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WEBSITE RESOURCES

The WebQuest Page: http://webquest.sdsu.edu/

CHAPTER 6

MULTIMEDIA-BASED HISTORICAL INQUIRY STRATEGY INSTRUCTION

Do Size and Form Really Matter?

David Hicks and Peter E. Doolittle

ABSTRACT

This chapter examines how the integration of a multimedia tool (SCIM Historical Inquiry Tutorial) can support the teaching of history. Specifically, we report on the results of an experiment that asks: To what extent does the level of strategic engagement (superficial or comprehensive) and the nature of the multimedia presentation (animation (A), narration (N), and on-screen text (T)) impact students' understandings of historical inquiry and the strategic knowledge required to engage in source analysis? Participants included 195 male and 209 female undergraduate students (n = 404). While the superficial/comprehensive instructional strategy results provided evidence that sustained engagement is necessary for the development of strategic thinking, the multimedia group (i.e., AN, AT, ANT) results surprisingly yielded no significant or meaningful findings. This study joins a growing body of empiri-

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cal research designed to examine how digital technologies can support the teaching and learning of the doing of history.

INTRODUCTION

> It is only when students understand that historians can ask questions about historical sources that those sources were not designed to answer, and that much of the evidence used by historians was not intended to report anything, that they are freed from dependence on truthful testimony. Much of what holds interest for historians... could not have been "eyewitnessed" by anyone, not even by us if we could return by time machine. Once students begin to operate with a concept of evidence as something inferential and see eyewitnesses not as handing down history but as providing evidence, history can resume once again; it becomes intelligible, even a powerful, way of thinking about the past. (Lee, 2005, pp. 36–37)

Progression in the discipline of history begins with a recognition that there is more to teaching history than the simple "aggregation" of historical facts, whereby success is simply quantitatively gauged by "an increase in the amount of information pupils could recall" (Lee & Shemilt, 2003, p. 113). Learning history, as the opening quote illuminates, requires learners to engage in the process of historical inquiry in terms of "the use of analysis to identify connections, relationships, and structures that tie together individual events or pieces of evidence" (Barton & Levstik, 2004, p. 69). The importance of preparing students to unpack historical sources as part of answering historical questions has long been advocated (see Osbourne, 2003) and remains prominent in the current benchmarks and standards of the American Historical Association (AHA, 2003), the National Center for History in the Schools (NCHS, 1996), and the National Council for the Social Studies (NCSS, 1994). While such an "analytic stance," in terms of teaching historical inquiry and analysis, is often identified as the 'ideal' approach for teaching and learning history, the shift from theory to practical application within today's classrooms can be difficult and time consuming (see Bain, 2000; Barton, 1997, 2005; Barton & Levstik, 2004; Hicks, Doolittle, & Lee, 2004; Levstik & Barton, 2001a,b; VanSledright, 2002b,c).

However, over the last 30 years a growing body of research clearly indicates that given careful and appropriate instruction students as young as seven can begin to engage critically with historical sources as part of the process of historical inquiry (see Ashby, Lee, & Dickinson, 1997; Barton, 1997; Barton & Levstik, 2004; Lee, 2005; VanSledright & Limón, 2006). As Barton (1998) notes, it is important to see a student's abilities to comprehend history and think historically as "a set of skills educators can nurture, not an ability whose development they must wait for or whose absence they must lament" (p. 80). Nurturing such abilities, Riley (1999) contends, requires teachers to engage in "systematic and sophisticated literacy work" with their students (p. 8). Such work itself necessitates that teachers provide students with scaffolds to support the development of procedural/strategic and metacognitive knowledge.

Set within and through such a disciplinary understanding of the purpose of history, which recognizes that the acquisition of historical knowledge is "both the servant and the result of enquiry" (Counsell, 2000, p. 70), this chapter examines how the integration of multimedia can support the teaching of history; and specifically scaffold such distinguishable slices of the inquiry process as the analysis of historical sources. Our research is explicitly designed to extend the literature that examines the extent to which the use of multimedia impacts student learning in history. Within the study we build on our previous work that sought to develop and evaluate the impact of one specific multimedia supported strategy to teach historical inquiry by taking into consideration the extent to which teacher concerns with limited class and preparation time can serve as stumbling blocks to (1) engaging students in the learning of the doing of history and, specifically, source analysis; and (2) integrating digital technologies into the social studies classroom (Hicks & Doolittle, 2007; Hicks, Doolittle & Ewing, 2004). Specifically, we report on the results of an experiment that asks: To what extent does the level of strategic engagement (superficial or comprehensive) and the nature of the multimedia presentation (animation, narration, and on-screen text) impact students' understandings of historical inquiry and the strategic knowledge required to engage in source analysis? Before introducing and explaining the multimedia tool (SCIM Historical Inquiry Tutorial) and reporting on the experiment at hand, we briefly situate our work within the field of multimedia learning in the social studies.

