

Writing to Learn from Multiple-Source Inquiry Activities in History

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Abstract

When learning about a historical topic, students must be able to work with information from multiple sources. In order to successfully integrate information across sources, students must understand the temporal structure of the events across documents (contextualization) and compare sources for consistent and conflicting information (corroboration). Three experiments examined how contextualization could be enhanced through the use of timelines and how corroboration could be enhanced through the use of inquiry-based essay prompts. A *position-based* essay prompt focused on evaluation of a specific cause while the *contributing-factors* essay prompt focused on explanation of the causes. Experiment 1 found that generating a timeline during learning did not improve essay quality compared to a read-only control. Although the position-based essay prompt was especially interesting to undergraduate students, it led to less coverage of concepts in the essays compared to an explanation-based essay prompt. Experiment 2 found a similar pattern of decreased coverage with the position-based prompts for high school students. Experiment 3 added a recognition test to serve as a learning measure, and found that younger students learned more after generating a timeline during reading compared to a read-only control. Taken together, these findings suggest that timelines may enhance learning, but only for younger students. Furthermore, the results illustrate that different writing tasks affect students' likelihood of synthesizing information across sources and their learning outcomes.

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To learn about History is to try to understand the past. Historians approach this task by considering the information available to them across many sources as they develop written accounts or arguments. Inquiry writing activities seek to engage students in a similar context by asking them to use multiple documents, like historians do, to reason about how different people's motives and actions; the cultural context including social, political and economic factors; and the occurrence of other events, all interact to make History happen.

In addition to being representative of disciplinary practice, there are other reasons why developing writing-to-learn activities specifically in multiple document contexts may be important. First, the contexts have practical and pragmatic importance in today's society. The ease with which information may now be accessed on the Internet turns many informal inquiry tasks ("Do citizens need an identification card to vote in their district?" or "What led to an attack on an embassy?") into a multiple-source learning situation. Searching the Internet for information on any topic produces numerous accounts that may overlap, vary in detail, or even contradict each other. Students need to be educated in skills that will help them in these contexts.

Second, there is a growing pedagogical need for this work. Learning in many subject-matter domains requires the comprehension of text and, increasingly, the use of multiple sources to construct written products (Britt & Aglinskias, 2002; Holt, 1990; Shanahan & Shanahan, 2008; Wiley, et al. 2009; Wiley & Voss, 1999; Wineburg, 1991). Yet the advanced literacy and composition skills needed to learn from multiple documents are not often directly taught during formal schooling, at least in the United States, except perhaps for the instruction that occurs in select high school Advanced Placement (AP) History courses around how to approach Document Based Questions that appear on the AP Exam (Wiley et al. 2009). As such, multiple source

writing activities appear to be becoming a widely adopted approach to writing to learn as shown by this volume, in which we see examples from Mateos et al.; MacArthur; van Drie, van Boxtel, and Braaksma; and Klein.

Third, this work has important implications for theories of text comprehension and models of reading for understanding. Multiple-document inquiry activities provide a unique opportunity to support advanced comprehension skills. Developing an understanding from multiple sources requires a transformative, integrative, and constructive activity (Britt & Aglinskias, 2002; Mannes & Kintsch, 1987; Spoehr & Spoehr, 1994; Wiley & Voss, 1999; Wineburg, 1991). But, it is clear that engaging in these processes can be demanding. Reading multiple sources and integrating information across different documents into a written product can be challenging, even to college students and adult readers (Britt & Aglinskias, 2002; Wiley et al. 2009).

In reading single documents, readers usually rely heavily on the textbase (Kintsch, 1998) and the author's intended purpose for a text, and engage minimally in interpretative, integrative, or constructive processing. Constructing understanding from multiple-document inquiry activities involves more than just creating independent representations for each document (Britt, Perfetti, Sandak, & Rouet, 1999; Perfetti, Rouet & Britt, 1999). Typically, the documents are written for varied purposes and contain information that can be integrated in numerous ways to address several different issues and inquiry questions. Readers must impose their own goal or purpose upon the documents to create an organizing structure that will guide how and what information from various documents is integrated. A reader's goal and inquiry question will often differ from that of some or even all of the documents, thus requiring interpretation, application, and re-purposing of information.

If we take understanding to mean the construction of mental models of phenomena, then when the parts of a model are distributed across documents, multiple-document activities make integration necessary for understanding (Wiley et al, 2009; Wiley, Griffin & Thiede, 2005). When the same parts of a larger model are presented as sections of a single coherent document, there is typically an author who does the work of organizing the presentation order of the sections to simulate how the concepts and cause-effect relations are organized in the phenomena, along with linguistic markers that connect the parts of the model, such as transitions, mentions of prior and upcoming sections, and overview or summary statements. Even when each individual document provides a coherent explanation of its own target concepts, a multiple-documents context will lack these features that signal how and what parts of the overall model need to be connected. Readers are forced to do much of the integration work on their own that an author would normally do for them in a single document context. Thus, multiple-document inquiry activities are opportunities that require students to develop the skills they need to engage in reading for understanding.

How Do Students Perform Multiple-Document Inquiry Activities?

Given that many students are not directly taught how to engage in historical inquiry or multiple-source comprehension, a goal behind much of the previous research in this area has been developing an understanding of the skills that naïve students bring to document-based writing activities. Early work by Wineburg (1991) identified three main types of processes that expert historians, but not high school students, use as they approach documents to answer a question in History. The *sourcing heuristic* resulted from the observation that historians routinely look to the bottom of excerpts to examine the source prior to reading, and also mention how the source helps them make predictions and interpret the content. The *corroboration heuristic*

resulted from the tendency of historians to note connections, agreements, or conflicts across documents. Corroboration is essential to creating an integrated representation of a situation. The *contextualization heuristic* resulted from the tendency of historians to use temporal context to make inferences about the information they read, and even question the accuracy of witnesses' accounts.

Convergent support for these observations comes from many subsequent studies that have been done on document-based learning with students in History. Many of these findings have come from Britt and her colleagues whose line of work on multiple-source comprehension uses a set of materials related to the Panamanian Revolution of 1903 (Britt, Rouet, Georgi, & Perfetti, 1994; Britt, Rouet, & Perfetti, 1996; Britt & Sommer, 2004). These materials also serve as the document set for the studies reported in this chapter. This previous work on the Panama unit has yielded a number of findings that resonate with and expand on the early Wineburg findings about how students typically approach document-based tasks. Several studies have examined the propensity with which readers pay attention to source information as they engage with documents. These studies have found that, in contrast to domain experts, high school and college students often fail to spontaneously attend to source information or consider the quality of sources when faced with multiple documents (Britt & Aglinskas, 2002; Rouet, Britt, Mason, & Perfetti, 1996; Rouet, Favart, Britt, & Perfetti, 1997). In fact, high school students readily use information from fictional sources such as novels and movies to support the arguments they make in their History essays (Britt & Aglinskas, 2002). It does not seem to be until students have substantial grounding in the discipline, such as being graduate students in History, that they routinely consider characteristics of the source such as the author and document type when given document-based activities (Rouet et al., 1997).

Other studies have suggested that students can be made more sensitive to source information. For instance, Rouet et al. (1996) found that providing primary documents in the document set increased students' attention to source information, affected their judgments of trustworthiness, and made them more likely to include references to documents in their essays as compared with students performing the same tasks on sets without primary documents. In other studies, the inclusion of conflicting information across documents seems to increase students' attention to source information. For instance, discrepant information makes the authors of sources more memorable to students (Rouet, Britt, Caroux, Nivet & Le Bigot, 2009). An eyetracking study has shown that discrepant information within news stories prompts readers to look back at source information, more so than when news stories contain only consistent information (Braasch, Rouet, Vibert, & Britt, 2012).

