instructional method in the 1940s. Each permutation, however, maintains the same core format: the setup of the topic, the monitoring of comprehension, and the integration of new knowledge obtained with prior knowledge. In the pre-reading phase, the teacher may set up the lesson by activating the background knowledge of students relevant to the text to be read. For example, students might be asked to make predictions about the text. The teacher also calls attention to new vocabulary words and words students may have difficulty decoding. Students may then be assigned a purpose for reading, such as reading to find out if their predictions were correct. During the reading phase, the teacher may conduct a discussion of parts of the material as it is read or simply let the students read all of the material silently. The post-reading phase begins with a discussion revisiting the purpose for reading the material and culminating with other activities to assist students on integrating new information with their prior knowledge. Their updated prior knowledge is then available for the next lesson.

Since there is an increasing demand for multimodal literacy activities, research must be done to determine how best to incorporate these activities into the reading lesson. One such multimodal activity is digital storytelling.
**Digital Storytelling**

Digital storytelling involves combining written, oral, visual, and gestural symbols into three to five minute videos. Students must plan their films (exchanging ideas, background knowledge, and establishing a purpose for the story) and, throughout the process, use language for and about digital moviemaking, in the discussion of software and technology. Digital stories are produced by engaging students in reading texts, then allowing them to work in their groups to plan and create short digital movies, which can take the form of picture montages or videos. In groups of three or four, students create original short movies based on a book read by all group members.

Successful readers use metacognitive processes to plan, monitor, and evaluate their comprehension (Baker & Brown, 1984; Coiro & Dobbler, 2007; Dole, Duffy, Roehler, & Pearson; 1991; Pressley & Afflerbach, 1995). Digital storytelling is a multimodal activity requiring the use of a particular kind of language to mediate reading, viewing, writing, and developing digital representations of text which may facilitate students’ acquisition and application of metacognitive processes.

Incorporating digital storytelling in the post-reading phase of a directed reading activity seems to be a reasonable place to begin empirical study of this activity, given that the post-reading stage involves the synthesis of both the newly acquired knowledge, the student’s pre-existing background knowledge, and whatever is shared with their classmates during discussion. Similar to the post-reading phase of a lesson, during participation in digital storytelling, students integrate the newly acquired information with their prior knowledge as they plan, discuss, and create digital representations of a material they have read.
In summary, a complex view of reading calls for a change in reading instruction, as does the NAEP, which will include technological proficiency on the 2012 Report Card (NAEP, 2008). Therefore, this study attempted to manipulate DRA in a way that incorporated the metacognitive strategies of planning, monitoring, and evaluating propagated by the complex view of reading and the technological literacy soon to be evaluated by NAEP. Digital storytelling has the potential to become an effective activity for students to summarize what they read in the post-reading phase of directed reading activity and to change their way of thinking about information text through participation in a multiplatform reading activity.

**Purpose of the Study**

The purpose of this study was to determine the effects of participation in a Directed Reading Activity (DRA) modified to include digital storytelling in the post-reading phase on the comprehension of information text. To achieve this purpose, this study sought to answer the following research questions:

1. What are the effects of participation in directed reading activity modified to include digital storytelling in the post-reading phase of DRA on sixth-graders’ comprehension of information text?

2. Do the interactions observed during participation in directed reading activity modified to include digital storytelling reflect the principles promoted by Cultural-Historical Activity Theory?

An experimental design manipulating the post-reading phase of DRA to include a digital storytelling activity was used. The cloze procedure was used to measure reading
comprehension. Qualitative methods were used to describe the kinds of social interactions that emerged during participation in a digital storytelling activity.

For the purposes of this study, digital storytelling was a multimodal activity mediated by tools. To create digital stories, students were required to utilize images and audio retrieved from the Internet, take digital still photographs or videos, or record voice-overs through a laptop microphone.

The following chapter presents a history of DRA and a detailed review of the literature on the simple and complex views of reading. Chapter 2 also provides a developmental model of reading, based on Cultural-Historical Activity Theory (CHAT), and a rationale for why CHAT was an appropriate theoretical framework for this investigation. The chapter concludes with a description of the search process involved in researching digital storytelling, as well as a review of the limited empirical research on digital storytelling.
Chapter 2

Review of the Literature

This chapter begins with a discussion of new literacies, including multimodal literacies, followed by a discussion of new directions of reading research and the views of reading. A developmental reading model is presented that can be placed in a re-organized directed reading lesson. The chapter concludes with a discussion of the theoretical framework of this study, an overview of the existing research on digital storytelling, and a rationale for its use as a reading comprehension activity.

New Literacies

The term “literacy” and the meanings to which it refers have changed in recent years. Early definitions of literacy encompassed decoding and encoding, mastering the alphabetic principle, effectively communicating through visual, oral, or written texts, learning grammar and sentence structure, comprehension, and becoming an expressive, persuasive, or informational writer (Moje, 2002). Moje and Sutherland (2003) extended the notion of new literacies as “the practice of navigating many different symbol systems and discourse communities to make meaning from and with written text” (Moje & Sutherland, 2003, p. 152). Literacy also refers to content literacy, critical literacy, informational literacy, and technological literacy (Alvermann, et al., 2006), all terms that incorporate new ways of knowing and thinking, and multiple modalities.

Print books are beginning to take a “back seat” to multimedia in the school life of students (Guensburg, 2006). Many students are immersed in media-centered environments that are different from classrooms of the past (Leu, 2000; Swenson, Rozema, Young, McGrail & Whitin, 2005). More and more, multimedia is viewed as an
effective teaching tool and has emerged as a tool for student expression (Tyner, 1998). In short, technology and digital media are challenging the constraints of text-based media and traditional literacy skills.

Media tools, such as iPhones and Blackberrys, make the Internet extremely accessible. However, this new technology comes with several acquired understandings, as users maneuver their way through a series of icons, images, and symbols. Electronics dominate American pop culture and are ubiquitous in students’ daily activities. In other words, students are becoming more literate in a wide variety of media as they participate in their everyday activities (House, 2007; Merkley, Schmidt & Allen, 2001). Literacy instruction must build on the understanding of the tools students bring to school.

**Multimodal Literacy**

Previous terms, like “multimedia,” simply referred to moving graphics, texts, sounds, and animation (Forcier & Descy, 2005). The term “multimodal literacy” (Heath & Street, 2008) hones in on specific applications of new literacies in the classroom. The dynamic nature of multimodal literacy encompasses concepts that cannot be fully expressed through written language. Another term to emerge is “digital multimedia,” focusing on the computer as the conduit by which multimedia elements are combined, networked, and presented through VHS, CD-ROM, DVD, and streaming video formats.

There is little argument that we live in a technological age. Pedagogy, in general, has pushed toward using interactive technologies (the Internet, intelligent classrooms, multimedia) as learning tools (Winer & Cooperstock, 2002). However, Internet access in every classroom is rendered a useless tool unless teachers are prepared to effectively integrate it into daily learning activity (Carvin, 2000). Using the Internet and other
technologies as learning tools is only purposeful if incorporated in the appropriate educational and social context.

The educational system is currently populated by “digital natives,” students who have grown up with technology ever-present in their lives, and “digital immigrants,” people who have learned to use technology later in their lives (Prensky, 2005). Classroom teachers must navigate the distance between their own technological knowledge and skill and the technological fluency of their students. Research recommends that new instructional strategies should attempt to tap into the skills of digital natives and that teachers acquire the knowledge of skills needed to provide multiplatform instruction.

_A New Direction for Reading Comprehension Research_

_The History of Comprehension Research._ Up until the early 1900s, reading comprehension was viewed as the product of instruction rather than the focus of instruction. Reading was understood in terms of oral reading, accuracy, and fluency, rather than the ability to comprehend. Decoding was the key, and a simplistic view of reading was widely accepted. By the 1920s and 30s, readability and reading skills began to dominate reading research, but it wasn’t until the publication of Nila Banton Smith’s _American Reading Instruction_ (1934) that a historical perspective on reading instruction was available and referenced.

Readability and skills instruction did not fully explain why students struggled with the acquisition of reading. Proponents of the readability theories of the 1920s advocated that short sentences and smaller words aided comprehension, which was consistent with the simple view of reading’s claim that language comprehension relied on
easily accessible words and phrases. However, the simple view did not, and still does not, take into account the accumulating evidence on the relationship of other variables – prior knowledge, conceptual relationships, inferencing, and metacognitive strategies and skills – with comprehension. By the 1970s and 1980s, scholars no longer accepted that decoding was the key to reading success, and the foundational, simplistic view of reading was challenged.

Challenging the Simple View of Reading. The “simple view of reading” is associated with the work of Gough and Tumner (1986). They argue that decoding skills plus language comprehension equals reading comprehension (D + LC = RC). According to Gough and Tumner’s equation, the absence of either decoding or language comprehension skills will result in a failure to comprehend. In contrast, the complex view of reading posits that decoding and language are just two of the many components that constitute reading that, if unmastered by students, result in comprehension failure.

It should be noted, however, that although the simple and complex views of reading are oppositional, they both claim that language comprehension is a key to reading comprehension. The simple view stresses simplifying language through syntax and word choice, to achieve comprehension. Like the complex view, the simple view acknowledges that an understanding of specific vocabulary is central to comprehending material to be read. Both views agree that decoding is a fundamental skill requiring mastery, although the complex view argues that comprehension goes far beyond decoding text. Studies supporting a more complex view of reading have reported that some students may demonstrate strong decoding and language skills and still not be able to comprehend what they read (Deacon & Kirby, 2004; Joshi & Aaron, 2000; Nagy,
Berninger, & Abbott, 2006; Nation, Clarke, Marshall, & Durand, 2004; Proctor, August, Carlo, & Snow, 2006).

The findings of Riddle-Buly and Valencia (2002) challenge the simple view of reading by reporting that students can demonstrate proficiency in any number of small reading processes and still not successfully comprehend. They found that students’ reading performance could be placed into six distinct categories – “automatic word callers,” “word callers,” “struggling word callers,” “slow word callers,” “word stumblers,” and “slow comprehenders.” “Automatic word callers,” for example, were strong in word identification and fluency, but could not comprehend. “Slow and steady comprehenders,” on the other hand, are strong in comprehension, but slow in word identification and fluency. These profiles challenge the simple view’s claim with evidence that readers who have mastered the components of decoding and language may not demonstrate proficiency in reading comprehension. Other reading knowledge and skills are also at play.

Oakhill & Cain (2007) list several processes affecting comprehension – including phonological awareness, memory, fluency, vocabulary, verbal IQ, syntactic knowledge, inferencing, and story structure understanding. These components appear to be consistent across genres, meaning that the reading process is essentially the same no matter what genre or text type is being read (Duke, 2007). Several studies have found that genre directly interacts with students’ ability to comprehend text successfully, their use of comprehension strategies, their inferencing, and their overall approach to reading (Hidi & Hildyard, 1983; Kucan & Beck, 1997). This evidence supports the argument that reading comprehension is affected by additional variables, such as text, genre, and
purpose, and that students need to be engaged in reading activities with a range of texts (Duke, et al., 2006/2007; Purcell-Gates, Duke, & Martineau, 2007).

Another challenge to the simple view of reading is that comprehension instruction generally utilizes paper texts with the expectation that the reader’s knowledge and skill will transfer to multimodal reading tasks. Multimodal comprehension tasks are non-linear, requiring the reader to incorporate prior knowledge and skills, engage in reading mediated with technologies, interpret non-verbal material, and engage in decision-making (Slavin, 1991; Patterson, 2000; Schmar-Dobbler, 2003). Although some comprehension processes taught in paper-based environments are similar to those in the digital world (inferencing, applying prior knowledge to topics, recognizing text structures, and regulating metacognitive monitoring processes), there also several unfamiliar processes, such as interwoven reading and physical activities and rapid, self-regulation, that are not accounted for by the simple view of reading (Coiro & Dobbler, 2007).

Given the available evidence, it is reasonable to conclude that the simple view of reading is insufficient. Following the lead of the complex view of reading comprehension, research needs to be conducted that explores the application of new learning activities and tools to accomplish reading tasks. An important goal of comprehension instruction is to develop self-regulated learners who can successfully transfer their reading knowledge and skills across genres and platforms.

What Good Readers Do. Comprehension was identified by the National Reading Panel (NICHD, 2000) as one of the foundational skills of literacy. Comprehension is the process of simultaneously extracting and constructing meaning through interaction and involvement with language (Durkin, 1993; Sweet & Snow, 2003). Good readers extract
meaning through their interactions with the text and then further construct meaning by organizing and combing new information with existing schema (Durkin, 1978/1979; Durkin, 1993).

Good readers use their prior knowledge to make predictions about what they will read and infer meaning from the author’s tone and purpose, ask questions while reading, visualize what is read, summarize after reading, update prior knowledge with new information, and most importantly, repair disruptions and breakdowns that emerge during reading. What distinguishes successful self-regulated readers from struggling readers is that self-regulated learners understand when a strategy is not working and can select from a toolkit of strategies to replace it with and achieve comprehension. This self-regulation is called “transference” or “generalization,” where students are able to apply learned strategies under varying conditions, varying tasks, and varying contexts (Harris & Pressley, 1991). Transference is most likely to occur when students are provided with instruction that provides them with different opportunities, settings, genres, and multiple platforms to accomplish increasingly complex reading tasks.

Reading instruction that induces readers to process text more deeply causes greater comprehension and recall (Kane & Anderson, 1978). Good readers can elaborate and operate on learned material, then re-present to the material to induce deeper levels of processing (Craik & Lockhart, 1972). The more they interact with the material, the more it becomes part of their long-term memory. Successful readers are able to recognize new information in terms of their prior knowledge and generate relationships between what is new information and what is already stored in their long-term memories (Anderson & Armbruster, 1978; Linden & Wittrock, 1981).
Meaningful learning by reading information text is, fundamentally, a constructive process requiring sustained interaction with the text (Wixson & Peters, 1987). There are five cognitive processes important for learning by reading information texts: activating, focusing, selecting, organizing, and integrating (Kintsch & van Dijk, 1978; Tierney & Pearson, 1981). The process of reading, therefore, is complex and constituted by the interplay of psychological, linguistic, neurophysiological, and socio-cultural elements, as well as the five cognitive processes which are applicable to information text comprehension (Dishner, Bean, Readence & Moore, 1992).

As noted by Duke (2007), there is a continued call for multimodal literacy activities, embedded in content, using multi-platform reading tasks, and specific to genres. However, the literature available on how students become self-regulated readers who can accomplish reading across multiple platforms is tentative, at best.

Models of Reading

There are several noted models of the reading process, including top-down models, bottom-up models, interactive models that combine top-down and bottom-up paradigms, stage models and developmental models.

Bottom-up and Top-Down Models. Bottom-up processing models center on text components, such as letter identification, sight word identification, and decoding. These components are usually emphasized first in instruction. Bottom-up models promote explicit skill instruction, such as letter-naming, spelling patterns, and a phonics approach based on decoding parts of a word to comprehend words, phrases, sentences, paragraphs, and later, texts. Examples of bottom-up processing theories are Gough’s Information
In contrast, top-down processing models center on reading for meaning, using prior knowledge and context to decode and construct word meaning, and schema building to create a meaningful context for learning the components of reading and comprehension. Top-down models promote strategies that recruit the reader’s general knowledge of a subject, focusing on a reader’s word recognition through content-embedded vocabulary and predictions based on pictures and title pages. A classic example of top-down processing is Goodman’s Psycholinguistic Model (Harris & Sipay, 1990).

*Interactive Models.* Interactive models explain the constant interactions between text-based and reader-based components of reading. Interactive models, such as Rumelhart’s Interactive Model (Ruddell, Ruddell, & Singer, 1994) and Stanovich’s Interactive-Compensatory Model (Stanovich, 1980) are more compatible with classroom instruction, as they seek to understand and provide varying means to meet both the bottom-up and top-down needs of learners engaged in reading. Scarborough’s model (2001) proposes that strategic reading is a combination of language comprehension (top-down skills, such as context clues and schema activation) and word recognition (bottom-up skills, such as phonemic awareness, decoding, and sight words). As language comprehension and word recognition develop, they are woven together and become tighter as instruction progresses. Language recognition becomes increasingly automatic and word recognition becomes increasingly strategic.
Critics of the simple view of reading argue that it fails to account for the development of proficient reading. A model of reading should demonstrate the evolution of reading, including how it develops from a collection of simple processes to proficient reading comprised of functional systems working in tandem with the brain to produce comprehension. Duke (2007) does not include developmental models in her argument for the complex view of reading. This omission leaves a gap in understanding and remediating the kind of instruction that she promotes.