MULTIMEDIA LEARNING IN THE SOCIAL STUDIES

Literature reviews focusing on the integration of digital technologies in the social studies continue to reveal that the field is still in its "adolescence" (Berson & Balyta, 2004, p. 148) and to a great extent "research lite" (Friedman & Hicks, 2006, p. 251) in terms of studies examining the impact of digital technologies on the teaching and learning of social studies (Berson, 1996; Ehman & Glenn, 1991; Friedman & Hicks, 2006; Whitworth & Berson, 2003). Interestingly however, a small number of researchers, informed by empirical research examining how students' learn history (for overviews see Barton & Levstik, 2004; VanSledright & Limón, 2006), have used such findings to inform, develop, and investigate the utility of multimedia tools to support the teaching and learning of the doing of history. The research

of Wiley and Voss on writing historical accounts (Voss & Wiley, 1997, 2000; Wiley, 2001), Britt and her colleagues working with the Sorcerers Apprentice (Britt & Aglinskas, 2002; Britt et al., 2000; Britt, Rouet, & Perfetti, 1996, Rouet et al., 1996), Spoehr and her colleague working with *American Culture in Context: Enrichment for Secondary Schools* (Spoehr & Spoehr, 1994); and Saye and Brush working with their problem-based inquiry tool *Decision Point!* (Brush & Saye, 2000, 2001, 2002, 2004; Saye & Brush, 2002, 2004, 2005, 2006, 2007; Wolf, Brush, & Saye, 2003) have all examined the extent to which multimedia environments can be effective for supporting the teaching and learning of working with multiple sources as part of the doing of history. What is clear from these studies as Wiley and Ash (2005) note is that "simply giving students access to multiple sources or multimedia learning environments will not guarantee any meaningful learning. This type of knowledge needs to be acquired through participation in highly structured guided activities with clear problem-solving and inquiry goals" (p. 385). The programmatic series of studies conducted by Saye and Brush have gone a long way to aid our understanding of the nature and utility of the type of structures, what they call soft and hard scaffolding, to support the teaching of history when working in a multimedia environment. Saye and Brush have consistently and explicitly identified the potentials, pitfalls, and provisos facing teachers and students as they worked with a multimedia historical inquiry tool they developed called *Decision Point! (DP!)* as part of the process of engaging in an authentic and meaningful historical inquiry on the Civil Rights era. In discussing their work, Saye and Brush are quick to acknowledge how issues of time, and the difficulty and breadth of the task assigned clearly impact students' abilities to learn to work with multiple sources and engage in the doing of history. They note:

> Despite additional scaffolding in *DP!* students continued to have difficulty acquiring deep, broad views of the civil rights knowledge base. These difficulties may be related to the breadth of the problem presented to the students in the unit. We hypothesize that the problem landscape for the *DP!* unit is too expansive for students to gain mastery in the time they have been given. In most classrooms, resources such as those available in *DP!* might be used more effectively if initial problems explored by students were smaller and more bounded. Students participating in both *DP!* 1 and *DP!* 2 had virtually no experience in participating in problem-based curriculum units in their social studies classes. (Saye & Brush, 2002, pp. 92–93)

In a recent review of their work Saye and Brush (2007) again recognize the limits to student learning and engagement because of class time, the scope of work expected, and the difficulty inherent in working with multiple sources. They explain:

> Our investigations have led us to believe that more tightly bounded problems are necessary to produce optimal improvement in student performances. We created the expansive *DP: Civil Rights*... in the hope that students could follow their curiosity to construct knowledge about their own questions as they arose as part of their investigations. However, we must balance this potential against the disorientation and superficiality that such an embarrassment of riches seemed to engender. We are currently developing much smaller defined sets of source documents. Smaller document sets will allow us to attend more closely to student conceptual and metacognitive needs by embedding supporting information and questions directly into the documents, a level of support that was impractical in the more open-ended *DP* event investigations. (pp. 216–217)

In recognition of such insights, our work has sought to re-scale the nature and use of multimedia to support the teaching and learning of history in terms of more closely scaffolding and also examining the impact of multimedia environments on more discrete slices of the inquiry process across different instructional contexts. Specifically, we developed a tool—the SCIM Historical Inquiry Tutorial—to explain the historical inquiry process and model how to examine and unpack individual sources. The SCIM historical Inquiry Tutorial derives from the SCIM-C strategy that is made up of five key phases that are designed to serve as scaffold to support student analysis of multiple historical sources in order to develop a historical account (Summarizing, Contextualizing, Inferring, Monitoring, and Corroborating). Such specific fine-grained research not only acknowledges the difficulties inherent in developing evidential understanding in working with various and multiple historical sources, but also provides the opportunity to "systematically investigate the effects of the content and design of multimedia environments on history learning... [while also identifying] which aspects of multimedia inquiry tasks are responsible for better learning outcomes" (Wiley & Ash, 2005. p. 386).

MULTIMEDIA AND HISTORICAL INQUIRY: THE SCIM HISTORICAL INQUIRY TUTORIAL

The SCIM Historical Inquiry Tutorial is an example of a multimedia instructional environment that focuses on the social studies domain and is designed to foster a deeper understanding of the doing of history in terms of understanding the concept of historical inquiry and the analysis of individual historical sources. The following sections describe the SCIM-C strategy for historical inquiry, upon which the multimedia tutorial is based, and the two versions of the SCIM Historical Inquiry Tutorial designed to examine the impact of superficial and comprehensive engagement on strategic

knowledge development. It is important to point out that the SCIM Historical Inquiry Tutorial that we used for this study was deliberately designed to examine the participants' abilities to analyze a single historical source rather than multiple sources, therefore only the first four phases of the SCIM-C process were taught and assessed. In doing this, our goal was to acknowledge the difficulties inherent in teaching how to analyze one historical source as part of the historical inquiry process, never mind teaching how to develop accounts based on multiple sources.

The SCIM-C Strategy for Historical Inquiry

Historical inquiry is not a process that students tend to understand and adopt naturally. Fortunately, however, historical inquiry *is* a process that can be entered into in at various levels of sophistication. This entering, or engagement, into historical inquiry is often quite daunting for students at all levels and requires careful scaffolding. One method of scaffolding the historical inquiry process is to use the SCIM-C strategy. The SCIM-C strategy provides students with the structural and conceptual help they need in interpreting historical primary source documents, in negotiating the spaces between fact-based and perspectival historical understanding, and in reconciling various accounts of the past, as they try to make sense of evidence from the past in order to answer historical questions (Hicks, Doolittle, & Ewing, 2004).