Other studies have investigated how a computer-based environment called *Sourcer's Apprentice* can train and support skills in sourcing (Britt & Aglinskas, 2002; Britt, Perfetti, Van Dyke, & Gabrys, 2000). *Sourcer's Apprentice* supports sourcing by prompting students to complete "notecards" for each document within a document set. When high-school students read the Panama unit using the *Sourcer's Apprentice* environment, it not only improved their ability to identify and evaluate source information, but also led them to write essays that cited more sources, and referenced more information from primary and secondary sources than did a comparison condition in which writers did not use it (Britt & Aglinskas, 2002). To support students' further use of document skills in their writing, a newer version of the *Sourcer's Apprentice* environment has been enhanced with an automated citation analyzer, *SAIF* (*Sourcer's Apprentice Intelligent Feedback*), which has been shown to increase the likelihood of citation practices even further (Britt, Wiemer-Hastings, Larson, & Perfetti, 2004).

Another area of difficulty in learning from multiple-document activities in History is the need to contextualize the information in time and place. One observation from years of studies of the Panama unit is that without a map, many students are unaware of Panama's location. Understanding Panama's unique geography is highly relevant for understanding the reasons for the Revolution in 1903. Another observation has been the prevalence of temporal misconceptions, especially among younger students. For instance, many students mistakenly think that the canal was built prior to the revolution when, in fact, the revolution enabled the treaty to build a canal with Panama. If students do not correctly represent the order of events, they cannot accurately infer potential causes of events. Thus, explicitly supporting students' ability to contextualize the information in the documents may also improve what is learned from the activity.

A third area that students seem to have difficulty with is corroborating or integrating information across documents. Readers of multiple texts are required to contend with the competing goals of understanding each source separately as its own entity, and then also in connection with the other documents. In order to build a coherent mental representation of the content being discussed in the documents, readers must integrate information from across the texts. An important element of reading multiple documents is the challenge of reading and integrating conflicting information, and this challenge is part of the Panama document set as it includes multiple, conflicting perspectives. Rouet et al. (1997) found that graduate students in History were more likely to write an essay that considered multiple perspectives, while graduate students in Psychology were more likely to assert a claim that argued for one perspective, or to include a statement of their opinion.

Britt, Rouet, Georgi, and Perfetti (1994) also found that undergraduates had difficulty integrating across different texts. In this study, a small group of undergraduates read large sections from several books on the Panama Canal. After reading each document, students were asked to give a summary of their current understanding about the Panamanian Revolution. Rather than including the most corroborated events across texts, these summaries were very strongly affected by the perspective of the most recent text that had been read. Engaging in corroboration or integration across texts seems very challenging for students who do not have advanced training in History. Yet, integration across documents is key for developing an understanding of the content. Thus, tasks or prompts that help readers integrate information across documents and recognize corroborated information may be very helpful. Two interventions have already shown some promising steps in this direction. Britt and Sommer (2004) found that answering macro-level questions about an initial text and being prompted to read for corroboration (“compare and contrast the information”) improved students’ integration of the Panama content. Britt and Angliskas (2002) also found that an interface that prompts students to take notes on agreements and disagreements among the documents, and even the simple presence of multiple documents (versus a single textbook-like text), led to greater integration.

Because much of the attention in learning from multiple documents in History has focused on improving sourcing skills, in this chapter we attempt to focus on the other two main skills underlying learning from document-based inquiry activities: contextualization and corroboration/integration.

Chronological Thinking and Learning in History

As discussed above, one of the three main processes that historians, but not students, spontaneously use when approaching historical information is contextualization. One important initial step toward engaging in contextualization is considering how historical information may be organized in time, which is essential for reconstructing historical events (Barton & Levstik, 1996; Wineburg, 1991). Indeed, national standards in History identify chronology as a basic component of historical thinking (National History Standards Project, 1994a, 1994b). Students cannot understand the causes of an event if they are not clear on which events precede and follow from other events. Alleman and Brophy (2003) further suggest teaching students to engage in chronological thinking will not only boost understanding of historical events, but that it could also help students avoid the problem of Presentism. Presentism occurs when a person evaluates the past through the lens of current societal or cultural expectations.

When reading from multiple documents, it is especially important for students to attempt to contextualize the information from each document and understand the temporal ordering of events. When studying from a single information source such as a textbook, it can usually be assumed that time will progress linearly throughout the narrative, with events mentioned earlier in the text preceding events mentioned later. If this is not the case, the author will likely indicate that this convention is being violated. When reading multiple documents, however, students cannot assume temporal continuity, and texts may be presented in a random order that does not match the natural progression of events. Furthermore, different documents may cover different timeframes. For example, in the Panama document set, some documents cover large time spans (early 1800s – early 1900s); some cover shorter time spans (October 16th, 1903 - End of October 1903; October 10th, 1903 - October 16th, 1903); and several present events from a single day (the 1846 Treaty; a newspaper article from July 13, 1903; military telegrams from November

2nd, 1903 and November 3rd, 1903). Thus, it is up to the reader to construct the temporal order of events that are mentioned within and across this set of documents.

Monitoring the chronological order of historical events can be a difficult task, and studies have shown that children at different age levels may not be equally proficient at it. Elementary school children in particular have been shown to have great difficulty thinking about time in the past and its relation to the present. Young students' understanding of the past has been characterized as undifferentiated, with children describing the past as a time when there were wars, dinosaurs, and kings, or when parents were young and Jesus and God were alive (Barton & Levstik, 1996; Lynn, 1993). The work of Barton and Levstik (1996) demonstrates that the ability to chronologically order historical information develops with age from kindergarten through sixth grade (ages 5 through 11). While all children showed some ability to order a set of pictures depicting key events in American History, the researchers noted that at about 5th grade, students begin to use more complex strategies to think about the ordering process.

Other research has shown that chronological thinking is also a skill that may be successfully supported even among young children, particularly through the use of multimedia (e.g., Wiley & Ash, 2005). In one study with high school students, Friedman and Marti (1945) showed that students who practiced developing timelines as part of their first semester of World History developed better understanding of the general temporal order of historical events as compared to students who did not. In another study, Davis, Hicks, and Bowers (1966) found that high school students learned more from a historical text when provided with a timeline. Studies with younger students have also shown that those who engage in activities such as timeline generation, sequencing, or detecting anachronism develop a better understanding of historical time than those who do not (Alleman & Brophy, 2003; Masterman & Rogers, 2002). Given the

inherently temporal nature of historical inquiry, in the present experiments we directly test the hypothesis that building a temporal model is an important precursor to exploring the complex causality of historical topics, by manipulating whether or not students were directed to engage in a timeline activity during the multiple-document inquiry task.