*A Stage Model.* Chall’s Stages of Reading (1983) presents six distinct stages that a reader moves through, from birth to the college years, as they accumulate reading skills. Readers in the “pre-reading stage,” from birth to age 5, have an unsystematic understanding of the print they encounter. In the “initial reading stage,” ages 6-7, readers have learned letters and can correctly associate them with parts of spoken words. In the “automaticity stage,” ages 7-8, readers can consolidate what they learned in the previous stage and read easy books on familiar topics. In the “reading for learning stage,” ages 9-13, students bring prior knowledge to their reading and reorganize their knowledge based on acquired new material. In the “multiple viewpoints stage,” ages 14-18, readers engage in learned comprehension strategies to critically analyze text and understand the content of the text from multiple viewpoints. In the “construction and reconstruction stage,” ages 18 and up, readers construct meaning from the text based on both analysis and synthesis. A reader must move deliberately through Chall’s Stages by accomplishing the specific reading tasks associated with that stage. However, Chall’s model does not explain the process of how readers move from one stage to another in Piagetian concepts.
A Developmental Model. The foundation of a developmental model is the intercoordination of mental systems with a number of “core reading systems” – phonemic awareness, word identification, vocabulary, comprehension, and mental systems to accomplish increasingly complex tasks. The development of proficient reading ability is explained as the hierarchical reorganization of core reading and mental systems. Their intercoordination is the outcome of accomplishing increasingly complex reading tasks. As can be seen in Figure 1, Blanton, Pilonieta, and Wood’s model (2007) relies on a set of developing, coordinated reading and mental systems that develop as increasingly complex tasks are performed. Whereas Chall’s Stages of Reading (1983) argues that reading development occurs by passing through stages as the reader accumulates skills, Blanton, et al.’s model proposes that proficient reading is the outcome of the accomplishment of increasingly complex reading tasks that hierarchically reorganize reading and mental systems. Proficient reading is acquired through participation in instruction that organizes a series of seamless Zones of Proximal Development (ZPDs) (Vygotsky, 1978). A ZPD is social space between a learner’s actual developmental level, as determined by independent problem solving, and the level of potential development, as determined through problem solving under adult guidance, or in collaboration with more capable peers.

The major difference between Blanton, et al.’s model and those that precede it is that this model explains the organization, transformation, and inter-coordination of mental and core reading systems and how the process of the learning and the development of reading are affected by the mediated structure of reading lessons. The
Figure 1: Acquisition of Proficient Reading, Thinking, and Subject Matter Systems

Core Reading Systems
- Phonemic Awareness
- How Reading Works
- Word Identification
  - Sight Words
  - Phonics
  - Context
- Vocabulary
- Comprehension
  - Recall of Facts
  - Interpretation
  - Critical Analysis
  - Understanding
- Artifacts

Mental Systems
- Attention
- Perception
- Memory
  - Word Meaning
  - General Knowledge
  - Domain Knowledge
- Language
  - Syntax
  - Semantics
- Thinking
  - Recall
  - Coordinating Meaning
  - Inferencing

Increasingly More Complex Reading Tasks

Proficient Reading and Fluency: Skill in coordinating core reading, mental and subject matter systems to accomplish reading tasks.
organization of instruction arranges for the acquisition of reading. During instruction, students internalize the social interactions mediating reading lessons. A meta-language for and about reading and thinking is acquired in much the same way as the process of internalizing the social interactions described by Vygotsky’s theory. Research needs to be done on activities that provide a framework for students’ reading development across genres and platforms, embedded in rich content, and based on authentic texts.

The question about whether to teach reading skills or reading strategies is another point of disagreement between the simple and the complex views of reading. The simple view, which relies on the bottom-up model, advocates the direct and explicit instruction of specific reading skills, such as decoding and phonics to develop automaticity. The top-down and interactive models are based on the notion that students should be taught reading strategies in such a way that they can self-regulate and evaluate their own comprehension and strategies and deliberately select strategies from a repository of strategies. Blanton, et al.’s model is unique in that it advocates both skills and strategies. Skill, in this model, is actually the coordination of reading and mental systems, subject matter knowledge, and tools to enact and accomplish reading tasks.

In order to successfully comprehend, students need to use metacognitive processes to regulate their reading and comprehension of both narrative and information texts (Mizelle, 1992; Mizelle, 1997; Paris, et al., 1991). Recent research demonstrates that good readers use comprehension strategies with every reading task. Good readers use them consciously, deliberately, and with flexibility, adjusting them to meet a variety of specific goals with multiple texts (Dole, et al., 1991). Research also demonstrates that the direct instruction of comprehension strategies will aid students in comprehension

In summary, the above developmental model poses that the cognitive structures that are necessary for reading, comprehending, thinking about, constructing meaning and understanding of text are, first, located in the structures of social interactions constituting reading lessons. As students participate in a reading lesson, the organization of the lesson is internalized and transforms students’ mental and reading systems, how they read, think about, and understand what they have read. The zone of proximal development explains how learners participate in activity, alongside more accomplished peers who provide guided assistance for accomplishing increasingly complex reading tasks.

Directed Reading Activity

Directed reading activity (DRA) is a continually evolving reading instruction framework used to engage students in reading both narrative and information texts. The teacher actively supports students throughout a reading lesson (Fountas & Pinnell, 1996; Tierney, Readance & Dishner, 1995; Watts & Graves, 1997). When DRA (Betts, 1946) first emerged as a reading strategy, it addressed preparing readers to read a text through concept development, introducing vocabulary, and simulating motivation. Silent reading was followed by discussion, a check of comprehension, and concluded with follow-up activities.

Stauffer (1969) introduced the Directed Reading-Thinking Activity (DR-TA) and a new dimension was added to the framework of DRA. Betts’ notion of reading readiness was transformed into identifying a purpose for reading and giving students the
responsibility and ownership through teacher-directed thinking questions, such as “why do you think so?” and “provide evidence from the text.” DR-TA continued to evolve based on the works of Ausubel and Piaget (Herber, 1970). Phases of DRA/DR-TA grew to incorporate pre-reading activities, such as word attack and anticipation guides. DR-TA also includes organizational strategies during reading and discussion after reading.

Information Text Reading Activity (ITRA) (Blanton & Moorman, 1990) extended the work outlined above. In the ITRA, the planning phase involves pre-reading preparation, vocabulary instruction, and the establishment of a purpose of reading. The monitoring phase involves monitoring reading often guided by reading and study guides. The final phase focuses on the extent to which the purpose of reading was attained and follow-up activities to integrate new knowledge with the prior knowledge of students. This evolution represents a scaffolded continuum from teacher-directed reading to student-directed reading and self-regulation. As participants of an ITRA transcend from a teacher-led activity to independence, they rely on the structure of the lesson and the social support of more capable peers.

There are three main phases of ITRA correlate to the three phases of a DRA reading lesson – pre-reading, during reading, and post-reading. During the pre-reading phase, the teacher activates the background knowledge of students, provides instruction on decoding difficult words, develops vocabulary essential to understanding the text, and provides a purpose for reading. During the reading phase, students read silently. The teacher may provide assistance during silent reading. The text may be divided into manageable units and various graphic organizers may be used to gather data for understanding the text.
During the post-reading phase of instruction, the teacher coordinates discussion. The first activity is to revisit the original purpose for reading by restating the purpose in a question form (for example, if the purpose was to “learn about building a bridge,” then the restated purpose-question would be “how do you build a bridge?”). The purpose of discussion and other activities during this phase is to update the prior knowledge of students. A generative activity, such as visualizing or summarizing, or assessment concludes the lesson.

Although the DRA framework is widely used as an instructional tool to engage students in the reading of information texts, its effects are assumed. However, there is substantial research on the structure of the reading lesson. Lessons designed to engage students in reading information texts should contain three phases: pre-reading, reading, and post-reading (Speigel, 1991). The purpose of instruction during each phase of the lesson is to assist the reader, and the behavior of both the teachers and students is different within each lesson phase (Collins, Brown, and Larkin, 1980).

Additionally, effective lessons should involved accessing or developing background knowledge, stating a purpose for reading, reading for that purpose, performing a task reflecting attainment of the purpose, and providing feedback about comprehension (Tierney & Cunningham, 1984). When the structure and phases of the lesson are made explicitly clear to students, there is a trend toward increased student achievement.

Despite what is already known about the reading lesson, the DRA framework has not been subjected to a great mount of research, nor have the interactions promoted by each phase of DRA been greatly examined. There is still much left to be understood.
about the effects of the organization of DRA. Also, there is a need to understand the nature of student interactions through *in situ* video-taped activities, rather than post-activity interviews (Venezky, 1983).

**Digital Storytelling**

*An Introduction to Digital Storytelling.* A digital story is a form of short narrative, usually a personal narrative told in the first person, presented as a short movie or display on a television or computer monitor or projected onto a screen (Davis, 2002). Digital storytelling, therefore, is the act of creating a digital exposition, to be presented on a computer monitor or television. In the same way that narrative stories can be created digitally, informational pieces can also be created, in the form of news reports, documentaries, and other outcomes of in-class projects. Previous uses of digital storytelling have been limited to narratives and autobiographies, and have not addressed academic issues.

Generally, digital stories are based on narratives – autobiographies, personal histories, and creative original stories. However, the elements of a digital story can be used to create informational stories. For example, the University of Houston’s Educational Uses for Digital Storytelling site lists “7 Elements of a Digital Storytelling” – author’s point of view, a dramatic question, emotional content, the gift of your voice, the power of the soundtrack, economy (providing just enough content without “overloading the viewer”), and pacing (Hofer & Owings-Swan, 2006). The “non-emotional” elements of a digital story – appropriateness of soundtrack, economy, pacing, and truth of content – can also serve as criteria for determining what makes a good digital story in any genre.
Digital storytelling is an evolving art form (Ohler, 2006). Beginning solely as a form of personal narrative, with research evidence, digital storytelling may become a useful technological teaching tool. Writing teachers can use digital storytelling to teach narrative parts, imagery, and other literary devices. Reading or subject area teachers can use digital storytelling to have students create news reports of the information texts read in class. It has been studied as a means of fostering narrative storytelling and expression using multiple modalities (Hull & Nelson, 2005; Waire, 2006). Similar to digital storytelling, music-video making, has also been used to bridge the digital divide between underprivileged urban students and their access to technology (Mahiri, 2006).

Personal computers are typically equipped with basic digital video programs, allowing any computer user to become an amateur film maker. Stories can be told through slideshow displays of still photographs set to music. Digital stories can also be easily created and shared via personal computer and the Internet. Organizations such as the Center for Digital Storytelling exist to foster the “art of storytelling” and to offer technological and creative assistance to users who wish to create digital stories (in effect, digital scrapbooks) of their lives (Robin, 2008). Students are also able to utilize digital storytelling as a way of telling their personal narratives. For example, students involved in Massachusetts’ Place Project have used digital storytelling to identify themselves as writers by linking their feelings of place with images and point-of-view, concluding that “place” is not simply a physical location, but also an emotional state (Banaszewski, 2002). Large corporations have also used digital storytelling to tell the company’s genesis to employees, in an attempt to make the company’s values more personal and engaging (Banaszewski, 2005).
The Search for Literature on Digital Storytelling. In searching for peer-reviewed empirical research on digital storytelling, the term “digital storytelling” was used in a search of the Educational Resources Information Center (ERIC) database, which resulted in 50 articles. It should be noted that out of the results yielded from this search, only seven articles were published in peer-reviewed journals. Most of the publications discussing digital storytelling appear in teacher magazines and online resources, such as SchoolsArts, EdTech Magazine, Edutopia.com, and Technology and Learning Magazine.

From that initial search, only three of the peer-reviewed articles reported on digital storytelling in an in-school classroom environment. Additional searches were made using the following terms: “multimedia learning,” “multimedia classroom,” “multimedia literacy,” “computer literacy,” “computer-assisted learning,” “computer-assisted instruction,” “digital video learning,” “film units,” “movie-making,” and “video diaries.” This search yielded similar studies, but no research specifically exploring digital storytelling, reading, and comprehension of information texts; nor did any studies appear that coupled digital storytelling and directed reading instruction.

Another search of the term “digital storytelling” conducted with Academic Search Premier yielded 88 articles, most of which referenced digital storytelling as a means of fostering community and preserving culture through home movies, blogs, and online video/image-sharing forums such as YouTube and Flickr. This second search yielded articles citing digital storytelling as a tool to improve the quality and thoughtfulness of writing. Six articles presented cases of digital storytelling in an educational setting, which lead the researcher to the Center for Digital Storytelling, as well as a website published by the University of Houston on the “Educational Uses of Digital Storytelling.”
This website encourages classroom teachers and researchers who use digital storytelling, or modified versions of it, to share their findings and experiences.

This second search also led to a number of websites on digital storytelling. The Digital Director’s Guild, a website for teachers who use digital movie projects in the classroom, provides a forum for sharing these projects with others. The Digital Director’s Guild explores the impact of digital storytelling on student learning outcomes, as well as mapping out a place for movie making across the curriculum. There are also links to digital storytelling and information texts, in the form of documentaries. Other digital storytelling sites, such as the Sedona Digital Storytelling Workshop and Storiesforchange.org, foster the use of digital storytelling by adults seeking to establish social commentary, preserve community history, and create a modern modality to the ancient art of storytelling. These sites offer hands-on workshops and online tutorials for the general public, including some for educators, whereby the qualities and quality of good digital stories are discussed.

Testimonials from teachers who have used digital storytelling in their classroom, through blogs and wiki entries, report it to be a flexible and enjoyable activity. Since the term “digital storytelling” has come to encompass a wide variety of genres and modalities, teachers gravitate toward it. Digital storytelling can be easily modified to suit students’ needs while still fulfilling state and district requirements to use technology-based activities (Robin, 2008).

Review of the Digital Storytelling Literature. Only one empirical study appeared in the two search process. In Oakland, California, the Digital Underground Storytelling for Youth (DUSTY) Center was founded in conjunction with Cole Middle School as an
afternoon activity club for students identified as socially at-risk for joining gangs or dropping-up. At DUSTY, students create digital autobiographies set to the music of local rap and hip-hop artists, telling their stories of life in Oakland, pride, self-worth, inner motivations, and desires to succeed. Hull and James (2005) reported that students who participated in DUSTY showed higher motivation toward schools, higher technological literacy (as most of them did not have access to a computer at home), higher retention, and lower truancy rates. Students involved in the DUSTY program also began to acquire a meta-language for creating films. Students appropriated the meaning of words not in their normal lexicon, such as “storyboard,” “script,” “theme,” “angle,” and “montage.” These findings reveal that a new shared meta-language for and about digital storytelling emerges in the creation of digital stories.

These searches also revealed one study (Smagorinsky & O’Donnell-Allen, 1998) that was similar to this study in methodology and technique that yielded positive results. Smagorinsky and O’Donnell-Allen (1998) studied a visualization activity called a “body biography” was added to the post-reading phase of a DRA on *Hamlet*. The researchers examined the group’s discussions during the creation of their body biography, as they drew life-size representations of Laertes, examining social interactions during the construction of meaning. They found that through collaborating to create the body biography, students coordinated their own interpretations of the characters and came up with an agreed representation of Laertes. In addition, this study provided evidence that reading is a process continually mediated by signs and language. The result was a restructured reading lesson enhanced by social interactions and the insertion of tools, and
the researchers concluded that reading teachers should consider incorporating multimedia activities into the post-reading phase of the lesson.

In storytelling, digital storytelling taps into storytelling skills from a student’s early youth, that may have lay dormant for many years within the middle school student’s imagination, thus blending two comfortable worlds – inventing stories and using technology (Egan, 1986). Digital stories can take many forms, including essays, narrative, biographies, and documentaries, all existing digitally through multimedia graphics, audio, video, and animation (Kajder, Bull & Albaugh, 2005). Only recently has digital storytelling as an instructional activity made its way into the classroom (Banaszewski, 2002; Bull & Kajder, 2004).

The absence of peer-reviewed study calls for empirical research. There is no denying that digital storytelling is becoming a popular instructional tool. The research on its effectiveness is limited to studies that address non-academic topics (Hull & James, 2005). However, Smagorinsky and O’Donnell-Allen’s study (1998) does lend some support for digital storytelling as an activity that may enhance comprehension.