The SCIM-C model is founded upon a belief that a central goal of doing history is to gain a critical understanding of the broad picture of the past. This broad picture is constructed from traces or sources of information from and about the past. These historical sources are then analyzed as part of the process of historical interpretation. History in this sense is not everything that happened in the past, but is a way of organizing and explaining the past. To actually engage in this process of doing history means that we have to ask and answer historically relevant questions. In order to answer historically relevant questions, students need to understand how to (a) evaluate sources in order to use them as historical evidence, and (b) reconcile conflicting evidence to create an interpretive account of the past. Ultimately the final narrative is an interpretation of the past based on an analysis of the available evidence.

Grounded within ongoing research on teaching and learning history (Barton & Levstik, 2001a,b, 2004; Wineburg, 1991a,b, 2001; VanSledgright, 2002a–c) and building upon and Riley's (1999) layers of inference models to support teaching evidential understanding, the SCIM-C model utilizes a five-phase process to teach students how to analyze historical primary sources in pursuit of answering historical questions. While there are many questions that can be asked of a historical source, the SCIM-C strategy focuses on five broad questioning phases: Summarizing, Contextualizing, Inferring, Monitoring, and Corroborating. Specifically, when students examine an individual source, they move through the first four phases—summarizing, contextualizing, inferring, and monitoring—and then, after analyzing several individual sources, they contrast the sources collectively in the fifth phase, corroboration.

Within each phase there exists a series of four spiraling and analyzing questions that serve to scaffold critical engagement with each source so that students may interact and transact with the source in light of the historical question being asked. More guiding questions can be asked within each phase as teachers rework the model to support the contexts within which they teach. The model should be viewed as an initiating device through which to nurture and support students' abilities to begin to engage in source analysis.

The model's utility lies in the recognition that SCIM-C simply provides a point of entry through which to teach historical analysis. The model, like any scaffold, is a support to "build other things with, and should be erected with an eye to taking them down" (Goffman, 1959, p. 254). The overall process of moving through the phases of the SCIM-C strategy should be viewed as a precise, recursive, and thoughtful approach to historical inquiry. It is an approach that requires a concerted level of engagement with each source whereby teachers allow students the time necessary to question, reflect, and comprehend the source in order to develop and write a historical interpretation. The following section addresses each of the five phases of SCIM-C, including the four spiraling analyzing questions for each phase.

Summarizing. Summarizing is the first phase of the SCIM-C strategy and begins with having students quickly examine the documentary aspects of the historical source, in order to find any information or evidence that is explicitly available from the source. Within this phase students identify the source's subject, author, purpose, and audience, as well as the type of historical source (e.g., letter, photograph, cartoon). In addition, the student looks for key facts, dates, ideas, opinions, and perspectives that are immediately apparent within the source. The four analyzing questions associated with the summarizing phase include:

1. What type of historical document is the source?
2. What specific information, details and/or perspectives does the source provide?
3. What are the subject and purpose of the source?
4. Who were the author and/or audience of the source?

Contextualizing. Contextualizing begins the process of students spending more time with the source in order to explore the authentic aspects of the source in terms of locating the source within time and space. One of the main problems people have when analyzing historical sources is making sense of the source within the context or time period in which the source was produced. That is, sources are remains of the past and were produced during a specific time and period for specific purposes by specific individuals or groups. Failing to pay attention to the importance of the historical context(s) from which the source originates leaves both students and teachers open to the risk of treating the source as a product of today and succumbing to the sin of historical anachronism (Berkhofer, 1995).

Students must recognize that it is important to understand that archaic words and/or images from the period may be in a source. These words and/or images may no longer be used today or they may be used differently, and these differences should be noted and defined. In addition, the meanings, values, habits, and/or customs of the period may be very different from those today. Students and teachers must be careful to avoid treating the source as a product of today as they pursue their guiding historical question. The four analyzing questions associated with the contextualizing phase include:

1. When and where was the source produced?
2. Why was the source produced?
3. What was happening within the immediate and broader context at the time the source was produced?
4. What summarizing information can place the source in time and place?

Inferring. Inferring is designed to provide students with the opportunity to revisit initial facts gleaned from the source and begin to read subtexts and make inferences based upon a developing understanding of the context and continued examination of the source. In answering a historical question and working with the primary source, sometimes the evidence is not explicitly stated or obvious in the source, but rather, the evidence is hinted at within the source and needs to be drawn out. As part of inferring, it becomes important to revisit initial facts gleaned from the two earlier phases and begin to draw conclusions. In addition, by leaving out certain details and highlighting others, the author/creator of a source can influence the reader. The inferring stage provides room for students to explore the source and examine the source's perspective in the light of the historical questions being asked. The four analyzing questions associated with the inferring phase include:

1. What is suggested by the source?
2. What interpretations may be drawn from the source?
3. What perspectives/points of view are indicated in the source?
4. What inferences may be drawn from absences or omissions in the source?

Monitoring. Monitoring is the capstone stage in examining individual sources. Here students are expected to question and reflect upon their initial assumptions in terms of the overall focus on the historical questions being studied. At this point in the analysis, students will have garnished a fair amount of information through summarizing and contextualizing the source, as well as inferring from the source. This reflective monitoring is essential in making sure that students have asked the key questions from each of the previous phases. Such a process requires students to examine the usefulness or significance of the source for answering the historical questions at hand. By doing this, students are double-checking and demonstrating their own awareness of the necessity to carefully and thoughtfully analyze the historical source.