As a first step toward examining whether such an intervention may be beneficial, we re-examined the annotations that students made who participated in the Wiley and Voss (1999) study. Wiley and Voss had undergraduates read a set of documents providing information about the causes of population change during the Irish Potato Famine. When writing their essays, students were able to use any notes they took during reading, but not the documents. A subset of students spontaneously created timelines or outlined the temporal sequence of events as part of their notes. The essays were scored in terms of the number of casual factors from an a priori model of the event. The post-hoc reanalysis of essays showed that the students who included timeline information in their notes demonstrated better understanding of the causes of the potato famine and included significantly more correct causal concepts in their essays ($M = 6.2$, $SD = 1.6$) than the other participants ($M = 5.0$, $SD = 1.6$), $t(44) = 2.00$, $p < .05$). These results suggest that constructing a timeline could be a facilitative activity toward constructing better understanding during historical inquiry from multiple documents. However, given that no timeline instruction was actually given to students, it is not possible to rule out an explanation for these results based on individual differences (i.e., better students spontaneously use timelines). Thus, one focus of studies described here is the manipulation of whether students are asked to generate or review a timeline before they write their essays.

Writing Task Instructions and Learning in History

Several studies (Voss & Wiley, 1997; Wiley & Voss, 1996, 1999) have found that the nature of the writing instruction that is given to students during writing-to-learn activities can also have an effect on learning. In particular, asking students to write essays that require them to integrate information across documents, such as writing an argument or explanation, can lead to better learning than asking students to write more descriptive or superficial essays. Britt and Sommer (2004) also found an effect of writing task instructions on learning from a pair of texts. They had some students create a summary of the initial History text before reading the second (Experiment 1) or answer macro-level questions compared to detail questions (Experiment 2). The students who wrote a summary of the first text and those who answered macro-level questions both showed better understanding across the pair of texts after reading. Thus, the writing instructions that are given can help students to generate a better understanding from historical inquiry activities, especially if they prompt integration across texts. In the present studies we used a “how and why” inquiry prompt as a way to direct students towards developing an integrated causal account of the Panamanian Revolution. In particular, students were asked to write an essay explaining the factors that caused the Panamanian Revolution of 1903.

As a comparison for this prompt, in some studies, we also used an alternative type of prompt that others have argued might be more engaging or might encourage more elaborative processing. For example, to increase engagement in expository writing on Science topics, Hidi and her colleagues have students write “position papers” such as “Insect infestations: To spray or not to spray?” (e.g. Hidi, Ainley, Berndorff & del Favero, 2007). Boscolo and his colleagues have suggested that having students write about their personal point of view about the topic of a set of sources should stimulate more personal interest and involvement (e.g. Boscolo, del Favero & Borghetto, 2007). Similarly, De La Paz and Felton (2010) have used *take-a-side* prompts to

increase engagement in writing in History (e.g., “Your task is to take the role of historian and develop a written argument about the Gulf of Tonkin Incident in 1964. If you were a member of Congress at the time this event unfolded would you have voted for or against the Gulf of Tonkin Resolution? Please choose and defend one point of view in a well-developed opinion essay.”).

The rationale for using these sorts of prompts comes from studies that have shown that heightened interest in reading topics or writing tasks can lead to longer essays (Flowerday, Schraw, & Stevens, 2004), better inference verification performance (Ozgungor & Guthrie, 2004), better recall of readings in written summaries, or higher quality essays that include more inferences or are more coherent (see Hidi, 1990; Schiefele, 1999; for reviews).

However, a major concern is that even if *take-a-side* prompts or prompts to write opinion-based essays are engaging, such prompts may orient the student to only part of the information. To understand an historical event, it is important for students to establish as complete a representation as possible of all the relevant information. Prompts to argue for a particular position may thwart this goal by reinforcing students’ tendency to selectively seek support for the position that their prior assumptions, limited knowledge, and misconceptions may bias them towards (confirmation bias; Perkins, 1989; Perkins, Faraday & Bushey, 1991). Rather than reason through the information to arrive at a position, students may adopt a position early, and process the information only to the degree needed to find what they feel is sufficient support for this position. This would lead students to write essays that fail to acknowledge other positions or perspectives, and ignore or distort important facts or details that do not support their side (my-side bias; Nickerson, 1998; Wolfe, Britt, & Butler, 2009).

In addition, position-based prompts will likely focus students on evaluating a specific claim for which there are limited and often dichotomous agree/disagree positions, such as “Did

the new taxes on the colonies by the British lead to the American Revolution?” This is in contrast to a prompt that provides no claim to be evaluated, but rather a more open-ended question that requires readers to construct a claim from the to-be-learned information, such as “What were the factors that lead to the American Revolution?” Even if students consider “both sides” of a specific claim, their focus will tend to be on the subset of information directly related to that specific claim, ignoring other information critical to understanding other causal factors of the historical event. Besides the narrowing of focus, typical position-based prompts seem to invite cognitive processes more akin to evaluating provided explanations than to constructing one’s own explanation. Thus, another focus of the studies described here is the manipulation of the kind of essays that students are prompted to write, to determine whether a *position-based* writing prompt or a *contributing-factors* writing prompt that requires construction of an explanation would lead to better coverage and integration of the content.

In sum, the studies reported in this chapter prompt chronological thinking using timeline activities, prompt integration using different writing prompts, and examine the effects that both of these manipulations have on student learning about History from document-based writing activities. The studies also move the investigation of learning from multiple-document inquiry activities using the Panama Unit into even younger student populations.

Experiment 1: Writing to Learn with Timelines and Different Writing Prompts Among Undergraduates

The objective of Experiment 1 was to manipulate both timeline activities and writing prompts, and to explore the effects of these on learning. In this study, the participants were university students and their level of understanding was derived by examining the quality of their inquiry products.

Participants

The sample consisted of 150 Psychology students from a large Midwest university in the United States who participated in partial fulfillment of an introductory course requirement. To ensure low prior knowledge, the sample was restricted to undergraduates who had completed fewer than three college History courses. The number of college and high school History courses taken did not vary by condition. The average age was 19.26 years ($SD = 2.81$). The sample was 44% female. Self-reported ethnicity was 8% Hispanic, 22% African American, 6% Asian, 65% Caucasian, and 1% Native American.

Materials

Document set. The materials included nine documents about the Panamanian Revolution of 1903, based on those originally developed by Britt, Rouet, Georgi, and Perfetti (1994) to represent multiple perspectives on the event and its antecedents. It was assumed that students would have low prior knowledge about the topic, so a background text was included that provided a general overview of events leading up to the revolution and the construction of the canal. Two of the documents were accounts written by historians, each taking a side on whether or not President Theodore Roosevelt was responsible for inciting the revolution. Two other documents were personal accounts. One was written by Theodore Roosevelt, who was President at the time, and one was written by Bunau-Varilla, an official from the French Canal Company that had failed in its attempt to build a canal in the 1880s. The excerpt from Roosevelt's autobiography denied any involvement in the revolution, while the excerpt from Bunau-Varilla's book detailed a meeting with Roosevelt where they discussed the possibility of a revolution in Panama. Other documents included excerpts of the 1846 treaty between Colombia and the U.S. that suggested a canal could be built in the future, and an article from the New York Times about

Colombia's negative reaction to a canal treaty proposed in 1903. The last two documents included U.S. Naval communications during the revolution, and a full-page map of Panama and the canal area. The average length of each document excerpt was around 300 words and average grade level was 10.9 as determined by the Flesch-Kincaid readability formula (Kincaid, Fishburne Jr, Rogers, & Chissom, 1975).

Pre-writing manipulation. Before writing essays, students were assigned to one of three pre-writing activity conditions: timeline generation, timeline preview, or no-timeline. The students in the timeline-generation condition were asked to read the documents and create a timeline as an initial activity to become familiar with the information. In this condition, they were given a blank page on which to create their timelines. They were prompted to give the dates for 10-12 events.