Outside the world of reading, multimedia systems have been used successfully to motivate students to become proactive learners, as well as developing their creativity, processing skills, and critical thinking skills (McCarthy, 1989; Roblyer, 2003). Turner and Dipinto (1992) found that incorporating multimedia in the classroom allowed students to be more introspective, increasing their understanding of complex metaphors, and encouraging innovative thinking. Some advantages of multimodal learning include engaging students in active learning, encouraging creativity, allowing for collaboration with others, constructing a healthy learning environment, allowing students to control the
process and product, providing flexible options for varied learners, providing positive reinforcement, involving critical thinking skills, and incorporating multiple intelligences (Forcier & Descy, 2005).

*The Rationale for This Study.* First, literacy is becoming recognized more and more as a multimodal activity which should be accessed across multiple platforms. Second, DRA is a framework that can be modified to include a multimodal literacy activity. Third, Duke (2007) argues that research and investigation should examine new, complex reading strategies that extend across multiple platforms. It is reasonable to infer that modifying a DRA to include technological tools could transform it into a framework for multiplatform literacy activity. Fourth, one of the goals of the post-reading phase of DRA is to provide opportunities for students to integrate their prior knowledge with the new knowledge acquired through reading. Fifth, Smagorinsky & O’Donnell-Allen’s study (1998) used a similar technique by adding a visual activity to the post-reading phase of DRA and they found it successful. This gives credence to trying to engage students in an activity such as digital storytelling in the post-reading phase of DRA.

Sixth, the literature suggests that the difference between good readers and poor readers is that good readers use reading strategies to self-regulate, debug, and repair their reading difficulties. Good readers also use generative strategies, such as summarizing and visualizing, after reading. Poor readers do not. Since digital storytelling uses generative multimodal activities, it may support poor readers’ acquisition and application of generative reading strategies.

For the above reasons, it seems reasonable to manipulate the phases of DRA with activities, such as digital storytelling, that create multiple platforms. A theoretical view is
desirable that promotes cognition as being appropriated from social interactions, tool use as fundamentally changing an activity and mental processes, and focuses on how learning activity is organized to include multimodal literacy. This study also requires a theoretical view that understands that the individual cannot be separated from the social context in which instruction is given. Cultural-Historical Activity Theory meets these requirements.

**Theoretical Framework**

The theoretical framework for this study was Cultural-Historical Activity Theory (CHAT). This framework is grounded in two CHAT views on reading and reading instruction (Blanton, et al., 2007; Gavelek & Bresnahan, 2009), as well as the development reading model that this study supports. Blanton et al.’s reading model is built on four key CHAT principles. The first principle is the Law of Cultural Development (Vygotsky, 1978), which states that cognitive structures exist, first, in the external world. Through participation in activity, thinking processes are internalization (Blanton, et al., 2007). Internalization does not mean that an exact copy of the external world is made inside one’s head. Rather, learners construct internal symbolic representations of the outside world. The process of internalization transforms internal mental processes and the contents of memory (Cole, 1996; Vygotsky, 1978). Humans also externalize their thoughts and experiences through speaking, gesturing, listening, writing, and signs.

The next principle is that human learning and development is culturally mediated (Cole, 1996). Humans do not interact directly with their environment. All their interactions with the external world are indirect and mediated with tools. When a tool is inserted into an activity, the activity is fundamentally changed and affects thinking
processes. There are two kinds of tools, instrumental and conceptual. Instrumental tools are external, concrete instruments, used to mediate activity, such as computers, books, slide rulers, cell phones, cameras, paper, and the like, are directed into the external world. Psychological tools, such as concepts and language, are directed inward and outward to regulate one’s self and others.

Language has several functions. Language mediates the social interactions between one’s self and others, coordinating communication and the mediation of intellectual activities, such as reading and writing (Radzikhovskii, 1991). Social language is internalized into an inner “meta-language” that is used for self-regulation of goal-oriented activities, such as reading, planning, monitoring, evaluating, and the regulation of others.

The third principle of CHAT is that all intellectual activities are coordinated, functional mental systems. Participation in culturally-mediated activity transforms basic mental functions, available at birth, into intercoordinated mental systems as the result of accomplishing increasingly complex tasks. Reading, writing, thinking, and language are all intercoordinated systems that do not function independently. As one participates in activity and accomplishes increasingly complex tasks, these mental systems are hierarchically and qualitatively restructured.

The last principle is that there is a mechanism that mediates the internalization of social interactions from the outside to the inside to restructure mental functions. This mechanism is the Zone of Proximal Development (ZPD). Vygotsky (1978) defined the ZPD as the difference between a child’s actual developmental level as determined by independent problem solving and the level of potential development as determined
through problem solving under adult guidance or in collaboration with more capable peers. In the ZPD, participants move from an inability to accomplish a task independently to the ability to perform it with the social support provided by more proficient peers (or adults). One of the main outcomes of participation in a ZPD is that a student’s attention is directed by others toward the accomplishment of a goal. When working independently, students may focus only on what they think is important. In social activity, members externalize their thinking by using language, visuals, and other conceptual and instrumental tools. This externalization helps students to attend to, to see, and to hear how the pieces of an activity fit together (Blanton, et al., 2007).

When students work with others to accomplish a task, each individual brings their unique background to the task which is externalized and shared with the group. While engaged in digital storytelling activity, students work in small groups, externalizing their thinking with language and mediating their interactions with language and instrumental tools. The structures of these interactions are internalized and transform cognitive structures. Engaging in social interactions organized around digital storytelling may prompt deep processing of information through discussion and story generation. The outcome for students is reconstructed literacy systems available to accomplish increasingly more complex literacy tasks.

The organization of the reading lesson and the individual cannot be separated. Theoretically, literacy is an activity that is located in social interactions. The organization of the reading lesson makes the language, thinking process, knowledge, and tools used available to students. Each phase of DRA organizes the thinking processes of the group. Inserting different tools in the DRA changes the activity. Through
engagement in the reading lesson and social interactions of the group, group members appropriate language and cognitive processes, such as planning, monitoring, and evaluating the accomplishment of reading tasks.

Why Digital Storytelling Circles as a Treatment?

The idea of a digital storytelling circle (DSC) was prompted by a reading and discussion of Blanton, Pilonieta, and Wood’s reading model (2007), particularly its potential to remediate the post-reading activity of a directed reading lesson. DSCs are similar to Literature Circles (Daniels, 1994). They are small, student-led collaborative groups composed of 4-5 students reading the same information text and then creating a digital representation of the text. Once all students in the DSC have read the text, group members are assigned a specific role and assume specific responsibilities during the production of the video (Director, Writer, Producer, and Editor). The division of labor and roles provides purpose and coordination of activity. The collaboration of participants builds conversational skills and allows for thoughtful and personal discussions of a text. The function of roles aids students in generating their own ideas about what they have read and facilitates in engaging students in discourse with their peers. Gradually, students assume responsibility for their own comprehension, interpretation, and understanding of the text they have read, the development of discussion, and the engagement in complex levels of thinking while reading (Bradham & Villaume, 2000). The DSC then shares their product with other DSCs.

Thus, a DSC provides a social context for students to utilize multimodal tools to construct personal interpretations of text and to externalize their interpretations through collaborative activity. The structure of digital storytelling activity directs student
attention on metacognitive processes, such as planning, monitoring, evaluation, and
reflecting on the accomplishment of multimodal tasks. DSCs also provide social support
for students to acquire additional reading knowledge and skills.

Summary of the Review of Literature

The traditional notion of literacy in American society is one that includes the
ability to read the printed page and to, subsequently, write in that medium (Venezky,
Wagner & Ciliberti, 1991). The advent of the technological age and the “post-
typographic culture” (Provenzo, 1986) has changed the idea of literacy to include
multimodal literacies, such as written, oral, visual, and gestural systems of
communication (Heath & Street, 2008; Kress, 2000). It has become increasingly
necessary to extend this evolution of literacy to incorporate both paper-based views of
literacy and a non-paper based views of literacy.

Instruction based on a simple view of reading is not sufficient. Instruction should
be driven by a more complex view of reading and include multiple platforms and reading
instruction. The emergence of multimodal literacy indicates the need to incorporate new
technologies into reading instruction. Digital storytelling is an activity that may be used
to create a multiplatform reading activity. However, there is a limited amount of research
on its application to reading instruction.

Based on the topics reviewed in this chapter, digital storytelling merits empirical
study as a potential instructional tool for engaging students in reading information text,
along with providing opportunities for students to acquire knowledge and skills necessary
for engaging in multimodal literacy activities. This study predicts that participation in a
directed reading activity reorganized to include digital storytelling circles in the post-
reading phase will have a significant effect on the reading and comprehension of information text.
Chapter 3

Methods

The purpose of this study was to determine the effects of participation in directed reading activity modified to include digital storytelling, a multimodal literacy activity, in the post-reading phase of instruction. The effects of digital storytelling on reading comprehension were studied, as well as the nature of social interactions that took place while students were engaged in digital storytelling activity. A mixed-methods design, employing both quantitative and qualitative research methods, was implemented. An experimental-control group design was used to test the effects of participation on the reading comprehension of the treatment group. A qualitative approach was used to account for the interactions during the digital storytelling activity.

In this study, digital storytelling was a multimodal activity mediated with a number of tools, such as text, computers, cameras, storyboards, software, and discourse. Students coordinated and interpreted written, oral, visual, and gestural symbols to create original self-sustaining representations based on their understanding of an information text. To create digital stories, students were required to utilize images and audio retrieved from the Internet, take digital still photographs or videos, or record voice-overs through a laptop microphone.

There is sufficient research to support the inherent challenges of using traditional research methods to study digital storytelling (Hull & Katz, 2006; Lambert, 2002). Socio-cultural factors are prevalent in the nature of social interactions during treatments involving multimedia (Smagorinsky, 2001). The crux of the criticisms is that existing research in this field has lacked a cohesive approach to describing how complex human
activities affect learning outcomes. Classroom learning should not be treated as varying by single isolatable factors (Crookall, Coleman & Oxford, 1992; Meskill & Mossop, 2000; Reinking & Watkins, 2000; Smagorinsky, 1995). Since many variables are at play within a classroom setting, descriptions of the interactions are needed to understand what constitutes a treatment (Mackey, 2003). The researcher sought to account for evidence that the principles of CHAT were reflected in the interactions of activity during the creation of digital stories.

Research Setting

The setting for this study was Anderson Secondary School (Anderson), a private 6-12 educational institution, located in a Southeastern United States metropolitan city suburb. Approximately 600 students, over 50% of whom are bilingual from 37 different countries are enrolled. Admission to Anderson is contingent upon pre-admission scores obtained from the Independent School Entrance Examination (ISEE) (Educational Records Bureau, 2009), as well as supporting documentation, including letters of recommendation from teachers and administrators, and an interview. In lieu of the ISEE, prospective students may submit scores on the Preliminary Scholastic Aptitude Test (PSAT) (College Board, 2009), SAT Reasoning Test (College Board, 2009), or American College Testing Program (ACT) (College Board, 2009). For candidates whose first language is not English, a passing score on the Secondary Level English Proficiency Test (SLEPT) (Educational Testing Service, 2009) is required.

At the start of every school year, all students are administered the Comprehensive Testing Program-4 (CTP-4) (Educational Records Bureau, 2009), a battery of tests covering varying aspects of reading, science, social science, and mathematics. Students
are also post-tested with the CTP-4 at the end of the school year for the purpose of tracking achievement and informing school curriculum. The researcher was given the previous year’s CTP-4 scores for all subjects for use in informing the results of this study.

Participants

The participants for this study were sixth-grade students enrolled at Anderson. Sixth-graders were chosen for this study because they are at a transitional point in reading, where the focus shifts from a focus on basic reading skills and the understanding of narrative texts to an increased emphasis on the comprehending and understanding of information texts. At Anderson, grade six is departmentalized and “team taught” by four teachers, one for each subject area. In 1999, Anderson initiated their “laptop program,” in which all students have laptops and are able to access wireless Internet from anywhere on campus, creating an accessible and connected community of learners. This creates an expectation of technological proficiency among the students, who are required in all classes to access the internet, send email, and use their computers daily through a learning management software platform called EdLine.

Although there is often a stigma of easy success attached to private school students, not all students are as successful academically as they are financially. Many students at Anderson fall at or below grade level measures of academic achievement. Students are not placed in “honors” or “gifted” classes at the middle school level, although Advanced Placement is available to students in the upper grades. Students of all ability levels are randomly assigned to their language arts sections, with the exception of a few students who are placed in particular sections due to scheduling conflicts with other courses.
The sample for this study was 80 sixth graders enrolled in five different language arts classes taught by the same instructor, Ms. Lovell, a certified teacher with 12 years of experience teaching at Anderson at the time of this study. A total of 87 sixth-grade students were enrolled at Anderson. They were all given forms requesting permission from their parents to participate in the study (see Appendix A). Five students elected not to participate, leaving 82 students available for the study. During the first week of the study, one student transferred to another school and another student transferred schools shortly thereafter, leaving a final sample size of 80 students.

To determine the sample size, the power analysis program G-Power was used to find an appropriate sample size. After imputing an alpha value of 0.05, a 1-Beta value of 0.80, and the desired large effect size value of $f = 0.40$ (Cohen, 1988), it was determined that a sample size of 80 would be acceptable, allowing for 40 subjects in each of the conditions of the study. All participants signed letters of assent (see Appendix B).

Subjects were randomly assigned to the treatment or control group. Then, students in the treatment group were randomly assigned to their Digital Storytelling Circles (DSCs). Randomization controlled for several confounding variables, including socioeconomic status, length of formal schooling, overall previous experience with technology, and level of expertise in using the specific technology in this study, which could arguably bias the results (Thomas & Collier, 2002). Randomization also controlled for the effects of previous formal schooling, critical in a setting such as Anderson since students represent 37 different countries and over half of the students are bilingual or multilingual.
Procedures

Prior to the treatment, the researcher met with Ms. Lovell and conducted several sessions of teacher preparation. The researcher trained the teacher on the procedures for developing digital stories and utilizing the camera and computer equipment. The researcher and Ms. Lovell jointly reviewed lesson plans, the components of DRA, and how to create and guide the production of digital stories. Immediately before the start of the study, the researcher reviewed the procedures and observed Ms. Lovell conducting mock lessons to rehearse the implementation of the treatment. It was imperative that the procedures and delivery of the DRAs be the same for each class period.

Students in the experimental group participating in digital storytelling received mini-lesson tutorials on the use of technology used in the study from Ms. Lovell. The purpose of these lessons was to familiarize all students with the use and functions of the digital cameras, camcorders, and software, as well as to make sure all students felt at ease using the equipment and to eliminate the use of technology as a confounding variable.

Ms. Lovell then gave the students guidelines for developing their digital stories prior to the start of this study. Students were instructed that the digital products should be between 3 to 5 minutes in length. They were also instructed that their digital stories should incorporate digital photos, digital videos, and audio elements in the form of background music and voice-overs. Copyright infringement was not a factor, as students were also guided to retrieve public domain images off the internet or to take their own original digital photographs.
Treatment

The treatment lasted eight weeks. As can be seen in Table 1, at the start of Week One, all subjects participated in a cloze assessment (see Appendix C) based on the initial primary text, *Planet in Distress* (Brewster, 2006). None of the subjects had prior exposure to this book. The remainder of Week One consisted of all subjects participating in a whole-class DRA, under the guidance of Ms. Lovell, using *Planet in Distress*. Ms. Lovell began the DRA by drawing a concept map and asking the students what they already knew about global warming. Students raised their hands and offered terms such as “going green,” “hybrid cars,” “greenhouse effect,” and “ozone hole.” After several images and keywords had been mapped out on the dry-erase board, Ms. Lovell then asked the students to go through the text and make a list of vocabulary words. In the book, important vocabulary words were bolded as keywords and defined in a glossary. Ms. Lovell asked students to provide examples of uses for the specific words, most of which were provided by the students during their initial brainstorming session (e.g., greenhouse gases, greenhouse effect, ozone, and carbon dioxide).

Next, Ms. Lovell asked each group to come up with a prediction of what the book, *Planet in Distress*, was going to be about. She wrote each group’s prediction on the board. Most groups mentioned global warming as the topic of the book; however, a few groups also alluded to the melting of the ice caps and the destruction of the polar bear’s habitat (this was most likely because the cover of the book pictured a polar bear on an ice sheet).