An additional aspect of monitoring, beyond monitoring the execution of the SCIM-C strategy itself, is to examine the credibility of the source. The "information value" of certain documents may in some cases be exaggerated, offering perspectives or images that are clearly inconsistent with similar sources. Sometimes people have lied about their experiences. Sometimes historical sources are produced a long time after the events it portrays, telling us more about recollections in old age, for example, than the events themselves. Finally, the source may have been produced with a specific purpose in mind that is no longer relevant.

Ultimately, monitoring is about reflection—reflection upon the use of the SCIM-C strategy and reflection upon the source itself. The SCIM-C strategy is recursive in nature and thus revisiting phases and questions is essential as one begins to create a historical interpretation of a source in light of one's historical questions. The four analyzing questions associated with the monitoring phase include:

1. What additional evidence beyond the source is necessary to answer the historical question?
2. What ideas, images, or terms need further defining from the source?
3. How useful or significant is the source for its intended purpose in answering the historical question?
4. What questions from the previous stages need to be revisited in order to analyze the source satisfactorily?

Corroborating. Corroborating involves comparing the developed evidence from each source based on the initial topic of investigation and the guiding historical questions. What similarities and differences in ideas, information, and perspectives exist between the analyzed sources? Students should also look for gaps in their evidence that may hinder their interpretations and the answering of their guiding historical questions. When they find contradictions between sources, they must investigate further, including the checking of the credibility of the source. Once the sources have been compared, the student then begins to draw conclusions based upon the synthesis of the evidence. The four analyzing questions associated with the corroborating phase include:

1. What similarities and differences between the sources exist?
2. What factors could account for these similarities and differences?
3. What conclusions can be drawn from the accumulated interpretations?
4. What additional information or sources are necessary to answer more fully the guiding historical question?

The SCIM-C strategy for historical inquiry served as the foundation for the SCIM historical inquiry multimedia tutorial, which was created in both a superficial and comprehensive strategy instruction version. Since the SCIM Historical Inquiry Tutorial was designed to focus on the analysis of individual sources, corroboration is not included within the tutorial.

SCIM Historical Inquiry Tutorial: Comprehensive Strategy Instruction Version

The SCIM Historical Inquiry Tutorial, a multimedia instructional scaffold, was designed to assist teachers and students in the development of historical inquiry knowledge and skills (see http://www.historicalinquiry.com for an example of the tutorial). That is, the tool was *not* designed to replace teacher–student interaction, nor was it designed to subsume the teacher's instructional role. The SCIM multimedia instructional scaffold seeks to engage students in inquiry, critical thinking, and critical reflexivity through an extensive and systematic engagement with historical sources.

This systematic engagement was designed based on research addressing (a) historical inquiry (see Levstik & Barton, 2001a, b; Riley, 1999, Wineburg, 2001); (b) cognitive strategy instruction (see Collins, Block, & Pressley, 2002; Reid & Lienemann, 2006); (c) instructional multimedia development (see Mayer, 2001, 2005); (d) scaffolding in technologically-rich instructional environments (see Quintana, et al., 2004; Reiser, 2004; Saye & Brush, 2006); and (e) classroom-based history teaching at the elementary, middle, secondary and college levels (see Booth, 2003; Doolittle & Hicks, 2003; Hadyn, Arthur, & Hunt, 2001; Levstik & Barton, 2001a; VanSledright, 2002a–c). The tutorial itself was created using Adobe's Flash™ and is a combination of animation, explanatory narration, and optional on-screen text mirroring the explanatory narration.

At the macro level, the SCIM Historical Inquiry Tutorial was designed as four instructional episodes lasting 30–45 minutes each (for a detailed account of the SCIM strategy, see Hicks & Doolittle, 2007). At the micro level, each instructional episode comprised a combination of *strategy explanation*, *strategy demonstration*, and *strategy participation* (see Figure 6.1). Specifically, during the first instructional episode students engaged in approximately 15 minutes of explicit SCIM strategy instruction, 15 minutes of expert demonstration (modeling), and no strategy participation. However, as the student progressed from the first to the fourth instructional episode the amount of time engaged in explicit strategy explanation and strategy demonstration decreased while the amount of time engaged in strategy participation increased. Indeed, during the fourth instructional episode the students were entirely engaged in strategy participation.

The *strategy explanation* sections of the instruction were designed to explicitly address a general approach to historical inquiry and introduce the specific phases and questions of the SCIM strategy. The section on the general approach to historical inquiry begins with the asking of historical questions and continues with the idea that historical sources must be obtained and analyzed as historical evidence. This historical evidence is then used to create a historical interpretation that addresses the original historical

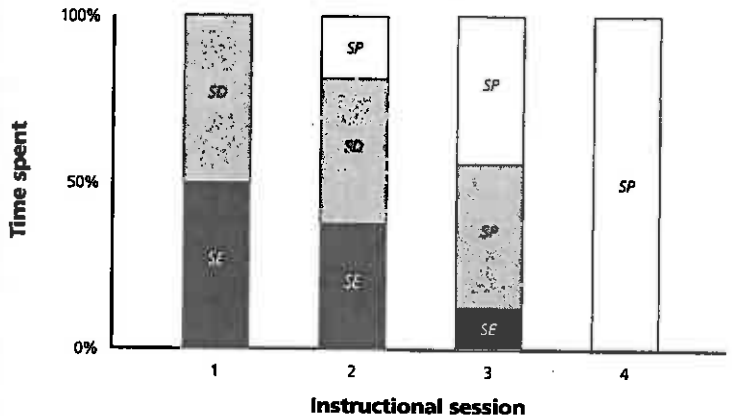

Figure 6.1 The distribution of time spent within the SCIM Historical Inquiry Tutorial on strategy explanation (SE), strategy demonstration (SD), and strategy participation (SP) across four days of instruction.