The students in the timeline preview condition were prompted to use the timeline and the set of documents to become familiar with the information. They were provided with an experimenter-generated timeline (using information from the document set) showing 13 events listed in temporal order:

- 1821 - Panama becomes part of Colombia.
- 1846 - The U.S. and Colombia sign the Treaty of 1846.
- 1848 - California gold rush.
- 1850s – 1900 - Panamanian people revolt against Colombian rule at least four times.
- 1855 - The U.S. builds a railroad connecting Atlantic to Pacific across Panama.
- 1869 - Suez Canal completed.
- 1880-9 - French company tries and fails to build a canal.
- 1902 - Commission identifies Panama as only site for canal. Early
- 1903 - The Hay-Herran Treaty approved by the U.S. Congress.
- Aug 1903 - The Colombian government rejects the Hay-Herran Treaty.
- Nov 3, 1903 - Panamanian Revolution takes place.
- Nov 6, 1903 - U.S. recognizes Panamanian independence.

In the no-timeline condition, students were simply prompted to become familiar with the documents as their initial activity.

Essay prompt manipulation. After the timeline or preview activity, students were given one of two essay prompts. In one condition students were asked to write an argument about the extent to which U.S. President Theodore Roosevelt and his administration were responsible for bringing about the Panamanian Revolution. In the other condition, students were asked to write an argument about the factors that contributed to the Panamanian Revolution of 1903, and were encouraged to piece together the most complete and accurate (evidence-based) account of the controversy.

Procedure

The experiment was run in one 90-minute session. Students were randomly assigned to pre-writing and essay prompt conditions, yielding a 3 x 2 design. They performed the pre-writing activities for 10 minutes before they were given the essay task instruction. While working on the essay task, students were able to use the documents and their notes. Students also provided demographic information and interest ratings.

Results

Essay length. Overall, the written responses were quite short and were generally only 10 sentences. A 3 x 2 ANOVA showed effects of the writing prompt, $F(1, 144) = 6.88$, $MSE = 3932.94$, $p = .010$, $\eta^2 = .004$. Essays had more words in the *position-based* prompt condition ($M = 202.72$, $SD = 61.39$) than in the *contributing-factors* prompt condition ($M = 173.56$, $SD = 67.76$). An effect was also found for pre-writing activity, $F(2, 144) = 3.82$, $MSE = 3932.94$, $p = .024$, $\eta^2 = .005$. Significantly more words were included in the *no-timeline* condition ($M = 204.69$, $SD = 57.71$) than in the *generate-timeline* condition ($M = 172.34$, $SD = 69.66$). The number of words included in the *timeline-preview* condition ($M = 196.80$, $SD = 65.26$) did not differ from the other conditions.

Core content. The essays that students wrote were scored for coverage of important information using the rubric of 16 core concepts based in an *a priori* event model. A diagram of the event structure appears in Figure 1. A 3 x 2 ANOVA on the proportion of core concepts that students included in their essays revealed only a main effect for the writing prompt, as shown in the left panel of Figure 2. Being prompted to piece together the factors that contributed to the revolution led to better coverage of concepts ($M = 0.18$, $SD = 0.10$) than being asked to write about whether Theodore Roosevelt was responsible for the revolution ($M = 0.15$, $SD = 0.08$), $F(1, 144) = 4.33$, $MSE = 0.008$, $p = .039$, $\eta^2 = .006$. No main effects were seen for the pre-writing activity manipulation, nor was there an interaction, $F_s < 1$.

To further explore the coverage of the event model, the core concepts were divided into proximal and distal causes of the revolution. The distal causes are presented as shaded boxes in Figure 1. As shown in the right panel of Figure 2, students in the *contributing-factors* condition were more likely to include the distal causes in their essays ($M = 0.22$, $SD = .16$) than students given the *position-based* prompt ($M = 0.13$, $SD = .11$), $t(100.12) = 3.94$, $p < .001$, while students in the *position-based* condition included more proximal causes ($M = 0.18$, $SD = 0.15$) than students given the *contributing-factors* prompt ($M = .13$, $SD = 0.11$), $t(144.46) = -2.24$, $p = .027$.

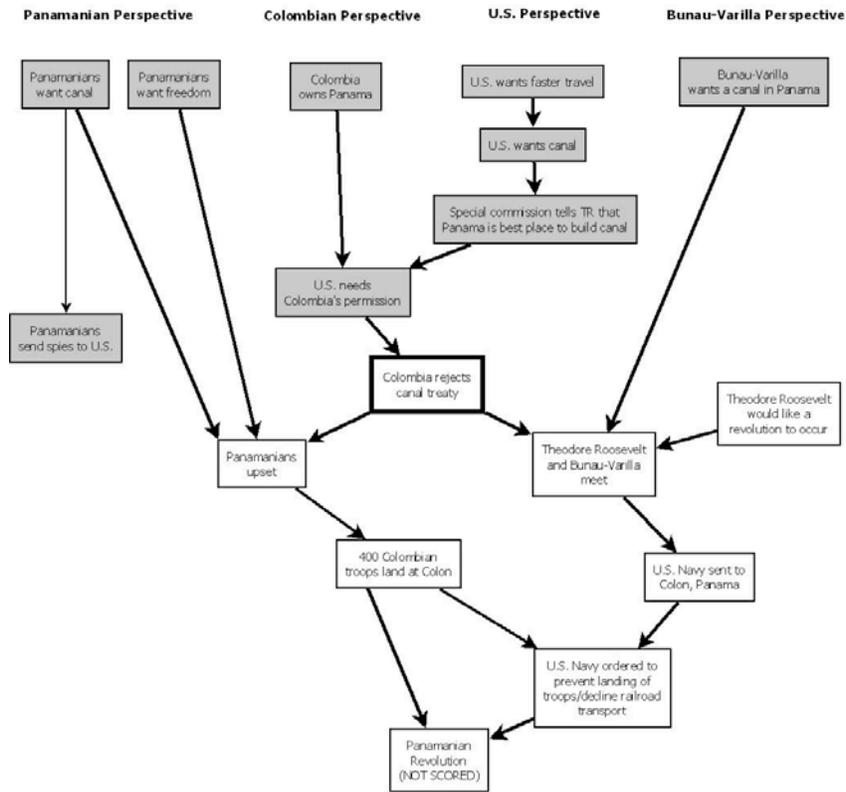


Figure 1. The Panama Canal model with perspectives, distal (shaded) and proximal concepts.