During the reading phase of DRA, Ms. Lovell engaged the students in reading the book silently, stopping every second page to answer questions she posed. As they
### TABLE 1

*Treatment Timeline and Procedures*

<table>
<thead>
<tr>
<th>Week 1</th>
<th><strong>Control Group Activities</strong></th>
<th><strong>Treatment Group Activities</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• <strong>Pre-test</strong> <em>Planet In Distress</em></td>
<td>• <strong>Pre-test</strong> <em>Planet in Distress</em></td>
</tr>
<tr>
<td></td>
<td>• Begin DRA <em>Planet in Distress</em></td>
<td>• Begin DRA <em>Planet in Distress</em></td>
</tr>
<tr>
<td>Week 2</td>
<td>• Complete DRA <em>Planet in Distress</em></td>
<td>• Complete DRA <em>Planet in Distress</em></td>
</tr>
<tr>
<td></td>
<td>• Discussion</td>
<td>• Discussion</td>
</tr>
<tr>
<td></td>
<td>• Complete worksheets from <em>Planet in Distress Teacher’s Guide</em></td>
<td>• Break into DSCs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Begin storyboarding digital stories</td>
</tr>
<tr>
<td>Week 3</td>
<td>• View “An Inconvenient Truth”</td>
<td>• Complete storyboards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Create digital stories on <em>Planet in Distress</em></td>
</tr>
<tr>
<td>Week 4</td>
<td>• <strong>Post-test</strong> <em>Planet in Distress</em></td>
<td>• <strong>Post-test</strong> <em>Planet in Distress</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Share digital stories</td>
</tr>
<tr>
<td>Week 5</td>
<td>• <strong>Pre-test</strong> <em>Searching for Lost Tombs</em></td>
<td>• <strong>Pre-test</strong> <em>Searching for Lost Tombs</em></td>
</tr>
<tr>
<td></td>
<td>• Begin DRA <em>Searching for Lost Tombs</em></td>
<td>• Begin DRA <em>Searching for Lost Tombs</em></td>
</tr>
<tr>
<td>Week 6</td>
<td>• Complete DRA <em>Searching for Lost Tombs</em></td>
<td>• Complete DRA <em>Searching for Lost Tombs</em></td>
</tr>
<tr>
<td></td>
<td>• Discussion</td>
<td>• Discussion</td>
</tr>
<tr>
<td></td>
<td>• Complete worksheets from <em>Searching for Lost Tombs Teacher’s Guide</em></td>
<td>• Begin outlining digital stories</td>
</tr>
<tr>
<td>Week 7</td>
<td>• View “The Mummy Returns”</td>
<td>• Create digital stories on <em>Searching for Lost Tombs</em></td>
</tr>
<tr>
<td>Week 8</td>
<td>• <strong>Post-test</strong> <em>Searching for Lost Tombs</em></td>
<td>• <strong>Post-test</strong> on <em>Searching for Lost Tombs</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sharing of digital stories</td>
</tr>
</tbody>
</table>
progressed through the book, Ms. Lovell elicited student-created questions, prompting higher-order “teacher-like questions.” When students came across bolded vocabulary words, they were to write them down in their notes and create a definition in their own words. They were allowed to use the glossary as a guide. At the conclusion of reading, the whole class was led by Ms. Lovell in a summary discussion on what they learned from the book. Students reviewed their predictions and checked them for accuracy.

Next, Ms. Lovell’s assistant teacher, Ms. Haise, took the control group next door where they participated in an alternative assignment. Students in the control group completed handout assignments and watched the film “An Inconvenient Truth” while the treatment group was engaged in digital storytelling, so that time was not a variable. The teacher’s guide for *Planet in Distress* provided for handout activities related to the text.

The treatment group remained with Ms. Lovell. Each DSC was given an outline of four roles – Director, Producer, Writer, Editor. Individuals were allowed to choose their roles. As group leader, the Director was ultimately responsible for making final decisions, keeping the group on track, and being behind the camera. The Producer’s job was to coordinate all filming, keep track of group materials, and assist the director as needed. The Writer was responsible for writing all texts, scripts, and credits, as well as preparing the outline of the digital story. The Editor’s job was to find any songs or photographs needed online, and edit all audio, graphic, and video components together using Windows Movie Maker. Students were given a handout describing these roles (see Appendix D). By sitting in a pod of four desks facing each other, students were able to lean forward and conference as the noise level in the classroom got louder.
Each DSC received two copies of *Planet in Distress* and a storyboard on which they could outline and plan their digital stories (see Appendix E). The storyboard contained boxes where the students could draw what they wanted to appear in a frame, as well as a place to write possible narration and sound or graphic suggestions for that scene.

Ms. Lovell demonstrated what the storyboard should look like by providing a frame drawing, a line of narration, and a suggestion for background music on the board. Students were told that their drawings did not have to be “masterpieces” and that stick figures were acceptable. She emphasized that the point of storyboarding was to develop a plan of action for their digital stories. She gave an example of a storyboard frame drawn on the board of “severe weather” as an outcome of global warming. She had written notes next to the frame to include Peter Gabriel’s “Here Comes the Flood” as background music for that slide. Ms. Lovell encouraged the students to make connections between the image they wanted to use and the sound that accompanied it. They were also instructed that they could either type narration into Windows Movie Maker as a superimposed title or they could read narration into their laptop’s built-in microphone to record their own voices. Each DSC was required to complete their storyboards and show them to Ms. Lovell for her approval before they could begin searching for images or making videos. They were engaged two days a week in digital storytelling, with approximately 55 minutes per class period allocated to work on their digital stories.
At the conclusion of Week Four, students finished their first digital stories and burned them from their computers to DVDs. The treatment and control groups took their cloze post-test created from the book *Planet in Distress* at the same time.

Week Five began with the control and treatment groups, combined again as a whole class, where they participated in a cloze pre-test (see Appendix F) based on a second text, *Searching or Lost Tombs* (Granahan, 2006). After completing the cloze assessment, Ms. Lovell engaged the students in a whole-class DRA on *Searching for Lost Tombs*. This book presented a history of both Ancient Egypt and Ancient China through archeological discoveries of the tombs of Pharaoh Ramses II and Emperor Qin Shin Huang. Ms. Lovell began the DRA by drawing a Venn Diagram (Venn, 1880) on the dry-erase board labeling one circle “Ancient Egypt” and one circle “Ancient China.” She then began to elicit terms and ideas from the students’ background knowledge about the similarities and differences to activate their background knowledge on both topics.

The students supplied words, such as “pyramids,” “tombs,” and “hieroglyphics.” However, their prior knowledge on Ancient China seemed to be limited. One student recognized the Terra Cotta soldiers of Qin Shi Huang depicted on the cover of *Searching for Lost Tombs* from viewing the Discovery Channel. Another student mentioned that China was ruled by emperors, which prompted Ms. Lovell to ask if anyone knew the title of the ruler of Egypt. When no one answered, Ms. Lovell wrote that question off to the side of the Venn Diagram for the students to answer once they identified the word “pharaoh” in the text.

Ms. Lovell then asked students to look through the book and, in their groups, write a one sentence prediction of what they thought the text was about. Most student
responses were along the lines of—“comparing Egypt and China,” “digging up the tombs,” or “discovering the pyramids. While searching through the text, students were also asked to list any bolded vocabulary words that were unfamiliar to them. This book also contained bolded vocabulary words and a glossary.

Students read silently, with Ms. Lovell stopping every few pages to review vocabulary words and ask questions about the text to reinforce comprehension. When students did come across information about Pharaohs and how they ruled Ancient Egypt, it was added to the Venn Diagram on the board. After completing their reading of the text, the class engaged in summary discussions and checked the accuracy of their predictions. Most groups agreed that their predictions underestimated the text’s focus on Ancient China.

Next, the treatment and control groups were separated again for the post-reading phase of the DRA. The control group went next door with Ms. Haise where they took completed handouts from the Searching for Lost Tombs Teacher’s Guide and watched the film “The Mummy Returns.” The treatment group broke into their DSCs and began outlining their second set of digital stories using the outline provided by Ms. Lovell (Appendix G). An abridged outline was sent to the treatment group as a Word document, and students in each DSC were able to engage immediately with their laptops to plan their outlines. Once their outlines were complete, they were approved by Ms. Lovell and each DSC began creating their digital stories. During the final week of the study, the second digital stories were completed and all students in the treatment and control groups took a cloze assessment post-test derived from Searching for Lost Tombs.
In summary, this study has four quantitative data points that were obtained from cloze assessments of comprehension: before reading *Planet in Distress*, after reading/creating digital stories of *Planet in Distress*, before reading *Searching for Lost Tombs*, and after reading/creating digital stories of *Searching for Lost Tombs*. Once the last piece of data was collected, students invited their families to school for a “film festival” where their digital stories were shared.

**Materials and Equipment**

The texts used were *Planet in Distress* (Brewster, 2006) and *Searching for Lost Tombs* (Granahan, 2006). These titles were chosen by the researcher and determined to be equivalent in level of reading difficulty, length, format, and quality of illustration/images, as well as level appropriate for the interest of sixth-graders (Fountas & Pinnell, 1996). *Planet in Distress* had a Guided Reading Level of U and a Lexile score of 950. *Searching for Lost Tombs* had a Guided Reading Level of S and a Lexile score of 790. The level of reading difficulty for each book was at a sixth-grade level, as determined by the Fry (1986) readability procedure.

Each DSC group used the same camera equipment: one Sony Cybershot DSC-S90 digital still camera, one Canon tri-pod, and one Sony TRV-280 Digital-8 camcorder with fire-wire capabilities. All students had access to similar Dell desktop computers with high-speed Internet access, DVD writers, and fire-wire ports. All computers were equipped with Windows Movie Maker, iTunes, and Microsoft PowerPoint. Treatment groups were videotaped during the digital storytelling activities on a Sony TRV-280 Digital-8 camcorder, mounted on a tripod in a non-intrusive position in the classroom.
The purpose of this additional camera was to film their group interactions. Wireless microphones were used to record their conversations.

**Instrumentation**

Reading comprehension was assessed through identical pre-test and post-test cloze assessments on each text that were created by the researcher. The cloze assessment was used to assess the comprehension of each student before and after each DRA. A cloze assessment is defined as any assessment that omits portions of a text and then asks the reader to supply the missing elements (Oller & Jonz, 1994). Thus, the cloze procedure is designed to test a reader’s ability to coordinate language processes and information obtained from the reading of text with prior knowledge to construct the meaning of the text read (Taylor, 1953).

There are two methods to develop a cloze test. Reliable cloze assessments should contain at least 250 words with at least 50 deletions (Mobley, 1980; Ranalli, 2002). The first method is by a fixed deletion, requiring every Nth word of a passage to be deleted and replaced with a blank. With fixed deletions, recommendations have been made to delete words at a rate between every fifth and every twelfth word (Ranalli, 2002). The second method is one of deliberate and systematic deletion of words in a passage. In systematic deletion, specific words are selected for deletion, based on the purpose of the assessment. Systematic, deliberate deletions may include grammatical words or phrases, content-specific words or phrases, or entire clauses, depending on the purpose of the test (Oller & Jonz, 1994). Test-takers write in a word to fill in the blank. Test takers must generate the word on their own from their knowledge of word meanings (Taylor, 1953). The fixed deletion method is recommended with novice cloze creators (Rye, 1982).
There are two methods for scoring of cloze assessments; exact word scoring or synonym word scoring. Exact word scoring is the exact replacement of the deleted word, whereas synonym word scoring involves replacing the deleted word with an appropriate synonym that is grammatically correct (McKenna & Robinson, 1980). Either method yields valid and reliable scores that correlate highly with reading comprehension (Robinson, 1981). However, the synonym scoring method leads to a more subjective scoring.

The cloze instruments for this study were constructed using the systematic deletion method, to create a close passage of at least 250 words with at least 50 deletions. The systematic deletion of content-specific words will allow the researcher to measure content comprehension. The fixed deletion method of omitting every fifth word often leads to the deletion of non-content specific words (such as “and,” “the,” “of,” instead of meaning-rich words, such as “greenhouse” and “excavation”). The researcher employed exact word scoring to reduce the possibility of test error based on scorer interpretation.

The reliability of the researcher-created cloze assessments for both *Planet in Distress* and *Searching for Lost Tombs* was determined with a pilot test using a different sample of sixth-graders from another school. Analysis of the internal consistency of both cloze tests produced Cronbach’s Alpha levels of $\alpha = 0.78$ for *Planet in Distress* and $\alpha = 0.71$ on *Searching for Lost Tombs*. Both values provide acceptable reliability for these assessments according to the range provided by Cronbach (1951).

These results are similar to research validating the cloze method (Taylor, 1953). When compared to multiple-choice tests on the same material, validity of cloze assessments has been demonstrated with correlations of .82, .78, and .73 between cloze
tests and standardized measures (Rye, 1982). Test-retest reliability coefficients ranged from .80 to .88 for the cloze assessments used in this study.

Summary of Methods

In summary, prior to the start of the study, Ms. Lovell was coached on how to explicitly teach students the skills needed to operate the technology used in digital storytelling through mini-lessons conducted by the researcher. Ms. Lovell was also coached on how to model and scaffold the digital storytelling activity, allowing the researcher to remain uninvolved. Although, as a veteran teacher, Ms. Lovell was very familiar with DRA, the researcher reviewed with Ms. Lovell the procedures prior to the start of the study to ensure that she was at ease with both DRA and digital storytelling activities.

The researcher randomly assigned the students in each of Ms. Lovell’s classes into two groups, treatment or control. The treatment group was then randomly assigned into ten sub-groups of four, as the recommended number of students working in a digital story group is 4 or 5 (Hull & Katz, 2004). Each of Ms. Lovell’s class has approximately 16 students. All students began by being pre-tested using the cloze assessment created for *Planet in Distress* (Book A) providing the first data point. Then, all students participated in a DRA directly instructed by Ms. Lovell on *Planet in Distress*. The control group completed worksheets and handouts provided by the *Planet in Distress* Teacher’s Guide, while the treatment group created digital stories related to the primary text. Midway through the treatment, all subjects were post-tested with another cloze assessment created from *Planet in Distress*, providing the second data point. Then, all subjects were pre-tested using the cloze assessment for *Searching for Lost Tombs* (Book
B), providing the third data point. Ms. Lovell conducted another DRA with all subjects on *Searching for Lost Tombs*. The control group completed handouts related to the text, while the treatment group created a second digital story based on *Searching for Lost Tombs*. At the conclusion of the eight-week study, all students were post-tested with a second researcher-created cloze assessment from *Searching for Lost Tombs*, providing the fourth data point.

**Quantitative Design**

A one-way analysis of variance (ANOVA) was used to analyze the variability between the treatment and control groups. An alpha level of 0.05 was the criterion level for determining the significance for all analyses. The researcher was granted access to previous student test scores on the Comprehensive Testing Program-4 (CTP-4) scores obtained at the beginning of the school year for the purpose of descriptive data reporting.

**Qualitative Design**

Qualitative data was obtained through class-wide video tapes of the students as they were engaged in DRA and as they participated in a post-reading digital storytelling activity. This allowed for analysis of student interactions, as well as the teacher’s planning and implementation of the DRA. The researcher also took field-notes and conducted observations over the eight-week period of the study. Written drafts of the digital stories, student-created notes and storyboards, and digital stories were analyzed to render an account for learning activity. Episodes of learning activity were deliberately selected by the researcher, and Burke’s Pentad (1969) was used to account for the principles promoted by CHAT.
In dramaturgical analysis, Burke’s Pentad (1969) is used to analyze what happens on stage at any given moment. According to Burke, the minimum requirements of dramatic action and narrative are an actor, an action, an intention (or goal), a scene and an agency (instruments and tools). CHAT theorists (Wertsch, 1998) propose that human activity can be represented with Burke’s Pentad – complete with a cast of participants, in this case students, an offstage (outside the learning activity), a script (the structure of the learning task at hand), and an audience (their teacher and classmates). Each of these elements mediates activity.

Normal stage performances are never exactly the same. Although there is a script, there are often improvisations, deviations, and extenuating circumstances that minutely alter a production. Similarly, student learning groups follow a “script” or strategy, but often encounter adaptations and problems requiring modifications to suit the needs of the moment. The "inescapable tension between mediational means and action" (Wertsch, 1998, pg. 203) provides an explanation for these unique variations. In any social activity, be it artistic or educational, there is a small element of accidental chaos that exists beyond the control of the teacher and students. The difference between the “scripted” (the expected) and the “variation” that occurs produces a tension that is resolved in the moment.