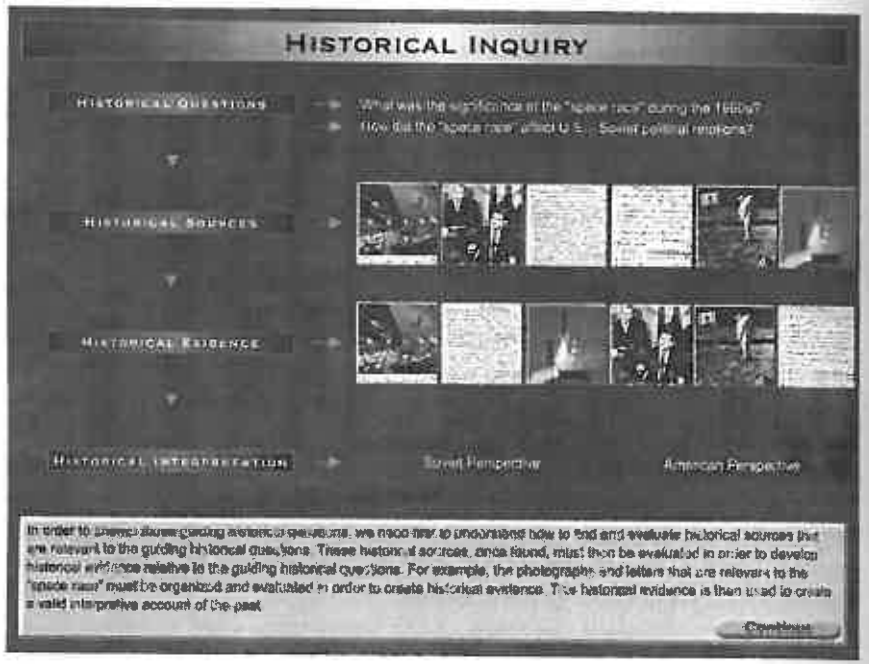

Figure 6.2 The SCIM tutorial and the historical inquiry process.

questions (see Figure 6.2). Following this discussion of the general historical inquiry approach, an explanation of the SCIM strategy is provided that focuses on explicit instruction in the use of the strategy (i.e., summarizing, contextualizing, inferring, and monitoring) with authentic sources (see Figure 6.3). Metacognitive knowledge of when, where, and why to use the strategy and examples of the strategy in use is also provided.

The *strategy demonstration* sections of the instruction are based on the think aloud protocols of historians as they analyzed various sources relative to specific guiding historical questions. This modeling of the SCIM strategy by experts is necessary for students to develop both the skills to use the strategy and the metacognition necessary to know when, where, and why to use the strategy. Specifically, these expert-based demonstrations model the iterative nature of the SCIM phases, the process of source analysis and evidence generation, and the creation of historical interpretations.

The *strategy participation* sections involve the students in making decisions relative to the analysis and interpretation of sources under study. Questioning, decision-making, and feedback dominate the strategy participation sections. Specifically, students are provided with a historical source to read and then are asked to answer identification and interpretation questions. Identification questions are surface level questions that focus on identifying explicit summary statements, simple contextualizing statements, obvious inferential statements, and basic monitoring questions. Interpretation questions, however, require students to read complex interpretive statements and determine the most accurate statements relative to the source under analysis. In addition, after students answer each question, they are provided with explicit feedback related to the correctness of their answer and guidance on how to analyze and interpret the source given the question asked. These identification and interpretation questions encourage students to self-regulate and control their use of the strategy.

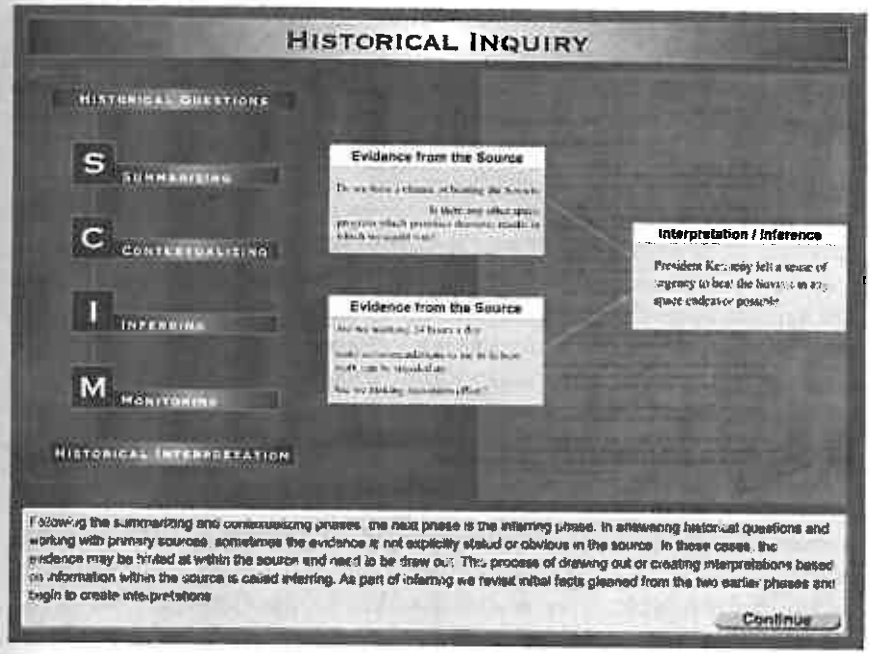

Figure 6.3 The SCIM strategy and the inferring phase.