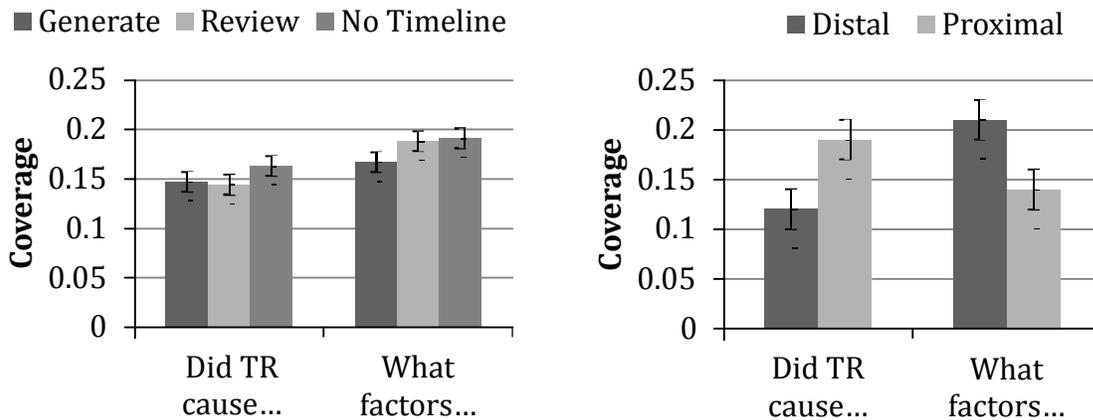


Figure 2. Coverage of Event Model in Essays by Timeline and Writing Prompt (left panel), and Proximal vs. Distal Causes by Writing Prompt (right panel)

Non-core content. To examine the other types of information that students included in their essays, sentences not including a key concept were coded into one of five categories. The

categories included *background information* (facts from the background text), *evaluations* (student's opinions or interpretations), *irrelevant elaborations* (additions of information not relevant to the topic), *questions* (questions posed by the students), and *misconceptions* (erroneous inferences or facts). Examples from student essays for each category include:

Background information: "In 1846 Columbia granted the US the right to travel through Panama. A portion of the treaty that granted this right stated that the US must ensure Columbia's sovereignty [sic] over Panama."

Evaluation: "Roosevelt chose to recognize Panama as an independent nation, because they were more willing to allow the construction of the canal."

Irrelevant evaluation: "Another reason Panama most likely rebelled was because of President Theodore Roosevelt, who is generally regarded as the most awesome of the Presidents. This is because he went hunting and owned a pet tiger and bear in his house which also happened to be the white house."

Question: "If he could feel a revolution coming, then why didn't he stop to think about his plan?"

Misconception: "In 1903 Colombia gave the US government [the right] to proceed with the construction of the canal."

The evaluative statements were most frequent ($M = 4.68$, $SD = 2.63$), followed by background statements ($M = 2.24$, $SD = 2.16$). The other three types of statements were infrequent (additions: $M = .14$, $SD = .58$; misconceptions: $M = .37$, $SD = .70$; questions: $M = .03$, $SD = .16$). Separate 3 x 2 ANOVAs were conducted on the number of each type of statement in the essays. The only significant effect was a main effect of prompt on number of evaluative statements. Participants given the *position-based* prompt included more evaluative statements ($M = 5.29$, $SD = 2.48$) than

participants given the *contributing-factors* prompt ($M = 3.75$, $SD = 2.59$), $F(1, 144) = 12.61$, $MSE = 6.42$, $p = .001$, $\eta^2 = .088$. All other effects were not significant (F 's < 1.76).

Essay quality. Coding was done for three other aspects of the essays: the extent to which they were written from a personal perspective determined by the use of first-person singular pronouns, the extent to which all of the four possible motivating perspectives were included (US, Panama, Colombia, and the French Canal Company), and whether or not they included citations.

The personal pronoun analysis revealed that the *position-based* prompt led to greater use of first-person singular pronouns ($M = 4.18$, $SD = 6.26$) compared to the *contributing-factors* prompt ($M = 1.66$, $SD = 3.37$), $F(1, 144) = 8.09$, $MSE = 28.73$, $p = .005$, $\eta^2 = .056$.

A 3 x 2 ANOVA on the number of perspectives that students included in their essays revealed only a main effect for the writing prompt. Being prompted to think about the contributing factors led to the inclusion of more perspectives ($M = 1.46$, $SD = 0.84$) than being asked to write about whether Theodore Roosevelt was responsible for the revolution ($M = 1.18$, $SD = 0.80$), $F(1, 144) = 4.60$, $MSE = 0.66$, $p = .034$, $\eta^2 = .032$.

The rate of sourcing in essays was also examined. Because of the low frequency of this activity, sourcing was coded as a dichotomous measure: whether any citation, reference, or source was offered for any piece of information in the essay, or not. No differences in sourcing frequency were seen across the different timeline conditions, $X^2(2) = 3.20$, $p = .20$. However, more sourcing was seen in the *position-based* condition where 38.5% of students included at least one reference, than the *contributing-factors* condition where only 16.9% of students did, $X^2(1) = 7.88$, $p < .001$.

Interest. A 3 x 2 ANOVA on topic interest ratings again showed only a main effect for

writing prompt, $F(1, 144) = 15.53$, $MSE = 4.92$, $p < .001$, $\eta^2 = .108$. Students were asked to indicate their interest on the topic on a scale from 1-to-10 with 1 meaning not interested and 10 meaning very interested. The topic was rated as more interesting if students got the *position-based* prompt ($M = 4.24$, $SD = 2.30$) than the *contributing-factors* prompt ($M = 2.76$, $SD = 2.04$).

Conclusions

College students did report more interest in learning with a *position-based* writing prompt, used more citations, and wrote longer essays; however, these differences did not translate into better coverage. Instead, the *position-based* prompt led to more selective essays containing fewer distal causes of the revolution. The *position-based* prompt also led to more usage of first-person singular pronouns, suggesting that in this condition students were more likely to write their personal opinion. Further, the use of a timeline activity did not improve the quality of essays among these college-aged students, and unexpectedly, generating a timeline led to shorter essays.

Experiment 2: Writing to Learn with Different Writing Prompts Among High School Students

The results of Experiment 1 suggest that differences in learning resulted from these different types of writing prompts. The *contributing-factors* prompt contained an additional encouragement to “piece together” information that the *position-based* prompt did not contain. In our second study, we extended the investigation of writing prompts into high school grades to see if the same effects would be obtained with just the manipulation of the question students were asked to answer – contrasting *position-based* prompts with *contributing-factors* prompts.

Participants

Participants were 88 high school students from 10 Non-AP History classes in two

Midwest schools in the United States. The average age was 16.90 years ($SD = 1.95$). The sample was 66% female. Self-reported ethnicity was 69% Hispanic, 2% Asian, 7% Pacific Islander, 7% Native American, 1% African American, 23% White. These total to over 100% because students were allowed to indicate multiple ethnicities.

Materials

Document set. The same document set was used in this experiment, with slight modifications to simplify vocabulary and sentence structure for younger students. The average Flesch-Kincaid reading grade level was 7.6 (Kincaid et al, 1975). The average word count per document was 245.

Essay prompt manipulation. Instructions for both conditions included the following short paragraph:

“Historians work from a variety of sources including newspaper articles, autobiographies, and government documents like census reports to create explanations of historical events. They read documents from a variety of points of view. They read documents that sometimes express strong personal opinions. Some documents may be written by historians. Some may be written by people who were directly involved in the events. You will read some documents like this, so you should not think of all the documents as being similar to textbooks.”

Below this paragraph was one of the two essay prompts:

“Your task is to use this set of documents to write an argument about the extent to which U.S. President Theodore Roosevelt and his administration were responsible for bringing about the Panamanian Revolution.”

or

“Your task is to use this set of documents to write an essay explaining the factors that caused the Panamanian Revolution of 1903.”

Students were told they could take notes while reading, and were asked to write at least a page.

Procedure

The experiment was run over two days, in 50-minute periods. Students were handed folders containing the document set. The experimenter then read over the task instructions (which included one of the two above prompts) while the students followed along. The participants were told to read through the document set starting with the background document to write their essay. Students also provided demographic information and interest ratings.

Results

Essay length. Essays were again quite short, averaging around 17 sentences. Essays also tended to be longer in the *contributing-factors* prompt condition ($M = 244.55$ words, $SD = 10.02$) than in the *position-based* prompt condition ($M = 241.75$ words, $SD = 13.77$), although this difference did not reach significance, $t(86) = 1.25, p = .22$.