In the present study, the “act” refers to what is actually done in the moment, the action being performed by the students. The “scene” is the setting in which the action occurs in the DRA and DSCs. The “agency” refers to the tools the students use to perform the activity. “Agents” are the individuals involved. “Purpose” is the immediate focus or goal the students are trying to attain. Both the instrumental tools and the
conceptual tools used were listed, as well as any allusions to prior knowledge or previous events (what occurred “offstage”). Figure 2 illustrates Burke’s Pentad (1969).

Data Collection and Archiving

The researcher assumed the role of observer, leaving the teacher as the only adult interacting with students in the treatment group. The researcher believed that having an omniscient perspective benefited the overall investigation by removing researcher and instructional biases as a threat.

In describing student interactions during participation in the digital storytelling activities, it was important to represent an accurate picture of the classroom where the in situ data was collected. The researcher placed a camera with a wide-angle lens on a tripod next to Ms. Lovell’s desk for observation. However, the activity and noise level during digital storytelling became quite animated; therefore, the sound quality of the video often made it difficult to ascertain conversations. As the study progressed, the wide angle camera was abandoned for smaller cameras that could focus on one or two groups and table microphones were placed at strategic points to pick up the conversation of the groups as they interacted.

Once the study was complete, the researcher converted all videotapes to DVD format for preservation. The researcher then watched the DVDs and created a log for coding episodes that seemed to reflect the principles of CHAT using the researcher’s interpretation of Burke’s Pentad. All student-created data, including outlines and storyboards, were scanned and saved as .PDF files to prevent tempering, and all digital stories were also burned to DVD. The data was then divided into folders for each digital
FIGURE 2
Burke’s Pentad (1969)

Act: What was done
Scene: When and where
Agency: How
Agent: Who
Purpose: Why, the goal, motivation, intention, aim, focus

Off Stage: the engine, a reference point, allusions to prior knowledge
Improvisation: variations to the activity/scene based on what happens during
The activity
storytelling group containing that group’s outline, storyboards, cloze scores, CTP-4 scores, digital stories, relevant observation notes, exit surveys, and the time codes for relevant videos.

Two groups, and their related data, were purposefully selected for analysis. The researcher analyzed the videotapes of the groups as they worked, searching for episodes that reflected the principles of CHAT. Once those episodes were identified, the researcher also analyzed the digital stories produced by each group.

The following chapter provides a report of the quantitative results of the investigation, the qualitative episodes, as well as detailed descriptions of the students as they engaged in cooperative activity to create their digital stories.
Chapter 4
Results and Discussion

The purpose of this study was to determine the effects of participation in directed reading activity modified to include a multimedia literacy tool called digital storytelling in the post-reading phase of instruction. Digital storytelling is a multimodal activity in which students create original digital representations of information texts read in class. In digital storytelling activity, a diverse set of tools is used by students to mediate written, oral, visual, and gestural symbols involving metacognitive processes to plan, monitor, evaluate, reflect on, and revise digital stories.

Descriptive Statistics

Previous achievement was controlled for by using the subjects’ previous year’s scores on the CTP-4. As can be seen in Table 2, the mean stanine scores from the CTP-4 for both treatment and control groups were random, but not atypical. The CTP-4 provides standard nine scores in Verbal Reasoning, Vocabulary, and Reading Comprehension. The average score for these subjects on the Verbal Reasoning subtest of the CTP-4 was 6.78, on the Vocabulary subtest was 6.58, and for the Reading Comprehension was 6.50. The study subjects’ scores were similar to those of the population on which the test was normed.

Quantitative Findings

The first research question was: What are the effects of participation in a directed reading activity (DRA) modified to include digital storytelling in the post-reading phase of DRA on 6th graders’ comprehension of information text? This question was answered by analyzing scores from pre- and post- cloze assessments obtained before and after
TABLE 2

*Mean Stanine Score for Verbal Reasoning, Vocabulary and Comprehension, Sample Size, and Standard Deviation of CTP-4 Scores for the Treatment and Control Groups*

<table>
<thead>
<tr>
<th>Group</th>
<th>Verbal Reasoning</th>
<th>Vocabulary</th>
<th>Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>Mean Stanine</td>
<td>6.75</td>
<td>6.33</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>1.27</td>
<td>1.82</td>
</tr>
<tr>
<td>Control</td>
<td>Mean Stanine</td>
<td>6.81</td>
<td>6.79</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>1.31</td>
<td>1.39</td>
</tr>
<tr>
<td>Total</td>
<td>Mean Stanine</td>
<td>6.78</td>
<td>6.58</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>1.28</td>
<td>1.60</td>
</tr>
</tbody>
</table>

reading each information text used in the treatment. A one-way ANOVA was conducted, controlling for previous achievement using the subjects’ scores on the CTP-4, to determine whether or not there was a main effect for the treatment. Prior to examining the results of the ANOVA, a homogeneity of variance assumption was tested to minimize the probability of a type II error (that is, the probability of accepting a null hypothesis when differences, in fact, occur). Levene’s test of homogeneity of variance was used to determine whether or not the assumption was violated. The results obtained with Levene’s test showed that the variances between treatment and control groups were similar, and the assumption of homogeneity was met. As can be seen in Table 2, results
### Analysis of Variance Results for the Main Effects of the Treatment

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test Average Scores</td>
<td>1</td>
<td>4.53</td>
<td>.036</td>
</tr>
<tr>
<td>Post-test Average Scores</td>
<td>1</td>
<td>.047</td>
<td>.829</td>
</tr>
</tbody>
</table>

show that there was no significant main effect of treatment, $F(1, 78) = .047, p = .829$, after controlling for pre-test information.

Before aggregating the pre-test scores of both groups and the post-test scores of both groups, it was necessary to confirm that there was a correlation. The correlation obtained between the pre-tests for both *Planet in Distress* and *Searching for Lost Tombs* ($r = .442$) indicated that the pre-test scores for the treatment and control groups were moderately correlated, based on the guidelines for interpreting Pearson’s correlation coefficient (Cohen, 1988). Additionally, the post-test scores on each book for both groups were also moderately correlated ($r = 4.52$). An average pre-test and post-test score was then calculated and used as pre- and post- values for each subject. Additional data points controlled for in the ANOVA were gender and the subjects’ scores on the CTP-4 exam on the Verbal Reasoning, Vocabulary, and Reading Comprehension subtests. None of these variables showed a significant difference.

**Summary of Quantitative Findings**

In summary, there was no statistical significance between the treatment group, which participated in digital storytelling as a post-reading activity, and the control group, which participated in a traditional directed reading activity.
**Qualitative Findings**

Given the lack of empirical research on this topic, the researcher chose to utilize a “synergy of methods” (Connor, 1987, p. 11) to provide a complete and accurate picture of the process, usability, and effects of participation in a digital storytelling on the reading comprehension of sixth-grade students. Qualitative data was used to answer the second research question: *Do the interactions observed during participation in a directed reading activity modified to include digital storytelling reflect the principles promoted by Cultural-Historical Activity Theory?*

**Description of Data Collection Setting.** In order to establish a context for this study, it is helpful to begin with a physical description of the school site and grounds. Anderson Secondary School was constructed in 1973 on 22 acres in South Florida. The grounds include a large stone sign at the entrance of a driveway that runs along the eastern perimeter of the grounds. Along the driveway, there are 20 flagpoles displaying the flags of all the nations represented by the students and faculty. It is a visually attractive school with beige external walls and a beige roof and dark green fascia.

The school has four main two-story buildings connected by brick walking paths with a central courtyard, chickee hut, and gardens. The large, square courtyard is well-manicured and dotted by many tall banyan trees that provide a good deal of shade. Two of the four buildings are dedicated solely to classroom space. Each building has an open hallway, so when the students exit their classrooms, they are immediately outside. A third building is the gymnasium, which also doubles as an auditorium and a cafeteria, including a covered patio for eating, and the administrative offices for the athletic department.
Anderson has a long-standing athletic tradition, especially in soccer, baseball, tennis, softball, and lacrosse, and recruit a number of students on athletic merit to compete in the local sports division. The fourth building houses a two-story media center, which includes a computer laboratory and study rooms for students. The media center has large windows on every side, allowing for light to enter the inviting space. The circulation desk sits in the center of the room next to a winding staircase up to the “stacks” on the second floor.

As one enters the middle school building and heads to the attendance office, the first room one passed is the ever-busy Blackbox Theatre. Students tend to congregate there in great numbers. At the end of the corridor on the left is Ms. Lovell’s classroom, Room 118. Ms. Lovell’s classroom has a large window that covers the length of the room and allows for plenty of light and a view of the banyan trees. Ms. Lovell, and her assistant teacher Ms. Haise, take great care to make the classroom as comfortable and colorful as possible. The walls are lavender and display posters on the reading and writing process and student work. A bulletin board displays student-made “covers” of their favorite novels. Both ends of the room contain Formica cabinets for books and supplies. There is a long white-board in the front of the classroom with a Smart Board and overhead projector.

Ms. Lovell often rearranges the configuration of the desks to suit the day’s needs. During this study, the desks were arranged in pods of four, facing each other, for a total of four pods in the classroom. Ms. Lovell’s desk is in the back corner, beneath the TV/VCR/DVD stand, diagonally situated next to a smaller dry erase board where she writes the bell schedule, the day’s agenda, and the vocabulary words of the week.
Anderson operates on a rotating schedule of 50-minute class block, labeled A thru H. A period and B period rotated with G period and H period every other week. C thru F periods remained the same, with D period being the lunch hour and E period being a school-wide convocation. This rotation allowed for Ms. Lovell to see her A period class, for example, first period in the morning one week, and then later in the afternoon the following week. The schedule could be somewhat confusing, which is why Ms. Lovell wrote the week’s schedule on the board for student reference.

Analysis of Qualitative Data. As presented in Chapter 2, Cultural-Historical Activity Theory was used as the theory to frame the study, its design, and the observation and reporting of these results. Due to the nature of the study, and the researcher’s desire to preserve the interactions that constituted a digital storytelling activity, it was not desirable to study the outcome of digital storytelling activity apart from the contexts of treatment. All subjects bring with them diverse and unique prior histories to digital storytelling activity, and they participate in the activity in medias res of all the other elements of their world. Students walk into a classroom to engage in a learning activity are similar to creating a performance. The researcher was charged with capturing student interactions in a learning activity in much the same way one would account for the performance of actors on a stage.

Dramaturgical analysts often use Burke’s Pentad (1969) in the study of drama and narrative. The pentad offers a grid for the minimum requirements of narrative design – an actor, an action, an intention (goal), a scene, and an instrument. CHAT theorists have proposed that Burke’s Pentad, as outlined in Grammar of Motives (Burke, 1969), can be used as a framework for analyzing human activity (Wertsch, 1998).
The elements of Burke’s Pentad were defined and appropriated to suit the nature of this study. As can be seen in Figure 3, the revised pentad includes a cast (of participants, in this case students), an offstage (elements from the context surrounding the scene of interest), a script (the structure mediating the learning task at hand), and an audience (teacher and classmates). The researcher selected two digital storytelling groups of four students each in Ms. Lovell’s A period to determine whether or not the principles of CHAT were reflected in the interactions constituting digital storytelling activity. Both groups of students were videotaped throughout the study and learning episodes were analyzed. Two DCSs were followed throughout the treatment, tracking their activity as they participated in digital storytelling.

*Analysis of Digital Storytelling Circle A.* Group A consisted of three girls and one boy in Ms. Lovell’s A period. Joanna was a very outgoing student who Ms. Lovell identified as “the brightest in the class.” Her stanine scores from the CTP-4 were 9 on Verbal Reasoning, 7 on Vocabulary, and 8 on Reading Comprehension. Joanna was very enthusiastic about participating in the study. Mary, who Ms. Lovell disclosed was very technology savvy, was an “average” student who often did not complete her work in a timely fashion. She was excited to participate in the study because she “always uses the computer, for everything.” She also said in her exit survey that she really enjoyed being at Anderson because it was a laptop school. Her previous school, which was a local public school, did not even have a computer in the classroom. Mary’s stanine scores were 7 on Verbal Reasoning, 5 on Vocabulary, and 6 on Reading Comprehension. Mary was also enrolled in a summer program for intensive reading that she had to complete as a contingency for entrance to Anderson Secondary School. A.J., the only boy in the
FIGURE 3

*Modified Burke’s Pentad (1969)*

**Off Stage**  Elements in the surrounding contexts creating disruptions and tension

**Purpose**  The goal of the digital storytelling activity

**Act**  the specific activity

**Agents**  The students and teacher

**Agency**  Tools used to mediate digital storytelling

**Scene**  The setting for the activity
group, was also enrolled in the summer program for intensive reading. His stanine scores were 6 for Verbal Reasoning, 4 for Vocabulary, and 5 for Reading Comprehension. According to Ms. Lovell, A.J. was the class charmer, always talking to the girls and nearly always off task. A.J. admitted in conversations with the researcher that he doesn’t like to read and only likes school because he gets to “hang out.” Andie was by far the quietest member of the group. Her stanine scores were 7 on all three subsections of the CTP-4. She said that she really liked reading, but mostly fantasy and science fiction. She didn’t always like to read books in school. Joanna, Mary, and A.J. are Hispanic. Andie is Caucasian, non-Hispanic.

Joanna took initial leadership, telling the group that she wanted to be the director because she had a few ideas about what to do. Mary also was quick to volunteer to be the editor because she claimed to be “good with computers.” A.J. and Andie were ambivalent about their roles, but Andie said she didn’t mind writing. So, Joanna suggested that Andie be the writer. A.J. became the producer by default.

As the episode begins, the “act” had several stages. The students has been asked by Ms. Lovell to outline their digital story on a storyboard, and for each frame of the storyboard, provide a drawing of the scene, a description of the shot/graphic, and suggestions for any sound or narration. As the group drew their storyboard, the initial intent was to create a mock game show, whereby the answers were facts taken from the book.

Joanna began by making a list of answers to the questions that would be asked during the game show. She directed A.J. to draw a logo for the show. He retrieved paper, but as he began to draw, Mary decided that if they were to draw the logo on the
laptop tablet in Microsoft Paint, a digital drawing and photo editing program, they needed to be able to save it without having to scan it later. But, Ms. Lovell had instructed the class that they were not to begin using their laptops until they presented a completed storyboard to her. So, A.J. and Mary closed their computers and turned the focus back to the task of storyboarding the game show.

Andie drew the storyboard frames for the game show, with a set reminiscent of “Jeopardy.” However, after the second frame, they all noticed that it would be cumbersome to come up with creative variations for each frame. They seemed to be stumped with completing the storyboard while avoiding drawing the same frame over and over. The script they were following hampered their vision of the game show because they were required to complete the storyboard for their digital story before they could open their laptops.

_Vignette 1: Improvising with Microsoft Paint_

As can be seen in Figure 4, the goal of the DSC at this point was to search for images to use in their first digital story on _Planet in Distress_. Mary suggested that the group draw or find images similar to those in the book and the use the title tool to run text over the images. She had seen a slideshow done before of images and words, and suggested that they could pick “cool songs” related to each image they showed. Andie promptly began drawing the image frames – a downtown city covered in smog, a dirty beach, a trash heap – while Joanna and A.J. collaborated on summarizing the text from the book.

About three minutes into this process, Andie asked if they could find an image of someone “hugging the earth.” Joanna was convinced that they could, so she suggested
FIGURE 4

Improvising with Microsoft Paint

Ms. Lovell reminded them that they could not use their laptops until they completed their storyboards.

**Purpose**
To find images to use in their digital story

**Agents**
Joanna
A.J
Mary
Andie

**Act**
Initial planning of Planet in Distress

**Scene**
Ms. Lovell's A Period from 8:00am-8:15am

**Agency**
Laptop
Pencils
Storyboard
Internet search engine
Book - Planet in Distress
Software - Adobe
Professional
- Microsoft
Paint
discourse
Roles
that Andie go ahead and draw it, and once they were done with their storyboard, they could begin looking on the Internet. A.J. showed Andie, and the rest of the group, how they could use Adobe Professional to type text directly into the .PDF file of the storyboard sent to them by Ms. Lovell. It became clear at that point that A.J. had a wealth of computer knowledge. The storyboard was finished during that class period. This group was the only group to type their storyboard (see Appendix H).

This vignette reflects several principles presented by CHAT. Human learning and development are mediated with tools. In this vignette, we can see how the tools used by students – computers, pencils, the storyboard, the Internet, discourse, roles, and the Adobe Professional software – mediated the activity of the group.