SCIM Historical Inquiry Tutorial: Superficial Strategy Instruction Version

In addition to the comprehensive version of the SCIM Historical Inquiry Tutorial, lasting four sessions of 30–45 minutes, a superficial version of the tutorial was created, lasting only 3.5 minutes. The superficial version of the tutorial included an explanation of historical inquiry—comprising historical questions, historical sources, historical evidence, and historical interpretations—and a basic explanation of the SCIM strategy. The expla-

nation of the SCIM strategy included a discussion of the four phases of the SCIM strategy and the analyzing questions associated with each phase. The superficial version of the SCIM tutorial does not include any of the source analysis examples, expert-modeled demonstrations, or source analysis practice opportunities.

RESEARCH QUESTIONS

It is hypothesized that the development of historical inquiry requires extensive engagement with historical sources and the application of specific cognitive and metacognitive strategies. The SCIM-C historical inquiry strategy and the SCIM Historical Inquiry Tutorial were designed with this purpose in mind. The development of the strategy and tutorial raise the issue of whether or not the strategy and tutorial create an effective instructional environment. In addition, given that the tutorial is multimedia-based, another question of interest is whether or not the tutorial's efficacy is affected by its presentation format, specifically, whether or not the tutorial is subject to the modality and redundancy multimedia effects (Ginns, 2005; Kalyuga, Chandler, & Sweller, 1999; Mayer, Heiser, & Lonn, 2001; Mayer & Moreno, 1998). Therefore, a study was designed to answer the following questions:

1. Is student recall and application of the SCIM strategy affected by the comprehensiveness (superficial versus comprehensive) of the SCIM tutorial multimedia instructional environment?
2. Is student recall and application of the SCIM historical inquiry strategy affected by the multimedia format (modality and redundancy principles) of the instruction?

METHODOLOGY

The purpose of this study was to determine the effects of (a) superficial and comprehensive strategy instruction in a multimedia instructional environment, and (b) instructional presentation format (animation, narration, and/or on-screen text), on the development of historical inquiry knowledge (recall) and skills (application). Specifically, students engaged in the SCIM Historical Inquiry Tutorial for either one 3-minute instructional session (superficial) or four 40-minute instructional sessions (comprehensive). In addition, students experienced the multimedia tutorial in one of

three multimedia instructional environments—animation with concurrent narration (AN), animation with concurrent on-screen text (AT), or animation with concurrent narration and on-screen text (ANT). According to previous studies, students should recall and transfer more from multimedia tutorials comprising animation and narration (AN) than animation and on-screen text (AT), which is known as the modality principle (Mayer & Moreno, 1998; Moreno & Mayer, 1999), and students should recall and transfer more from multimedia tutorials comprising animation and narration (AN) than animation, narration, and on-screen text (ANT), which is known as the redundancy principle (Kalyuga et al., 1999; Mayer et al., 2001). The modality and redundancy effects are based on the premise that the presentation of multiple sources of information within one perceptual and/or processing channel (e.g., an animation with on-screen text, both visual stimuli) can split one's attention and overload the perceptual/processing channel and lead to decreased cognitive performance.

Participants

Participants included 195 male and 209 female undergraduate students ($n = 404$), with a mean age of 20.4 years (SD = 2.1), enrolled in a health education course at Virginia Tech. The sample was ethnically reflective of the U.S. population with 72.5% White, 14.6% Black, 6.7% Asian, 2.5% Hispanic, and 2.0% Multiracial.

Participants' prior knowledge of historical inquiry was assessed using a five-item self-rating scale and a seven-item checklist. The self-rating scale asked participants "Please rate your knowledge of historical inquiry" from 1 (*very low*) to 5 (*very high*), while the checklist asked participants to indicate which statements applied to them: (a) I have an undergraduate degree in history, or a history related field; (b) I have an advanced degree in history, or a history related field; (c) I like to watch the History Channel or BBC on television; (d) I like to read historical novels; (e) I can explain the differences between primary and secondary historical sources; (f) I can explain historiography or presentism; and (g) I can explain why history is always less than the past. The historical inquiry prior knowledge assessment had a maximum score of 12; specifically, 1 to 5 points on the self-rating scale and one point for each checklist item checked. Since the current study addressed the development of historical inquiry knowledge and skills, participants that scored 7 points or higher on the historical inquiry assessment were not included in the data analysis. Using this procedure, 9 participants were excluded.

Design

The experimental design was a 2 × 3 factorial design with instructional group (superficial, comprehensive) and multimedia group (AN, AT, ANT) as between-subject variables. Participants were randomly assigned to either the superficial ($n = 189$) or comprehensive ($n = 215$) instructional group, and the AN ($n = 124$), AT ($n = 140$), or ANT ($n = 140$) multimedia group.

Materials and Apparatus

The SCIM Historical Inquiry Tutorial. The tutorials created a multimedia instructional environment based on an interactive program designed to scaffold students' learning of the SCIM strategy for historical inquiry (see Hicks & Doolittle, 2007; Hicks, Doolittle, & Ewing, 2004). The comprehensive instructional strategy tutorial consisted of three main sections, strategy explanation, strategy demonstration, and strategy participation, and was distributed across four 40-minute segments (see previous discussion). The superficial strategy instruction tutorial consisted of one main section, strategy description, and comprised one 3.5-minute segment (see previous discussion).