Core contents. The essays that students wrote were scored for coverage of important information using the same rubric of 16 core concepts used in Experiment 1. An independent samples t-test revealed that being asked to write about the factors that contributed to the revolution led to better coverage of concepts ($M = 0.25, SD = 0.11$) than being asked to write about whether Theodore Roosevelt was responsible for the revolution ($M = 0.20, SD = 0.12, t(86) = 2.10, p = .039$). Also, as in Experiment 1, differences were seen in the number of proximal and distal causes by writing prompt condition. Students in the *contributing-factors* prompt condition were significantly more likely to include the distal causes in their essays ($M = 0.28, SD = 0.15$) than students given the *position* prompt ($M = 0.20, SD = 0.15, t(86) = 2.51, p = .014$), while no differences were seen in the proximal causes, $t < 1$.

Essay quality. Coding was again done for three other aspects of the essays. The *position-based* prompt ($M = 7.15, SD = 14.10$) led to greater use of first-person singular pronouns than the *contributing-factors* prompt ($M = 1.51, SD = 5.45, t(86) = 2.34, p = .024$). The

multiple perspectives analysis revealed the *contributing-factors* prompt ($M = 2.10$, $SD = 0.86$) led to more perspectives being included in the essays than the *position-based* prompt, ($M = 1.61$, $SD = 0.86$), $t(86) = 2.67$, $p = .009$. No differences were seen in rate of sourcing in this study, $X^2 < 1$.

Interest. Students rated their interest in the topic on a 1-to-5 scale with 1 meaning not interested and 5 meaning very interested. In this study, the topic was rated as more interesting if students got the *factors* prompt ($M = 2.54$, $SD = 1.18$) than the *position-based* prompt ($M = 1.97$, $SD = 1.21$), $t(86) = 2.10$, $p = .032$

Conclusions

High school students showed a clear effect of the different writing prompts on essay coverage. Even without encouragement to “piece together” the evidence in the factors condition, the *contributing-factors* prompt led to better coverage and understanding of distal causes, while the *position-based* prompt led to more selective and personalized essays.

Experiment 3: Writing to Learn from Timelines in Middle School Students

Although Experiment 1 failed to yield effects of timeline activities for college students, a third experiment investigated whether timeline activities might be more helpful for improving the understanding of younger learners when faced with document-based writing activities in History.

Participants

Participants were 34 6th graders from 3 classes in a Midwest middle school in the United States. Average age was 11.4 years ($SD = 0.54$). The sample was 56% female. Self-reported ethnicity was 32% Hispanic, 3% African American, 15% Asian, 56% White, 9% Other. These total to over 100% because students were allowed to indicate multiple ethnicities.

Materials

Document set. The same basic document set was used, again with some slight modifications. The main change was to make the motives of the different factions involved in the Panamanian Revolution more explicit (e.g., adding a short section about President Theodore Roosevelt’s belief that nothing further could be done in terms of negotiation with Colombia over the canal treaty). The average Flesch-Kincaid reading grade level was 9.8 (Kincaid et al., 1975). The average word count per document was 250.

Timeline manipulation. Students were randomly assigned to one of two timeline conditions in which they either filled in a timeline prior to writing their essay or after writing their essay. Students in the timeline-first condition were asked to read the documents and fill in a timeline before writing an essay. The instructions for this condition were:

“Your task is to read these documents so you can later write an essay explaining the factors that caused the Panamanian Revolution of 1903. But before you can understand the causes, you have to first figure out what happened. Please complete the timeline below by writing the event that happened next to the dates provided. You will be able to use this sheet to help you while you are writing your essay. Feel free to write on these documents while you are reading.”

TIMELINE:

1821 –
 1846 –
 1848 –
 1850 –
 1855 –
 1902 –
 Early 1903 – Aug
 1903 –
 Sept./Oct. 1903 –
 Nov 3, 1903 –
 Nov 6, 1903 –
 1914 –

Students in the second condition were given the essay task on the first day:

“Your first task is to read these documents so you can write an essay explaining the factors that caused the Panamanian Revolution of 1903. You will need to use specific information from the document set to support your conclusions and ideas. Feel free to write on these documents while you are reading.”

This is the same writing prompt that the timeline-first condition received on the second day of the study. Both conditions had one 50-minute period to work on the essay.

Learning measures

In this study, two measures were used to assess student learning. As in previous studies, the essays that students wrote were scored for coverage of important information and number of perspectives. In addition, a true-false measure (the Inference Verification Task) was developed to test for students’ understanding of the connections that could be made among the documents.

Inference verification task (IVT). Based on the procedure used in Wiley and Voss (1999), an IVT task presented 22 statements of possible connections between ideas stated in the documents. The students’ task was to decide whether each statement seemed true or false based on the information they had read. Half the statements represented correct inferences from the documents and half represented incorrect inferences. The connections that were tested were considered central to understanding the document set as a whole, and were not arbitrary links between different statements. About half of the items asked about actions or temporal aspects of events and another half asked about motives. False items were created by making inappropriate connections, such as stating that the Panamanians rejected the canal treaty, when it was the Colombians who had done so (this is an example of a false/motive item). An example of a true action/temporal item is “Orders were sent by a U.S. Commander before the revolution started telling the railroad to deny transit to Colombian troops.”

Procedure

The experiment took place over two days, in 50-minute class periods. Students were

handed folders containing the document set. In the timeline-first condition, participants worked on the timeline activity during the first day. On the second day, participants switched to the essay-writing task. In the essay-first condition, the participants wrote their essay on the first day. On the second day, participants switched to the timeline activity. At the end of the second class period, all materials were collected and students completed the IVT from memory. On another day, participants provided demographic information, interest ratings, and responded to questions about their perceptions of the task. To obtain measures of reading skill, a teacher survey asked teachers to indicate each student's comprehension skill relative to grade level as low, medium, or high.

Results

Essay length. Responses were brief at only around 10 sentences. Only non-significant trends were seen as essays tended to be longer in the timeline-first condition ($M = 171.06$, $SD = 13.90$) compared to the essay-first condition ($M = 138.83$, $SD = 14.59$) $F(1, 28) = 2.82$, $MSE = .32$, $p = .11$, $\eta^2 = .102$, and essay length tended to increase with comprehension skill $F(1, 28) = 2.49$, $MSE = .32$, $p = .11$, $\eta^2 = .178$.

Core content. A 3 x 2 (comprehension skill by timeline condition) ANOVA on the overall proportion of concepts that students included in their essays revealed only a main effect for teacher-rated comprehension skill. As might be expected, higher-skilled comprehenders learned more from this writing-to-learn activity. No differences were seen in the inclusion of proximal causes in the essays, either for comprehension skill or timeline conditions, $F_s < 1.03$. All students included around one proximal cause. However, there was a significant effect of comprehension skill on the proportion of distal causes included in the essays, $F(2, 28) = 7.71$,

$MSE = .014, p < .01, \eta^2 = .55$, and a trend toward an effect for timeline condition, $F(1, 28) = 2.42, MSE = .014, p = .13, \eta^2 = .087$, as shown in the left panel of Figure 3.