For example, by suggesting that the DSC use Adobe Professional to convert the file to .PDF format, A.J. took a cultural artifact that he was privy to and inserted it into the planning activity, modifying the activity so that the storyboard could be produced entirely electronically. The tool, in this case Adobe Professional, shared A.J.’s prior knowledge with the group, whereby group members appropriated his knowledge. This vignette also reveals the subtlety of how cultural tools are transported in an activity. In this case, the tools used are instrumental – laptops, software, storyboard, etc. – and conceptual – language/discourse, and roles.

This vignette took place over approximately 15 minutes. During that time, eight tools were manipulated by the DSC (the laptop, a pencil, the storyboard, the book, the Internet, the software, discourse, and students’ roles). Agency was altered by an offstage element (Ms. Lovell’s instructions), and an improvisation occurred to create a new task to attain their goal. Using similar processes to those involved in reading, the students were
immersed in planning throughout the activity. To solve emerging problems, they monitored their activity, reflected on the outcomes, and revised their plans as they worked. Within the group, they evaluated new knowledge (in this case, the Adobe Professional software) and determined whether or not it would be prudent to include it in their activity.

*Vignette 2: Hugging the Earth*

As can be seen in Figure 5, the tasks for attaining the purpose of the DSC had changed. Andie immediately reminded the group to look for a picture of someone “hugging the earth.” Andie and A.J. shared a laptop and Mary and Joanna worked on another. A.J. used Google Images, an internet photo repository, to search for pictures. His search terms included “earth arms,” “earth hug,” “world arms,” and “world hands.” When Joanna noticed this, she suggested using “He’s Got the Whole World in His Hands” as background music. A.J. presented several .Jpegs, a specific file type for digitized images, to Joanna. As the conversation is picked up below, Andie agreed that was not what they were looking for.

Joanna: Those are pictures of bears hugging the earth.

Andie: Yeah, can’t we have a person?

A.J.: I’m still looking.

Andie: But, what if we can’t find a person? Can we, like…can we draw the earth and then take a picture of one of us hugging it?

Joanna: That’s ok. But, like, I dunno if it would look okay, it might…

Mary: (interrupting) Guys, guys. You can just draw it. You can use this [the tablet laptop- Microsoft Paint] to draw it.
FIGURE 5

Hugging the Earth

Purpose
The students were in search of a picture of someone hugging the Earth.

Agents
Joanna
Andie
Mary
A.J.

Act
searching for a picture of someone hugging the Earth

Scene
Ms. Lovell's A Period
8:20 am-8:25 am

Agency
Laptop/Tablet
Jpegs
Book - Planet in Distress
Discourse
Roles
Software - Microsoft Paint - Google Images

Off Stage
A.J.: Just be sure you save it as a .Jpeg so the computer can read it.

Andie: Right. Can I save it that way in Paint?


Mary flipped the top of her laptop down and started to draw a picture of the earth with arms around it. She was having difficulty drawing the topography of the earth, so Andie also began drawing on her laptop. The initial task of searching for a picture of someone hugging the Earth was changed by Mary’s suggestion to use Microsoft Paint to draw their preferred image, altered the tasks.

Mary’s suggestion prompted A.J. to externalize his knowledge that all image files must be saved as .Jpeg to be read by the Windows Movie Maker program. A.J. put forth his knowledge of computerized photo files and introduced a conceptual tool to the group, a .Jpeg. Andie’s response affirmed that she was also aware of the term, asking if the Microsoft Paint software had the ability to save her drawing as a .Jpeg, showing that she was aware of both the term .Jpeg and its functionality. This vignette shows how language is used to mediate the groups planning, monitoring and reflection on the production of their digital story, as well as affecting the process by which they created it.

**Vignette 3: An Inconvenient Truth**

This vignette, outlined in Figure 6, continues immediately from where the previous vignette left off. At this point, the group has accepted Mary’s suggestion to use Microsoft Paint to draw a picture of someone hugging the Earth, and to save it as a .Jpeg file so that it can be read by Windows Movie Maker.

As Andie begins to draw the picture on her laptop tablet, A.J. asked Joanna:

A.J.: “So, um, what exactly are we doing again?”
FIGURE 6

*An Inconvenient Truth*

The students were trying to find a way to incorporate facts and suggestions for how to stop global warming into their digital stories.

**Purpose**

**Agents**
- Joanna
- Andie
- Mary
- A.J.

**Act**
- Creating the credits

**Scene**
- Ms. Lovell's A Period
  - 8:25am-8:30am

**Agency**
- Laptop/tablet
- Software - YouTube
- Video clip of "An Inconvenient Truth"
- Book - Planet in Distress
- Discourse
- Roles

**Off Stage**
Joanna: We’re gonna make, like, a slideshow. And we’re gonna put facts and things in it about Global Warming. Like the Al Gore movie [“An Inconvenient Truth”]

A.J.: But, we’re just doing, like facts?

Joanna: …and music.

A.J.: Okay.

Joanna: And we should, like, um…we should offer suggestions. You know how, at the end [of “An Inconvenient Truth”] they have suggestions that, um, that come on the screen with the names [credits]?

A.J.: Huh?

Joanna: When the movie’s over and it shows all the names of the people, there’s like a list of things, um, things people can do to help global warming.

A.J.: Let me check You Tube.

A.J. then proceeded to check You Tube, an online video repository, for a video clip of the credits from “An Inconvenient Truth,” which he found. The group watched the clip and then incorporated the same idea of running credits at the end of their film with suggestions of ways to help the environment embedded throughout their digital story.

This vignette illustrates how the insertion of tools in an activity changes the activity, in this case, using language to introduce a conceptual tool (“An Inconvenient Truth”) that was appropriated by the group. The suggestions for tips for how to save the
planet were inserted into the credits of their movie. The Internet was also used as a tool for accessing another tool, in this case, You Tube.

The purpose changed for the fourth time – from searching for a picture of someone hugging the Earth, to drawing it on Microsoft Paint, to incorporating suggestions of helpful facts about Global Warming in the credits, to searching for a clip on You Tube. As the group collaborated, they shared information, knowledge, and expertise, as illustrated by A.J.’s knowledge of technology and its functionality, Andie’s and Mary’s shared experience with technology, and Joanna’s prior knowledge of “An Inconvenient Truth.” A.J.’s introduction of the new term .Jpeg was appropriated by the group, especially by Andie, who asked if the program she was using could save her drawing as a .Jpeg. The knowledge that was shared propelled activity.

Multimodal Literacy at Work. In summary, the DSC engaged in multimodal activity. Students used several modalities to represent the information acquired by reading Planet in Distress. They used the text they wrote on the storyboard to produce text on the screen to record their own voice-overs. A sequence of improvisations created new tasks. The group reorganized their original idea of a “Jeopardy”-style game show into an informative slideshow summarized from the text. Improvisations were solutions to problems, in this case, the difficulties in creating their game show. Joanna’s solution was to present an Academy-Award winning documentary that she had prior knowledge of an alternative template for their digital story. A.J.’s sharing of his knowledge of Adobe Professional aided the group in providing a typed storyboard. When the DSC could not find the images they wanted online, the problem was solved by Mary’s knowledge of
Microsoft Paint was another improvisation, providing a solution appropriated by the group.

**Vignette 4: A Glitch**

There was a learning curve associated with the technology used to mediate DSC activity. As can be seen in Figure 7, this DSC committed a fatal error in saving the images for their digital story. Although, the students were instructed by their teacher to create a folder on their desktop to store all the images for their digital story and then import them into Movie Maker, this group imported their images directly into Movie Maker without saving them to a hard drive. Subsequently, when they went to “finalize” their movie, several of the images had been lost.

With the deadline looming, and the group in distress, Andie quickly drew a second image of the Earth being hugged and suggested that it appear throughout the digital story, with all their saved superimposed titles running over the image. This was the digital story that they presented. However, the final product did not reflect as a true representation of the hours of quality work put into their digital story. By existing standards, their pre-finalized digital story was exceptional, containing references to the text, relevant images, and appropriate, factual voice-overs takes from information in the book.

Despite the group’s technical mishap, after the glitch, they did produce a reasonable digital story. However, the production of a stellar digital story is not required for the activity to be successful. CHAT advocates that interactions enabling the accomplishment of increasingly complex tasks are the engine that mediates the restricting of mental systems. As long as the digital story represents an understanding of the text, it
FIGURE 7

A Glitch

In order to present their teacher a digital story without several minutes of blacked-out images, the student quickly drew a new picture of the Earth being hugged and let that be the background image for most of the digital story. The superimposed titles then appeared over the single continuous image.
is reasonable to conclude that the students were successfully engaged in creating digital representations of the text. The quality of the digital story is secondary to accomplishing more complex tasks.

**Vignette 5: An Agent Creeps In**

Given the case DSC’s frustrations with storing images for their first digital story, they decided to create a video on *Searching for Lost Tombs*, rather than a slideshow of images. The DSC began by planning the facts they wanted to incorporate in their digital story by using the template provided by their teacher. Their purpose was to list the similarities and differences between the Ancient Egyptians and the Ancient Chinese cultures discussed in the book. The DSC’s outline can be found in Appendix I.

Figure 8 outlines the beginning of the activity. The start of the case study group’s second digital story began with a question suggested by Mary: “Have you every closed your eyes and imaged how ancient Egyptian and Chinese civilization was?” Mary went on to suggest that the group show images related to the differences and similarities between Ancient Egypt and Ancient China.

Joanna: So…

A.J.: What? Why are you staring at me?

Mary: I’m reading. (pause) Alright.

A.J.: Alright, I’ll type this. (to Joanna) You wanna help me do this one.

Andie: Look, I already sent you the pictures.

A.J.: I know.

Joanna: No…that’s not…that’s about Ancient China.
FIGURE 8

An Agent Creeps In

The students began by looking for images showing the similarities and differences between Ancient Egypt and Ancient China.

Agent:
- Joanna
- Andie
- Mary
- A.J.

Act:
- Initial planning of second digital story

Scene:
- Ms. Lovell's classroom, A period
- 8:15am-8:30am

Agency:
- Laptop
- Email
- DS outline
- Book - Searching for Lost Tombs
- Picture of a Sphinx
- Video camera
- Internet search engine
- Discourse
- Roles
A.J.: No, I was about to write something and I forgot…please…Sphinx, how do you spell Sphinx?

Joanna: S-P-H-I-N-X.

Mary: Let me just make sure.

Joanna: Yep, sphinx. You can look it up on the picture, I think the picture has the words, too.

A.J.: (continuing to type) out…side…of…the…

Joanna: Wait, stop. We shouldn’t do it like this again. We don’t want to have a bunch of red X’s. [referring to the malfunction of saving pictures during the first Digital Story].

This vignette reveals how the DSC is monitoring and remediating their activity. They reflected on and debugged a process of saving images to avoid another glitch similar to the one they encountered in their previous activity.

_Vignette 6: Another Agent Enters_

As can be seen in Figure 9, the fleeting changes in activity become clear when another tool creeps into the scene. After overhearing a neighboring DSC’s song choice, Joanna makes a suggestion that other groups might focus more on Ancient Egypt since. During the pre-reading phase of their DRA, it was clear that most class members possessed significantly more prior knowledge on Ancient Egypt than Ancient China. The conversation is picked up with Joanna.

Joanna: What’s that song?

(one of the other groups is playing a song on their laptop)

Mary: That’s the “Walk Like an Egyptian” song.
After hearing a nearby group's song, Joanna suggests that the group focuses more on Ancient China, because most groups are more familiar with Ancient Egypt.

**Act**

initial planning of second digital story

**Scene**

Ms. Lovell's classroom, A period 8:15am-8:30am

**Agents**

Joanna
Andie
Mary
A.J.

**Purpose**

to establish a core idea for their digital story on Searching for Lost Tombs

**Agency**

Laptop
DS Outline
Book - Searching for Lost Tombs
Picture of a Sphinx
Video camera
Internet search engine
Song - "Walk Like an Egyptian"
Discourse Roles
Joanna: You know…all the groups are gonna do Egypt ‘cause it’s easy and people know a lot about it. Maybe we can just do China or something.

Mary: Ooooh, kay.


Joanna: Nah, listen. We can use the video camera to tape, like, um, like a news show. It’s what we wanted to do first anyway.

A.J.: Like CNN?

Andie: How about like Channel 7 does? That show where they talk, um, where they talk about movies and things.

Joanna: It’s called “Deco Drive.”

The group proceeded to type out their outline with this idea as the guiding vision, eventually ending up with a final product that presented the architecture, fashion, and culture of Ancient China, and featured a “Live Special Report” on the discovery of Qin Shin Huang’s Terra Cotta Soldiers. In ten minutes, the purpose of their activity shifted from creating a comparison/contrast story, influenced most likely by Ms. Lovell’s Venn diagram during DRA, to a product that emerged from the discussion of the group. This vignette illustrates how language is used to regulate the discussion of the group and appropriate several ideas seeded in the discussion. For example, “Deco Drive,” CNN, the spelling of Sphinx, the use of the Internet in searching, and the desire for their digital story to be set apart from the others by focusing solely on the Ancient Chinese civilization.
As Joanna overheard the song “Walk Like an Egyptian” offstage in another DSC, she concluded that other groups may focus on Ancient Egypt since “people know a lot about Ancient Egypt.” She then suggested that their DSC should create a “news show” on Ancient China.

This vignette reflects several principles of CHAT. First, the insertion of conceptual tools into the activity have the same influence as conceptual tools. In this case, a cultural concept, a news show, influenced the planning and evaluation of the DSC’s digital story. Language mediated the activity and communication between the group members, as they spelled Sphinx for the purpose of searching the Internet.

**Vignette 7: Tools Galore**

This vignette is the most concrete example of the complexity of activity mediated by tools. The DSC decided to go outside into the hallway to film their scene. They had brought a number of tools, pre-determined props and costumes, a kimono, a Chinese fan, and a piece of silk to school. While outside filming, Mary held the digital camera as she filmed Andie in a kimono. Simultaneously, she read the script off of the laptop screen being held by A.J. After Mary’s countdown, A.J. pressed record on Movie Maker and the computer recorded her voice as she read. Joanna held a piece of Chinese silk that Mary referred to in her voice over. Additionally, Mary panned down to capture a picture of the silk when she reached that point in the script.

As presented in Figure 10, the activity became mediated with a number of tools brought in by the students. Most of the tools were coordinated and used simultaneously.

[Andie comes around the corner dressed in a Kimono].

Mary: 4..3..2..1… “HELLLLLLLO, China! To start your day, I’m going to
FIGURE 10

Tools Galore

Off Stage

Several tools were brought to school by the students

Purpose
To film a scene from their digital story on
Searching for Lost Tombs

Act
recording a scene for their digital story

Scene
the hallway outside Ms. Lovell's classroom - 8:35am to 8:36am

Agents
Joanna
Andie
Mary
A.J.

Agency
Kimono
Chinese fan
Piece of Silk
Archeologist's hat
Digital Camera
Laptop
Script in .doc format
Windows Movie Maker
Discourse
Roles
bring you the inside scoop on China’s fashion and art. Today’s fashion is a colorful silk pattern. Today’s art is usually pictures of dragons and clowns…with, with…plenty of, of colors, like the one below…

[Mary takes the camera and pans to the silk piece being held by Joanna].

And, that’s all I have today, here’s the rest…thanks for watching the regular news. Bye!”

Joanna: Okay, that’s good.

The outcome was an eight minute digital story of a fictional news show that uncovered two archeological “videos” – one of an Ancient China entertainment news show about the creation of Qin Shin Huang’s army and the other a similar entertainment show about the tomb of Ramses II and Ancient Egyptian fashion and art.

Summary and Discussion of DSC A. These episodes of DSC A demonstrate the social interactions that occur as students are engaged in a digital storytelling. The data demonstrates that digital storytelling is an authentic literacy activity. As presented in the episodes, digital storytelling also represents a more complex view of reading, in that it is non-linear, participants were required to use their prior knowledge, engage in decision-making, and interpret non-verbal symbols.

Analysis of Digital Storytelling Circle B. Group B was selected by the researcher because their second digital story on Searching for Lost Tombs was similar to that of Group A. Group B’s final product was also a news show, but it featured “live” reports from two “reporters” on the scene at the discoveries of the Terra Cotta Soldiers and the tomb of Ramses II, both of which are mentioned in detail in their text. However, their
digital story was filmed almost entirely on campus, at different locations around the school.