Strategy recall test and scoring. Participants' recall of the historical inquiry process and the SCIM strategy was assessed using a single open-ended question: "Write down everything you know about the process of engaging in historical inquiry (i.e., analyzing primary historical sources)." Two trained scorers evaluated each response such that a response (inter-rater reliability, $r = .93$) received one point each for describing the four phases of historical inquiry—asking historical questions, finding and evaluating historical sources, creating historical evidence from historical sources, and writing historical interpretations—and one point each for describing the four phases of the SCIM strategy—summarizing, contextualizing, inferring, and monitoring. Thus, the maximum score for each recall test was 8.

Strategy application test and scoring. Participants' ability to analyze historical source letters, and write an interpretation based on a specific historical question, was assessed by two trained scorers (inter-rater reliability, $r = .84$). Each strategy application test consisted of participants reading a historical letter on the computer screen and then writing a historical interpretation to a historical question based on the letter in a text box on the computer screen. The strategy application test letter was written in 1865 by Thomas Christie, a soldier in the U.S. Civil War, to his brother (see Appendix A). Each response was scored such that four points were possible for each of the four SCIM phases, for a maximum score of 16 points. Within the summarizing phase, participants received one point each for including the letter's subject, author, audience, and purpose. In addition, within the contextualizing phase, participants received one point each for including in the response when, where, and why the letter was written, as well as what was happening within the immediate and/or broader context in which the letter was written. While evaluating the inferring phase, participants received one point each for including explicit inferences, implicit inferences, inferences based on omissions from the letter, and inferences based on perspectives. Finally, while evaluating the monitoring phase, participants received one point each for including in the response the need to define terms, the need for information beyond the source, the usefulness or significance of the source, and the need to revisit questions addressed previously in the analysis.

Procedure

All data collection and media presentations were completed on wireless laptop computers. Participants in the superficial and comprehensive strategy instruction groups were studied separately. Those participants in the superficial strategy instruction group were required only to attend one experimental session. These participants, upon entering the computer lab and being assigned to a laptop computer, completed a demographics questionnaire and the prior knowledge of historical inquiry assessment. Participants were then provided brief instructions regarding the superficial version of the SCIM historical inquiry tutorial. Participants then engaged in their specific version (i.e., An, AT, ANT) of the tutorial. Following the engagement in the tutorial, participants were given 10 minutes to complete the strategy recall test and 20 minutes to complete the strategy application test.

Those participants in the comprehensive strategy instruction group were required to attend four experimental sessions on different days during a single week. On the first day, upon entering the computer lab and being assigned to a laptop computer, participants completed a demographics questionnaire and the prior knowledge of historical inquiry assessment. Participants were then provided brief instructions regarding the comprehensive version of the SCIM historical inquiry tutorial. Students then engaged in the first 40-minute segment of their specific version (i.e., AN, AT, ANT) of the tutorial. On the second and third days of the study, participants were again given brief instructions and then completed the second and third 40-minute segments of their specific version of the tutorial, respectively. On the fourth day, participants were again given brief instructions and then completed the final 40-minute segment of their specific version of the tutorial. Following engagement in the final tutorial segment, participants were given 10 minutes to complete the strategy recall test and 20 minutes to complete the strategy application test.

RESULTS

The purpose of this study was to determine the effects of (a) superficial and comprehensive strategy instruction in a multimedia instructional environment, and (b) instructional presentation format (i.e., AN, AT, ANT), on the development of historical inquiry knowledge (recall) and skills (application). These two questions were analyzed using a 2 (superficial, comprehensive) × 3 (AN, AT, ANT) ANOVA with both the recall and application data. All post-hoc comparisons involved Tukey analyses with an alpha criterion of 0.05 and all effect size calculations involved Cohen's *d* (Cohen, 1988).

Superficial versus Comprehensive Strategy Instruction

According to the cognitive strategy instruction literature (see Pressley & Harris, 1990; Pressley & Woloshyn, 1995; Weinstein & Mayer, 1986), participants that engaged in comprehensive strategy instruction involving explicit explanations, expert modeling, extensive examples, and practice with feedback should learn to understand and apply the strategy more readily than participants that engaged in superficial strategy instruction that included general explanations only. This superficial versus comprehensive strategy instruction effect was confirmed for recall of the strategy (see Table 6.1), $F(1,398) = 177.36$, $d = 1.35$, $p = .00$. In addition, the superficial versus comprehensive strategy instruction effect were confirmed for application of the strategy, $F(1,398) = 552.11$, $d = 2.43$, $p = .00$. These results indicate that a more sustained instructional experience significantly increased both recall and application of the SCIM historical inquiry strategy.

TABLE 6.1 Means and Standard Deviations for Recall and Application Scores for the SCIM Strategy for Students Engaging in Superficial and Comprehensive Strategy Instruction

	Recall		Application	
	M	SD	M	SD
Superficial	3.58	1.70	3.70	1.50
Comprehensive	5.83*	1.63	10.50*	3.66

Note: Max recall score = 8. Max transfer score = 16.
* $p < .05$

TABLE 6.2 Means and Standard Deviations for Recall and Application Scores for the SCIM Strategy for Students in Differing Multimedia Groups

	Recall		Application	
	M	SD	M	SD
AN	4.85	2.02	7.36	4.39
AT	4.53	2.05	6.74	4.32
ANT	4.96	1.92	7.86	4.55

Note: Max recall score = 8; Max transfer score = 16; AN = animation + narration; AT = animation + on-screen text; ANT = animation + narration + on-screen text.
* $p < .05$