Essay quality. The first-person singular pronoun analysis revealed no significant differences between the timeline conditions ($F < 1$), although there was an effect for comprehension skill, $F(2, 28) = 4.45, MSE = 33.12, p = .021, \eta^2 = .318$. Low-skill comprehenders were more likely to use first-person singular pronouns. No significant differences were seen in the number of perspectives due to timeline conditions, $F < 1$. However, there was an effect of comprehension skill, $F(2, 28) = 6.98, MSE = .73, p = .003, \eta^2 = .499$. Above-average comprehenders included more perspectives than average comprehenders, who considered more perspectives than the low-skill comprehenders. Only six of the students included a reference in their essays, and this did not vary significantly due to timeline condition or comprehension skill.

Interest. No differences were seen in topic interest due to either comprehension skill or timeline condition, $F_s < 1.37$.

IVT. Overall, the students in the timeline-first tended to do better on the IVT ($M = .61, SD = .08$) than did the students in the essay-first group ($M = .57, SD = .14$). While both groups performed similarly on the temporal items, $F < 1$, students in the timeline-first group did better particularly on the motives items, $F(1, 28) = 4.73, MSE = .01, p = .038, \eta^2 = .169$. There was also a trend toward an effect of comprehension skill on the motives items, $F(2, 28) = 2.18, MSE = .01, p = .13, \eta^2 = .155$.

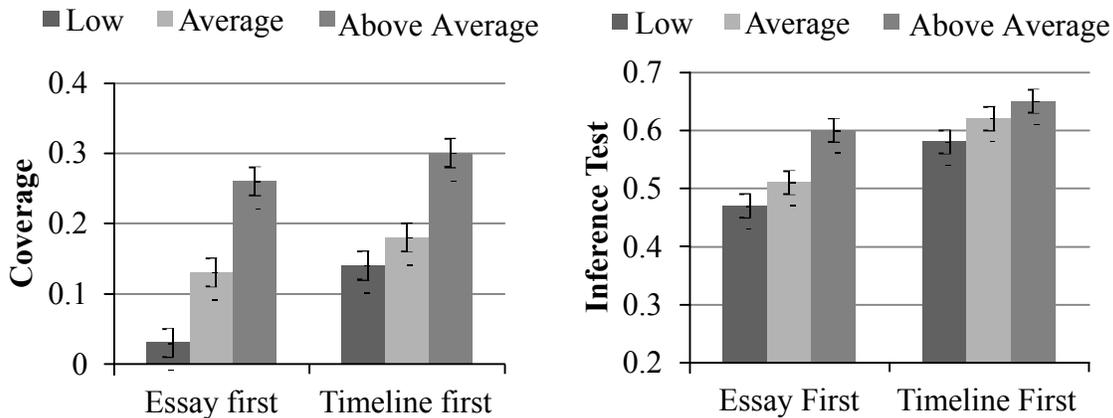


Figure 3. Coverage of Distal Causes in Essays (left panel) and Performance on Motive Items on the Inference Test (right panel) by Comprehension Skill and Timeline Condition

Perceptions of the task. The students rated this kind of learning activity as being very new and different from the way they usually learn (average rating of 3.8 out of 5). They also reported enjoying it more than “normal” assignments (average rating of 3.7 out of 5). Finally, they were asked what kind of things in the activity they found difficult or challenging. The responses addressed the need to corroborate across documents as well as simply the amount of reading. Examples include:

“It felt difficult when I had to scavenger [sic] through the documents just to find the date I was looking for. It was challenging! I did like doing it though.”

“In order to find it I had to skim all the parts of the story to make sure I was piecing it together in a way that will make sense.”

“how to put things in a way they make sense to other people”

“having to look back and forth between documents and taking notes from multiple documents at once”

“I think the work was challenging with all the reading but I like a good challenge.”

Conclusions

Middle school students showed some benefits from engaging in a timeline activity to guide their first reading through a document set. Although both conditions were given an equal amount of time to construct a timeline and to write their essay, the order of these tasks seemed to affect their understanding. Considering the timeline first may have helped students to form a structure of what happened, and having that structure in turn may have helped them to think more deeply about the causes for the Panamanian Revolution as they constructed their essays. As a result, they included more distal events in their essays, and better understood the connections between the motivations of the different agents and the actions that were taken.

Discussion

The main goal of these studies was to explore writing to learn from multiple-source inquiry activities in History. Because of this, our target measure of essay quality was coverage of a model that represented understanding of the historical content. Another focus of these studies was two main skills underlying learning from document-based inquiry activities: contextualization and corroboration/integration. We prompted chronological thinking using timeline activities and integration using different writing prompts, and we examined the effects that both of these manipulations had on student learning about History from document-based writing activities.

Writing Prompts

Overall, the writing prompt did have an effect on both college students and high-school students. In the two experiments that varied the writing prompt, the *contributing-factors* prompt led to including more concepts in general and more distal concepts in particular in their essays. The factors prompt also led to essays including more perspectives. In contrast, the *position-based* prompt resulted in more first-person singular pronouns, more proximal causes (college students

only), and more sourcing (college students only). The college students given the position prompt viewed it as more interesting and wrote longer essays than the college students given the factors prompt. The position prompt had the opposite effect on the high school students. They rated the position prompt as less interesting and wrote shorter essays. Some possible reasons for the inconsistent results in interest may be due to either the population or the context. The college students were older, but also were not doing this as a class activity whereas the younger high school students were doing the task as part of History class activity.

However, while the college students showed heightened interest in the position prompt, it is important to note that this did not relate to improved learning. While it may be important to generate student interest in learning tasks, stating an opinion on a historical debate may not tap the type of interest that will lead to the most complete understanding of the texts. It has been suggested that only certain types of interest (e.g., cognitive interest) may benefit comprehension processes, while other types (more emotional or personal interest) may not (Harp & Mayer, 1997; Kintsch, 1980). Further, the negative effects of using a position-based writing prompt are consistent with the findings of Stahl, Hynd, Britton, McNish, and Bosquet (1996) who found that students who were asked to write an opinion were more likely to present unsupported generalizations than students asked to write a description.

One possibility is that students may not be very familiar with writing persuasive, argumentative, or explanatory essays, and may not know that they should attempt to use evidence to support their positions, claims, or explanations. The lack of prior instruction in how to write in these genres may have a large effect on how these writing instructions were interpreted. More research is needed to better understand what types of writing instruction can help students to better understand these kinds of writing. Then we can return to exploring which

of these prompts might maximize both cognitive interest and learning from multiple-document inquiry activities.

Another issue with interpreting the results of the present studies is that only the final study included a measure of learning outside of the essay. While it may be that the essays provided a valid reflection of student understanding of the content, it may also be the case that students wrote more selective essays in direct response to the position-based prompt, and that they actually learned more information than they used in the essays. Future research needs to include measures such as the IVT that was introduced in Experiment 3, or any other alternative learning outcome assessment, to separate learning outcomes from the quality of the written product and to better understand the contexts in which writing activities can effectively be used as writing-to-learn activities.

Timelines

In two experiments, we used a pre-writing timeline activity to prompt chronological thinking and contextualization. Overall, the effects of this manipulation on learning were relatively weak. Wineburg (1991) and others (Alleman & Brophy, 2003; Masterman & Rogers, 2002; Poster, 1973) have noted the important role of understanding the temporal order of events in creating an interpretation of historical events and we expect that this is even more important when reading multiple documents where temporal order has to be monitored across documents. While there have been a few studies examining how students understand time and use time to create context, to our knowledge only Davis, Hicks, and Bowers (1966) has found a benefit of timeline activities on learning. They found that a timeline helped students learn temporal information from a single text. Also, they found it was most beneficial for high IQ students. No studies that we know of have looked at the effect of timeline activities on the learning of a causal

model from multiple-documents inquiry tasks. Thus, the present studies are an important first step into understanding how and when timeline activities may be used to improve understanding.