Group B consisted of three girls and one boy also from Ms. Lovell’s A period. Elizabeth was a very bright Hispanic who had recently emigrated from Colombia. Her stanine scores for the CTP-4 were 9 on Verbal Reasoning, 8 on Vocabulary, and 8 on Reading Comprehension. Ms. Lovell noted that Elizabeth seemed outgoing in small group settings, though she was often hesitant to participate in class discussions. Ms. Lovell predicted that it might have to do with her heavy accent. Nate, a young man who was half-Asian and half-Hispanic, was “the class bookworm” according to Ms. Lovell. She noted that he was always suggesting a good book to her and he was especially fond of role-playing books. His stanine scores were 8 for Verbal Reasoning, 7 for Vocabulary, and 7 for Reading Comprehension. Virginia was an average student of Hispanic descent, who often “slipped under the radar,” according to Ms. Lovell, although she was always pleasant and turned in her assignments. Virginia’s stanine scores were 7 on Verbal Reasoning, 6 on Vocabulary, and 6 on Reading Comprehension. Jon was a Caucasian boy who was enrolled in the summer intensive reading program due to his below-average grade in Language Arts from his previous school. He was described by Ms. Lovell as “shy, but a hard worker.” His stanine scores were 4 on Verbal Reasoning, 4 on Vocabulary, and 5 on Reading Comprehension.

Jon immediately requested to be the editor, as he said he preferred to work with the computer. Elizabeth added that she had several props that could be used. Her mother “always dressed like Cleopatra for Halloween,” she said, so she became the producer. Both Nate and Virginia wanted to be the director. A round of the hand game “rock,
paper, scissors” (Virginia won) determine the final two roles, and Nate became the
writer. Once roles had been decided, the group began to plan.

The following episodes provide a window to observe how the text was the focus of a lively discussion on the details of their digital story. The tasks to be accomplished to attain their purpose moved from deciding what props to bring into the “mummy’s tomb” to locating an aerial view of Ramses’ tomb on Google Earth, all through discussion and engagement with the text and the Internet.

Vignette 8: Arguing about Torches

As can be seen in Figure 11, Virginia has suggested that the group film a scene on “discovering” the tomb of Ramses II, similar to the archeologist’s description presented in the text. She also suggested using some of the costumes offered by Elizabeth and mentioned being able to bring in candles to provide insight for scene. The episode begins with Nate speaking.

Nate: You can’t use candles, they didn’t have candles.

Virginia: Then how could they see in the dark?

Nate: They had…um…they had torches.

Virginia: Okay, fine. But we don’t have torches, so we can just use candles.

Nate: No, you can’t! You have to use torches. They didn’t have candles back then.

Virginia: It’s the same thing! You’re making things so complicated.

Nate: I’m not making…[he starts to look through the book]

Virginia: [gesturing] Yes, you are, you’re like torches, the torches…
FIGURE 11

Arguing About Torches

Purpose
Planning what props to bring in to film a scene "inside the mummy's tomb" for their digital story

Agents
Virginia
Elizabeth
Nate
Jon

Act
discussing props needed for their digital story

Scene
Ms. Lovell's A Period
approximately 8:45 am

Agency
Two laptops
Book: Searching for Lost Tombs
Outline
Discourse
Roles
Nate: Torches are made for fire when you go into a tomb.

Virginia: Shhhh…you could have said that before.

Elizabeth: Are you being serious?

Nate: That’s what I’ve been trying to tell you! [to Jon] Do you see what I’m trying to tell her?

Jon: Don’t get me involved ‘cause I don’t know what you’re talking about, I’m just writing stuff down.

[Jon had been taking notes on his laptop throughout the debate.]

It was clear that Nate had background knowledge on Ancient Egypt and was adamant that the digital story be authentic. He cited the book as an example and suggested that they follow the structure of the book, which highlights archeologists’ discoveries of Ramses II’s tomb and the Terra Cotta Army. This vignette reveals how one student externalized his thinking in a dynamic way that not only allowed him to share his background knowledge, but also to regulate the activity others. The outcome was a twelve minute news report that followed two different archeologists as they discovered Ramses II and Qin Shin Huang, and then proceeded to interview them in a talk show format. Throughout the interview, each character told facts about their country’s geography, customs, and history, using facts taken from the text and summarized by the students.

The insertion of cultural artifacts, such as the Chinese costume for Qin Shin Huang, allowed the students’ activity to extend beyond the confines of a slideshow of images and present historical figures in their digital story, extracted from and parallel to
the text that they read. Language underscored this group’s desire for authenticity when
Nate insisted that the proper terminology be used – torches instead of candles.

_Vignette 9: Fire Drill_

As illustrated in Figure 12, during the production of their second set digital
stories, a fire drill interrupted A period. Although the students were required to leave
everything behind in the classroom, once they were outside, Elizabeth, Virginia, Nate,
and Jon gathered and continued to discuss their digital story. Because this took place
outside of the classroom space, the researcher did not have the opportunity to video tape
the students at that time, however, the researcher did take field notes of their exchange.

Elizabeth noted that the book provided an illustrated map of the burial sites of
Ramses II. She suggested that the group consider scanning it to use in their digital story.
The group accepted the suggestion and Jon volunteered to make the scan. Nate said that
he knew of some kind of computer program that would show an aerial view of the actual
burial site. Jon added that the program was called Google Earth and it was easy to
download.

When they returned to the classroom, Jon downloaded Google Earth, and the DSC
located a real-time aerial view of the pyramids at Giza. They could not, however, figure
out how to save the screenshot for use in their digital story, so they agreed that the scan
from the book would suffice.

The DSC once again linked their activity directly to the text by actually scanning
a map out of the book for use in their digital story. Unlike Group A, which appeared to
rely more in their own prior knowledge to mediate the production of their digital story,
Group B continually referred back to the text. This DSC’s digital story integrated both
FIGURE 12

Fire Drill

During the fire drill, the discussion about scanning the map from the book began.

Outside the suggestion of Goog Earth, it was also made.

Purpose
To find an illustration of the archeological dig of Ramses II.

Act
Discussing ways to find a map for their DS.

Scene
Ms. Lovell's A Period, bringing field to the classroom.

Agents
Virginia
Elizabeth
Nate
Jon

Agency
Two laptops
Book - Searching for Lost Tombs
Software - Google Earth
Outline
Discourse
Roles
Scanner
images from the text and a video of an “archeological dig” described in *Searching for Lost Tombs*.

**Summary of Findings**

**Question 1** - What are the effects of participation in directed reading activity modified to include digital storytelling in the post-reading phase of DRA on sixth-graders’ comprehension of information text? There was no significant effect for treatment on a measure of comprehension as a result of participation in a digital storytelling activity.

**Question 2** - Do the interactions observed during participation in directed reading activity modified to include digital storytelling reflect the principles promoted by Cultural-Historical Activity Theory? From the analysis of the videotapes of students engaged in digital storytelling, the researcher’s field notes, and the digital stories themselves, several episodes emerged that reflected the principles of CHAT. Digital storytelling activity showed evidence of both conceptual and instrumental tools mediating digital storytelling activity. There was also evidence of how metacognitive processes being used by the students to plan, monitor, revise, and reflect on the outcomes of their activity. After analyzing the video tapes, a clearly-visible Zone of Proximal Development was not observed.

Offstage events disrupted activity and created the opportunity to improvise. Oftentimes, the final product was a dramatic revision of the initial idea of the DSC. Modifications were indexed to prior knowledge, metacognitive processes, and tool use. In the post-reading phase of instruction of DRA instruction, where participants were asked to discuss and summarize what was read, participants discussed and summarized
text while planning and creating multimodal representations of the information presented in the text and their understanding of the text.

Participation in digital storytelling afforded rich interactions mediated with the technical language of digital storytelling, as well as student engagement with the text, particularly content-specific vocabulary. Digital storytelling mediates accomplishment of the goals of DRA by enriching the post-reading phase of instruction with technology and text-mediated discussion and engagement of students in planning, monitoring, evaluating, and revising their activity. Results demonstrated how the re-organization of reading lessons can provide opportunities for students to engage in multimodal activity. Multimodal activity transformed the discussions from simple talk to discussion reflecting the use of complex systems of language, symbols, and tools.

Although this study’s findings did not show a significant difference in the comprehension of students as a result of participation in a digital storytelling activity, there is no denying that students were continuously engaged throughout the treatment with a multiplatform activity. From the view of students, this activity seems to be more desirable, more motivating, and more interesting than a single platform activity, such as completing a worksheet or watching a video. The intrinsic qualities of digital storytelling, the limitations to this study, and the implications for future research will be discussed in the following chapter.
Chapter 5

Conclusion

This chapter begins with the conclusion followed by a discussion of the limitations of this study. The chapter concludes with implications for practice and future directions for research on digital storytelling.

As the results obtained indicate, there was no significant effect for participation in a DRA modified to include digital storytelling in the post-reading phase on reading comprehension of information text. However, interactions promoted by Cultural-Historical Activity Theory were observed.

Limitations

The research findings should be viewed in light of a number of limitations. It is important to keep in mind the exploratory nature of this study.

Length of the Treatment. The first significant limitation to this study was the length of the treatment. The treatment was implemented over an eight-week time period. Given that analysis of qualitative data revealed that digital storytelling activity reflected the interactions promoted by CHAT, it can be argued that extending the time of the treatment might yield different results. It is the recommendation of the researcher that, if this study were replicated, it should span the length of several months, possibly an entire school year. Extending treatment may also provide time for students to adjust to the novelty of digital storytelling, since it is mediated with a diverse set of technological tools.

Instrumentation. Next, cloze assessments as the sole quantitative measure of comprehension can also be considered a limitation of the study. Although cloze
assessments are reliable and valid, another assessment method may have yielded different results. Given the length of the study, cloze assessments seemed appropriate. Should this study be replicated, different measures of comprehension, such as the Sentence Verification Technique (Royer, Hastings, & Hook, 1979), retelling of texts read (Armbruster, Lehr, & Osborn, 2001), or criterion-referenced measures may be used to show broader gains in comprehension over lengthy, continual engagements in digital storytelling activities. Also, given the visual nature of the project, assessments involving a visual element might be desirable.

Sample. Generalization of findings is limited not only to the size of the sample but also the demographics of the school setting for this study. Despite the fact that the school setting was culturally diverse, as a private school, it did lack socio-economic diversity. Socio-economic status is often cited as having an effect on literacy (Lareau, 2000; Hull & James, 2005). Although the school site is private and most students are affluent, it does offer scholarships to students who cannot afford tuition, as well as free tuition to the children of teachers, administrators, and clergy employed by the school. Yet, these only accounted for a handful of students school-wide. Replication of this study should include public schools that are socially, linguistically, and ethnically diverse.

The sample for this study had a fairly rich exposure to technology, with many of the participants carrying personal electronic devices, such as iPods, Blackberrys, and Sidekicks, sometimes using them as tools to help mediate their digital storytelling activities. In a school with a lower mean socio-economic status, it can be assumed that
personal technology might be more limited, subsequently affecting technological literacy and the ease with which students use the technology during the study.

This was also a sample of convenience, based on the participation of the teacher, who agreed to allow her students to participate in the study because of her interest in technology-rich learning activities. Subject characteristics, such as motivation and interest, are not always present when the sample consists of non-volunteers, although every participating student and parent signed documents of informed consent prior to the start of the study.

Research and Teacher Biases. Although the researcher was not aware of any known biases, researcher bias is a common phenomenon when the researcher acts as a participant and observer. In this case, the researcher was primarily an observer. However, there was minimal interaction with the students, save the technology training on Windows Movie Maker with the teacher prior to the start of the study. Although, the teacher did have prior experience with both DRA and film editing (as she holds a BFA in TV Production), she did meet with the researcher several times before the start of the study to review procedures and technology.

Teacher effects are unknown, as all students had the same teacher for language arts. Future studies should employ multiple teachers and classrooms and teacher effects should be examined.

Technology. Another limitation is the technology used, specifically Windows Movie Maker. It was very user-friendly initially for students to begin creating their digital stories. Yet, as the students became more adept at using the software, they found its functionality to be limiting. The program could accommodate only one soundtrack at
a time, so the students had to choose between a voice-over narration or background music, but not both. This limitation, however, did foster some creative problem solving, as students played background music simultaneously as they recorded their voice-overs. Ideally, as the students’ technological proficiency increased, they should’ve been given access to more complex editing software. Given the proper training and programs, such as Final Cut Pro, Avid, and Adobe Premier, participants may be able to produce more creative digital stories.

**Texts.** Finally, the information texts used were a limitation. They were written on a sixth-grade level, which ended up being the independent level of the study participants. Therefore, the reading of the texts themselves did not prove to be a challenge for any of the students in the sample. Texts written at a higher level of difficulty, for example, at the students instructional level, may have promoted different interactions during digital storytelling, thus affecting comprehension differently. It is strongly recommended that, if this study were to be replicated, texts written at the subjects’ instructional level be used, and the tools of digital storytelling be introduced with the aim of reducing the level of difficulty of the texts through cultural and social interaction.

**Implications for Future Research**

Sustained exposure to informational texts, coupled with meaningful activities should affect metacognitive processes (Blanton & Moorman, 1990). The results of this study showed that the addition of digital storytelling in the post-reading phase of DRA was a meaningful activity that encouraged the use of metacognitive processes – such as planning, monitoring, and evaluating. Digital storytelling shows promise as an adaptable multimodal literacy activity that could, with further research and development, be an
effective way to improve comprehension. Additionally, future research is recommended that examines student engagement with texts beyond their level and assesses them through multiple units of analysis, including in a visual medium.

The history of DRA since its introduction by Betts in the 1940s has shown that the core framework can be adapted and modified to accommodate multiliteracy activities. It is the opinion of the researcher that further study should be considered where DRA is rearranged to explore other multiplatform literacy activities integrated throughout all phases of DRA. By interweaving digital storytelling throughout DRA, the planning processes across all stages of the activity may be affected by engaging students in continuous reflection and re-evaluation as they are engaged with information texts.

Lastly, the result of the qualitative analysis revealed that a multimodal activity, such as digital storytelling, sustains student engagement. Therefore, it is recommended that the study be replicated with struggling readers who lack motivation to engage them in the reading of information texts.

In closing, this research study focused on re-organizing a directed reading activity to include a multimodal literacy activity, digital storytelling, in the post-reading phase. The research questions posed examined the treatment’s effects on reading comprehension and analyzed the interactions of the participants as they created digital stories for episodes that reflected the principles of Cultural-Historical Activity Theory. While this study revealed that there was no significant difference in comprehension from the treatment, results did reveal that there were desirable learning interactions that reflected the principles of CHAT. Recommendations for further studies on this topic have been made.
APPENDIX A

Parental Permission Form

Dear Parent/Guardian,

My name is Maryann Tatum, and I am a graduate student researcher at the University of Miami School of Education. I would like to invite your child to participate in a research study regarding reading comprehension and the use of “digital storytelling,” an activity in which your child will be making mini-documentaries of the books they read in class.

**Purpose:** The purpose of this research study is to collect information about the reading comprehension of children who make digital stories about their texts, versus those who participate in standard reading instruction. This study is aiming to discern if digital storytelling is an effective form of differentiated instruction and a viable means of incorporating technology in the classroom.

**Procedures:** Your child’s language arts teacher is currently planning to implement digital storytelling as an approach to reading instruction. Students will be placed in groups of 4-6 and assigned different roles to perform. Roles that your child may be assigned include: director, producer, writer, editor, or cinematographer. These roles are meant to encourage your child to work together with other students in his/her group to create a final film. Each group will be assigned an information text which they will read. Their task will be to create a 3-5 minute digital story, told through video, audio, graphic, or still images, about the information text they have just read. They will be creating this film from storyboard to final cut from scratch in their groups. All technology (camera equipment, editing software, computers) will be provided for your child. All students in your child’s class will be participating in digital storytelling twice a week for six weeks and also in a traditional whole-group instruction twice a week for six weeks. For the purpose of this study, students will be individually assessed on their reading comprehension at the beginning of the six-week period, and again at the end. The assessment used will be a cloze assessment, based on their readings, where a passage will be supplied with missing words and your child will be asked to supply the missing words. Each assessment should take approx. 15-20 minutes. Your child will not be pulled out of class, since digital storytelling is a part of your child’s daily instruction and will be delivered by your child’s teacher. For the purpose of this study, I will need to access your child’s scores on the Comprehensive Testing Program – 4 (ERB/CTP-4) administered to your child earlier this school year, to gather information about your child’s current reading level. I, therefore, request your permission to gain access to these documents. Also, as a part of this study, your child will be videotaped while creating their digital stories for the purpose of analyzing student interactions during the activity. Once the data have been analyzed all tapes will be destroyed.