Modality and Redundancy Effects

According to the cognitive theory of multimedia (see Mayer, 2001, 2005a), participants that engaged in a multimedia tutorial that include animation with concurrent narration (AN) should learn more than participants who engaged in a multimedia tutorial that provided animation with on-screen text (AT) (known as the modality effect), and more than participants who engaged in a multimedia tutorial that provided animation with both concurrent narration and on-screen text (ANT) (known as the redundancy effect). Results of the analysis indicated a non-significant main effect for recall (see Table 6.2), $F(2,398) = 0.50$, $p = .60$. The analysis of the strategy application data also demonstrated a non-significant main effect, $F(2,398) = 0.36$, $p = .69$. These results indicate that there was neither a modality (AN vs. AT) nor a redundancy (AN vs. ANT) effect. These results are in contrast to prior research (Kalyuga et al., 1999; Mayer & Moreno, 1998; Moreno & Mayer, 1999) that found significant modality and redundancy effect. In addition, there were no interaction effects within the recall, $F(2,398) = 0.19$, $p = .82$, or application, $F(2,398) = 0.27$, $p = .75$, ANOVAs.

DISCUSSION

The findings clearly illustrate that the quality of instructional engagement, superficial versus comprehensive, significantly affected both the recall and application of the SCIM strategy. While superficial engagement is beneficial for introducing the strategy, the findings reflect the importance and

necessity of sustained engagement in learning and utilizing the SCIM- Historical Inquiry Tutorial to prepare students to engage in the cognitively sophisticated task of analyzing a historical source. Throughout the research we never expected the participants to learn to become expert historians, rather our hope was that the design and evaluation of the different versions of the multimedia tool would provide insights into the impact of the tool on scaffolding the teaching and learning of source analysis as part of preparing students for the overall process of historical inquiry.

If students are to acquire and use their strategic knowledge to engage in the doing of history, initially learning such a simple strategy as SCIM as part of the process of historical inquiry is an important first step. However, such a first step to facilitating complex thinking cannot occur overnight, rather teachers and students must be ready, willing and able to spend time, work with and maintain such scaffolds as the SCIM Historical Inquiry Tutorial within and through their teaching. Sustained engagement of 2.5 hours did provide students with the initial support to begin to recall and apply the SCIM strategy to source analysis; however it is not clear that 2.5 hours was enough time for students to be ready to have the scaffolding, or intellectual training wheels, removed. If the ability to work with historical sources is as important as Lee (2005, p. 36) in the opening quote contends it is for understanding and learning history—"once students begin to operate with a concept of evidence as something inferential and see eyewitnesses not as handing down history but as providing evidence, history can resume once again"—then it would seem that in the big picture, 2.5 hours of initial sustained engagement is time well spent for establishing a strong foundation from which a teacher would continue throughout the year to invest in, nurture and build upon the students' abilities to use their strategic knowledge to develop their source analysis skills, and learn to more fully engage in the authentic process of the doing of history.

While the superficial/comprehensive instructional strategy results provided evidence that sustained engagement is necessary for the development of strategic thinking, the multimedia group (i.e., AN, AT, ANT) results yielded no significant or meaningful findings (Table 6.2). The lack of a modality effect is somewhat surprising given Ginns' (2005) meta-analysis of the modality effect, in which he examined 43 relevant studies, yielding an overall weighted mean effect size (Cohen's d) of 0.72. One explanation may be that the vast majority of Ginns' 43 studies used cause-and-effect multimedia tutorials (e.g., what causes lightning), while the current study used a strategy-based multimedia tutorial. This reason, cause-and-effect tutorials versus strategy-based tutorials, may also be the cause of the lack of a redundancy effect. Ultimately, the lack of modality and redundancy effects calls into question the generalizability of the effects.

Finally, while the SCIM Historical Inquiry Tutorial is no panacea for preparing teachers and students to engage in source analysis, the tutorial does appear to provide a potentially worthwhile example of (a) a hard scaffold within a technology enhanced learning environment for teachers and students to engage in the type of sustained metacognitive strategic engagement required to develop a knowledge and understanding of the power and purpose of history; and (b) the type of design-based research needed within the field of social studies to examine the impact of digital technologies and tight technology enhanced learning environments on clear cut student learning outcomes.

APPENDIXA
Strategy Application Test Letter

My dear Sandy,
Savannah, Ga., Jan. 5th 1865

While we were in position on the lines outside the city we had several very exciting duals with the Rebel Batteries of 32 pdrs, & 10 pound Rifles. On the 15th Nov. they opened fiercely on us and our Cannoniers rushed to their posts, while I looked out a position from which I could observe the fire of my Gun. On the flank of our work was an old Rice mill, of which you have heard before. I thought this would be a good spot from whence to get a view of the Rebel position. On going inside however I found the stairs had been taken down by the men for firewood, so I had to give up the project. I had scarcely got to my piece again when a 32 pound shell from one of the Guns in front of us struck the old window blind & burst just inside the mill. I could not but think that if those stairs had been all right in their place, I would have had a hard time of it at that old window.

A day or two after that close call of mine, a shot from the same flank Gun, dashed through an Embrasure of the 15th Ohio, in the same fort with us, & tore a man's shoulder & arm all to pieces. He has since died. When we passed through the line of Rebel forts on our way to the city on the morning of the 21st, we had a good chance to see the effect of our shots. Their embrasures were completely torn to pieces, & two of their Guns had been dismounted by our Rodmans. I don't think you have much idea of the terrible accuracy of our kind of Guns, which the Rebels confess they dread far more than any other kind.

If you enlist under the new call Sandy, and if no persuasions will keep you at home you must come to us. Never think of joining any other Company than ours.

Yours hurriedly,
Th. D. Christie.

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SECTION 3

RESEARCH ON TEACHERS USING TECHNOLOGY IN SOCIAL STUDIES