**Risks:** There are no known risks in participating in this study since the instruction received forms part of your child’s language arts curriculum.
**Benefits:** It is expected that your child’s skills will improve in the areas of reading comprehension and technological proficiency. It is also anticipated that results from this study will help us understand how to help other children improve their reading skills. The information we collect here may help other people, such as teachers, who are interested in using digital storytelling in their classrooms.

**Compensation:** No compensation for participation is being offered in this study.

**Alternatives:** You have the alternative not to allow your child to participate in this study. While your child is being assessed, he/she can stop at any time. Nothing negative will happen to your child if the assessment or the digital story is not completed.

**Confidentiality:** Names are collected and a list does link responses to individuals, but this list will be destroyed when data collection is complete. There will be no way to link the information collected with your child in the final publication of the results. The investigators and their assistants will consider your child’s records confidential to the extent permitted by law. Your child’s records may also be reviewed for audit purposes by authorized University of Miami employees, The Department of Health and Human Services (DHHS), or other agents who must follow the rules of confidentiality.

**Right to Withdraw:** Your child’s participation in this study is voluntary. Your child has the right to withdraw at any time and will not be negatively affected by withdrawal or lack of participation.

**Other pertinent information:** The researcher will answer any questions you may have regarding this study. The researcher will give you a copy of this consent form. If you have any questions about this study, please feel free to contact the principal investigator, Dr. William Blanton, or the graduate student researcher, Maryann Tatum, at (305) 284-5053. If you have any questions regarding your child’s rights as a research participant, you may call Maria Arnold, University of Miami Institutional Review Board Director, at (305) 243-2079.

________________________  ______________________________
Name of Parent/Legal Guardian *(please print)*  Signature of Parent/Legal Guardian

________________________  __________________________
Name of Child *(please print)*  Date

**Please check one:**

_____ I give my informed consent for my child to participate in this study.

_____ I DO NOT give my informed consent for my child to participate in this study.
Hello,

My name is Ms. Tatum. I am a student at the University of Miami. I am conducting a study that will help me learn more about how participation in a digital storytelling activity might help sixth-graders improve their understanding of what they read. Your teacher has already planned to use digital storytelling in her classroom. Digital storytelling involves students getting together in groups of 4-6, reading a book, and then making a digital movie based off of the book. To study this, I need to see how sixth-graders understand what they read and how they plan out and make digital stories. In your language arts class, you will be put into groups and allowed to create digital stories over the next six weeks. I will look at your school records to find out your current reading level. I will also be videotaping your whole class while you make your digital stories. You will also be given a test before and after the six weeks.

How you do on the reading activity will not affect your grade in language arts. I will keep your records private. You don’t have to participate in this study if you don’t want to. If you decide to participate and change your mind, just let me know and you will be able to stop and nothing negative will happen to you. Please ask me questions that you may have at any time.

I agree __________ I do not agree __________ to participate in the above outlined study, which I have read or has been explained to me by ________________________________.

______________________________  _____________
Name (please print)                                      Date

______________________________
Signature
Highways are jammed. People are driving to work, to school, to shopping. Cars and trucks sit bumper-to-bumper, or crawl along the road like snails. As their engine burn gas and oil, they send ___________ fumes into the air. Those fumes contain _______________ _________________ - a gas that is one of the main causes of global ________________.

But traffic isn’t the only cause of global _______________. Machines in factories burn coal and _____________ to make soap, furniture, clothing, car parts – you name it. _______________ plants burn coal to make _________________. Furnaces burn coal, oil, and _______________ _____________ to heat buildings. All these fuels, called _______________ _________________, release carbon ________________ and other gases into the air when they are burned.

The Earth is surrounded by gases. We call these gases Earth’s _________________. Some of the gases are called ________________ gases because they create the ________________ effect. That means they help keep our planet ________________ enough for people, plants, and animals to live. So far, so good. But when we drive _______ and run factories and _______________ plants, we release more of those same ________________ into the atmosphere. This ________________ the greenhouse effect and makes ________________ on Earth even warmer.
Earth’s surface warms and ________________ sunlight. The Earth’s ________________ also gives off invisible ____________ called ________________ energy. Greenhouse _________ absorb much of this energy. In turn, ________________ gases give off infrared ____________ of their own. This creates the ________________ _________________. As greenhouse gases increase, the greenhouse effect also _________________.

Carbon ________________ isn’t the only greenhouse gas ________________, and animals are adding to Earth’s atmosphere. ________________ traps even more heat than ___________ dioxide. This gas comes from garbage, coal ____________, decaying forests, and ___________! Yes, those gentle creatures that give us ____________ eat a lot of grass. As they ___________ it, they burp a lot and, just as we do, they pass ___________. That gas is _________________, and with more than a ____________ cattle worldwide, that’s a lot of _________________.

_______________ oxide is another greenhouse ________________. It comes from chemical ________________. Framers use it to help their ____________ grow. Other people use ________________ to grow thick and green lawns and beautiful ________________. 
APPENDIX D

Digital Storytelling Circle Roles

**THE DIRECTOR**
Responsibilities include making the final decisions, supervising all editing and writing, coordinating all production photos and scripts. This person is the group leader and is ultimately responsible for the success (or failure) of the movie! They create the storyboard!

**The Producer**
Responsibilities include keeping EVERYONE on task and making sure all four group members are involved in the editing process. Also, the producer keeps track of all the paperwork – the outline, storyboard, and scripts. This person should be very organized. The producer is also responsible for keeping track of all the equipment (cameras and computers) and making sure that the movie is done on time!

**The Writer**
The Writer is responsible for writing the script and for composing any narrative or voice-over used in the movie. They also write the subtitles (if they are used) and the credits. This should be someone who likes to write!

**The Editor**
The Editor should be very good at computers because they are responsible for putting the movie together from start to finish.
APPENDIX E

Student Storyboard - Blank

Digital Storytelling: Storyboard

A storyboard is a useful planning document for all types of film makers. It is made up of frame-by-frame sketches that show what will shots will be needed in order to complete scenes. In this case, these sketches will describe the pictures, words, and music you will be using in order to create your story. Your pictures do not have to be perfect - stick figures will do! You will be using these to get an idea of what you want your project to look like before writing your final story.

Use your outlines as a guide, and try to visualize what individual scenes, as well as your final project, will look like.

Light it, Camera! ACTION! Bring your ideas to life.

1. Scene Sketch  Shot description/Graphics  Music & Voice Over

2. Scene Sketch  Shot description/Graphics  Music & Voice Over
How people treated the dead gives us clues to their beliefs. For examples, some ancient cultures believed in an ________________, or life in another world after __________. They often placed times such as clothing, ________________, and pottery inside the graves and ________________. They believed the dead would ___________ them in the other world. These items, called ________________, are sometimes found perfectly ________________, even after thousands of ________________. Examining the artifacts helps ________________ make guesses about how people ________________ long ago.

Archeologists don’t go ________________ to find tombs. They know that ________________ are found where people once ________________. And people usually settled near good ________________ for farming. They also ________________ towns and cities near rivers, lakes, and other ________________ sources. So archeologists search for places where ________________ people might have found those things. Those ________________ are where people probably ________________, and died, long ago.

Archeologists also read ________________ records, such as diaries or letters. Often, these ________________ are hundreds, or even ________________, of years old. They might contain ________________ to help find the ________________.
Archeologists also _________________ people who live in those places now. These
people may have heard stories or ______________________ about ancient tombs.

So the ________________________ went looking for a lost _________________. His
crew flew air _________________ over the Valley of the ______________________. They
looked for signs on the ______________________ below. After several months, they have
an ________________ where the tomb might be _________________. The team started
________________________ the tomb later that year. It was hard work. They used
____________________ to pound rocks. They used _________________ to remove the dirt. AS
they dug, they _________________ that the tomb have been partially destroyed. It had
been ________________ hundreds of years before by tomb ________________, who were
probably searching for _________________ and other riches. Several
_______________ had also damaged the ________________. It took five years to
remove the dirt and _________________ and enter the tomb. As they entered the
______________, they were shocked to _________ more than just one small room. In
fact, there were several ________________, lined with dozens of smaller rooms, called
_______________. They also discovered that the walls were ________________
with colorful art and writing, known as _________________, carved or painted onto
tomb _________________ tell stories about people’s lives.
APPENDIX G

Story Outline - Blank

Lost Tombs Outline

Prompt:

Compare and contrast essays show how things are alike (compare) and how they are different (contrast). *Searching for Lost Tombs* explores the burial rituals and cultural beliefs of ancient civilizations. Compare and contrast the beliefs and rituals of ancient Egyptian and Chinese cultures.

Please use this form to organize your thoughts. Proper capitalization, spelling, effective sentence structure, and punctuation count as always!

I. Introduction
   A. Hook:

   B. Background information on the subject:

   B. State your main idea (The "topic sentence" of your essay):

II. Similarities (3 examples)
   A.

   B.

   C.

III. Differences (3 examples)
   A.

   B.

   C.

IV. Conclusion (What do you have to say about what you have learned?)
   A. Restate your main idea

   B. Draw conclusions/Make connections to your life (What did you walk away thinking?)

   C. (Final thoughts/Wrap up)
APPENDIX H

Student Storyboard – Example

A storyboard is a useful planning document for all types of film makers. It is made up of frame-by-frame sketches that show what will shots will be needed in order to complete scenes. In case, these sketches will describe the pictures the pictures, words, and music you will be using in order to create your story. Your pictures do not have to be perfect stick figures will do! You will be using these to get an idea of what you will be using these to get an idea of what you want your project to look like before wasting your time looking for pictures and music you will not need.

Use your outlines as a guide, and try to visualize sense, as well as your final project, will look like.

Lights! Camera! ACTION! Bring your best ideas to life 🎬

1. Scene Sketch  Shot description/Graphics
   • World in our hand
   • Thermometer sick earth
   • Beach chair guy
   • Melting earth
   The world's in our hands.

   [Whole world's in our hands] the world is in our hands. The world is getting sicker every day, and we can help it get better but it is our fault. The biggest problem is global warming. Global warming is the increase in the world's temperature. Although global warming is one of the biggest problems there are many others, but there are solutions. I understand what you mean about all of the other problems, but what is so bad about global warming? It just means that it would be summer all year long. Well global warming is actually very bad for our earth, but you will learn more about global warming as you keep watching. We caused this mess so let's clean it up.

2. Scene Sketch  Shot description/Graphics
   • Faucet Ocean
   • Cut down trees
   • Gray sky
   • Mix of pictures
   Trouble!

   [Damaged] Our world is in so much trouble! It has so many problems; the ocean levels rising, trees dying, the air is being polluted. I could go on forever, but these are the top three problems you will be learning about today.

3. Scene Sketch  Shot description/Graphics
   • Traffic
   • Cartoon cars
   • Factories with fumes coming out

   [Honk sound! Hello Emma, I was just wondering, does your family own a car to share or drive around in? Yes, actually we have two, one for your mom and one for my dad. Well did you know that because we are running things like factories, power plants, and cars on gasoline we are releasing exhaust fumes into the air, and that is polluting the earth's environment making it harder for us to breathe? Oh my goodness! So by riding a car to the super market I am hurting the environment. That is exactly right Emma.

4. Scene Sketch  Shot description/Graphics
   • Burning forests
   • Soda can
   • Cut down trees

   [This is why I am hot] The atmosphere is getting hotter because there are no trees to absorb the carbon dioxide, which is one of the main causes of global warming. What is carbon dioxide Emily? Carbon dioxide is one of the gases in the exhaust fumes of cars; it is also what they put inside sodas to make it fizz up. We are cutting down trees, and that is very bad for the earth.

5. Scene Sketch  Shot description/Graphics
   • Ocean waves
   • Dead crops
   • Island with water
   • Ice caps melting

   The earth's oceans are expanding and getting bigger there for the sea levels are rising and killing crops and animals all over the world, and if it gets high enough it could soak up an entire island. And what are the earth's oceans getting bigger? They are getting bigger because the ice caps are melting and when it melts it forms more water. Things also get bigger when it is hot, the same goes with water.
6. Scene Sketch  
Shot description/Graphics: Windmills, Watermills, Veggie oil
Music & Voice Over: We can stop polluting the environment by running factories, cars and power plants on natural resources. What kind of natural resources, Emily? Things like the sun's rays, wind, water, and veggie oil. The great thing about these resources is they will not harm the environment at all. I don't think my parents will want to buy a new car is there anything else that I could do? Of course, just keep watching.

7. Scene Sketch  
Shot description/Graphics: Recycling bins, Laptops, Pens, Trees
Music & Voice Over: [Mr. song] We can try to save trees by recycling papers, using laptops, reusing the same paper by using the backs, and by buying more pens instead of pencils. We really need trees because it reduces the green house effect. I will definitely try to do these things.

8. Scene Sketch  
Shot description/Graphics: Recycling earth, Veggie bus, Seeds of trees
Music & Voice Over: The earth's oceans are expanding because of the green house effect, so if we use natural resources, recycle everything, and plant a tree every once in a while, it will keep the green house gases at a normal temperature. I might be able to plant a tree in my back yard it would make my backyard look prettier.

9. Scene Sketch  
Shot description/Graphics: Holding hands, Gas masks, Rainbow sky
Music & Voice Over: (Keep Holding On) Well Emily, is there hope? Yes, but everyone has to pitch in and try to help out. If everyone tries to do one of the solutions we mentioned then the world would be a better place. Just think about the future maybe out grand children will have to wear gas mask to breathe, or it can go the other way and they will look outside and see trees growing with a nice blue sky above them.

10. Scene Sketch  
Shot description/Graphics: Future picture, Dirty air
Music & Voice Over: (Stronger) The earth really cannot take it anymore. We have many solutions, so all we need to do is one of them. If we keep this up in a few years the earth will be underwater, or we won't be able to breathe because the air is so dirty.
APPENDIX I

Story Outline - Example

Lost Tombs Outline

Prompt:

Compare and contrast essays show how things are alike (compare) and how they are different (contrast). Searching for Lost Tombs explores the burial rituals and cultural beliefs of ancient civilizations. Compare and contrast the beliefs and rituals of ancient Egyptian and Chinese cultures.

Please use this form to organize your thoughts. Proper capitalization, spelling, effective sentence structure, and punctuation count as always!

I. Introduction
   A. Have you ever closed your eyes and imaged how ancient Egyptian and Chinese civilization was?

      B. Ancient Egypt was located in Southern Africa. Egyptians were ruled by pharaohs and the gods. On the other hand, China was ruled by emperors and is located in Asia. In the time 221 B.C a famous Chinese emperor rules over China. As in 1279 B.C a famous Egyptian pharaoh ruled Egypt. That is an example to tell the different times that each was ruled.

      C. There were many differences as well as similarities between the rituals and beliefs of ancient Egypt and China.

II. Similarities: Even though they two great civilizations were separated by miles and years, they shared many common rituals and beliefs.
   A. The Egyptians and the Chinese had tombs. In the tombs they had burial chambers, for royalty and wealthy people; they contained native objects and art.
   B. The statues represented soldiers or workers. They were there to serve the king in the afterlife.
   C. They both had outfits that they had worn for different purposes.

III. Difference: Although there were many similarities between the beliefs and rituals, these two great powers had several differences.
   A. In their tombs they had different drawings, writings, and objects. For example, the Egyptians had drawings of pharaohs, workers, and hieroglyphics. The Chinese had paintings of dragons and clouds.
   B. The things that archaeologists found in Egyptians tombs were clothes, jewelry, burial chambers, gold rings, food, and anything that was based on daily life. The Chinese tombs had chariots, clay soldiers, which were made 246 B.C and 206 B.C, weapons, and anything that reflected on war.
C. Their clothes were very different. The Egyptians wore linen. This very light material was a perfect fit for the hot climate. Chinese people back then wore colorful clothes made of silk. They also used silk to make cushions.

IV. Conclusion
A. This is how ancient Egyptian and Chinese burial rituals and beliefs were alike and different.

B. Even though they believed in all of those things thousands of years ago, we still believe in some of those beliefs today. For example, they believed in the afterlife and some people still believe in it today. They had ceremonies when a person died and today have ceremonies for the dead but, in a different way.

C. We hope that you have learned about ancient Chinese and Egyptians history.
References


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