The findings from our timeline studies with college students suggest that the timeline activities may not be necessary. The timeline activities did not help to improve the essays of college students. In fact, having students generate the timeline led to shorter essays which suggests a tradeoff in effort between writing the timeline and the essay. Alternatively, it may be that students considered the timeline part of their answer, so they did not include redundant information because it had already been said. Still another possibility is that having written the information once caused students to have memory confusion, and they failed to notice it had not been included in their essays. For any of these reasons, timeline activities that are done immediately before writing an essay response may have the negative consequence of reducing essay content. Perhaps this could be alleviated with more specific instructions on how to use the timeline to construct an account. Students could be taught that generating the timeline is only a first step in contextualization that needs to become part of the account. Or, introducing a delay between the two activities could help with memory confusions.

In our study with middle school students, where timeline and essay activities were done on separate days, we did find some evidence that a timeline activity may be helpful; students made more accurate inferences about motives and showed a trend towards including more distal concepts in their essays. However, three aspects of this study may have reduced our ability to see a larger impact of the timeline activity on learning. First, we had a small sample, and perhaps with a larger sample, significant differences might have emerged. Second, we wanted to examine the effect of task order (timeline before writing, writing before timeline) while holding the activities constant. It is possible that a group that did the timeline activity before writing,

compared with a group that did not do a timeline activity at all, would show more robust differences on the final learning measure (the IVT). Third, similar to the suggestion made with college students, students were not told how to use the timeline to contextualize information and support their essay writing. It may be that instructing students how to use the timeline to support the understanding of potential causes would add meaning to the task and help students see the timeline as more than a list of dates or unrelated busy work. It may also be that having students create timelines concurrently with planning the essay (as the spontaneous timeline generators did in Wiley & Voss, 1999) would lead to better synergy from the two activities. Although the competing demands of doing two activities at once might overwhelm younger students, which is why we chose to do the activities sequentially in the present study, an interesting empirical question is what would happen in a combined timeline/essay planning condition. Nevertheless, the present results are encouraging as they offer some evidence that completing a timeline before writing gave younger students a context they could use for integration and understanding. Future studies will explore how these benefits may be enhanced.

Increasing Interest and Skills in Writing to Learn from Multiple-Document Inquiry Tasks

One very encouraging set of results came from asking the middle school students in Experiment 3 about their perceptions of the Panama task they had just completed. Students reported that writing essays from multiple documents was challenging, but many students also remarked that they enjoyed the challenge. Students generally rated the activity as more interesting than normal History assignments. They also rated it as a relatively novel activity, consistent with the assumption that most middle school students have limited practice in how to approach multiple-document inquiry activities. Given the increased demands of reading multiple documents, providing students with practice in writing-to-learn activities throughout their middle

school and high school years is essential to helping them negotiate the demands of the task. But, of course, practice is not enough. We also need to document the kinds of training and scaffolds that may guide students toward developing the skills they need in these contexts. While we have several leads on potentially beneficial conditions, the results of these studies highlight the need for more research to identify effective and efficient methods of improving students' development of the skills of both contextualization and integration/corroboratorion.

In addition, it is important to better understand how skills in all three of the target processes, sourcing, contextualization, and integration/corroboratorion, might interact. In these studies, we wanted to specifically examine how contextualization (the timeline activities) might set the stage for integration/corroboratorion (the construction of an essay containing the core content of the unit, plus the ability to recognize connections between ideas in the IVT). However, we also examined spontaneous sourcing. The level of sourcing was generally low for all groups. In fact, the percentage of students mentioning at least one citation was 28% for college students, 19% for high school students, and 17% for the 6th graders. While this rate of sourcing was similar to what we have found for untrained college students (Britt et al. 2004), it is lower than we have found for high school students (Britt & Aglinskias, 2002). Especially for younger students, it may be difficult to simultaneously promote both sourcing and integration. Sourcing relies heavily on individual document representations, whereas integration relies on abstracting common ideas (Britt, et al., 1999). It may be that students need more practice with each skill to be able to effectively coordinate these two skills. Better use of contextualization might provide a key link between the other two skills, but as noted above, students may need a better understanding of how to engage in contextualization, and prompting students to create timelines may be just a first step in this process.

Although the research reported here focused upon the domain of History, some of the same skills are likely to be relevant to learning from multiple sources in other contexts (see also the Klein chapter in this volume). On the one hand, contextualization of the information in place and time seems notably more relevant to specific historical events than to the type of cause-effect explanations in Science that are typically intended to generalize across place and time. On the other hand, integration and sourcing are highly relevant for scientific inquiry practices.

Documents in Science can conflict or cohere with each other, or provide different pieces of an explanatory account of complex scientific phenomena. For example, Wiley et al. (2009) and Griffin, Wiley, Britt, and Salas (2012) have explored learning from multiple document inquiry tasks in Science, where key causal concepts about plate tectonics or climate change are presented separately in various documents, so that developing an understanding of the phenomena requires integrating these concepts and connecting them. Research reports and data presented by scientists versus popular media accounts or textbook chapters have differences that parallel the differences between primary and secondary sources in History. Also, author bias, expertise, and the reliability or credibility of sources are important factors to consider when learning Science from multiple documents or internet inquiry tasks (e.g., Wiley, Ash, Sanchez & Jaeger, 2011; Wiley, et al., 2009). Thus, developing skills of sourcing and integration/corroboratorion is likely to be useful across a wide range of contexts where people need to gain understanding from multiple sources.

Another set of factors that we have only mentioned in passing throughout this chapter are the many individual differences between students that may affect learning from multiple sources and how students approach both reading and inquiry tasks. In these studies we have begun to explore the effects of (single text) comprehension skills on learning from multiple-source inquiry

tasks. As one might expect these skills are related, as learning from multiple-sources will necessarily depend on the ability to read and represent single sources. Another area of individual-differences research has been the exploration of students' beliefs about the disciplines of and inquiry practices in History (Voss, Wiley, & Kennet, 1998) or Science (Bråten, Britt, Strømsø, & Rouet, 2011), and the effect that these beliefs might have on how students engage in multiple-source inquiry tasks. But, there are also other individual differences that may be important, in particular students' more general epistemic goals related to forming and updating their own ideas and beliefs. Inquiry and essay prompts frame a given academic task and can shape the readers' goals, but readers also come to the task with their own goals, which are partially shaped by their thinking dispositions. For example, the extent to which students generally consider it important to evaluate their own ideas against evidence ought to influence the extent to which they seek out and make use of evidence during an inquiry task. Griffin (2008) showed that people do vary in whether they tend to base their ideas in their own emotional preferences or on evidence. Salas and Griffin (2012) extended this finding to a multiple-document context, showing that students who base their beliefs more in affect than evidence are less likely to give preference to documents that provide evidence. In a more recent study looking at learning in multiple-document inquiry tasks in Science, Griffin et al. (2012) measured middle-school students' general disposition to consider and evaluate evidence related to their existing beliefs and ideas. They found that this general thinking disposition predicted the number of key concepts that students included in their essays about climate change and predicted their comprehension as measured by an inference test. These effects on both measures of learning were found to be independent of the influence of reading ability, prior knowledge, or student interest. Such individual-difference studies signal another set of potential leverage points for

improving learning. Interventions that encourage students to increase their commitment to considering evidence should improve learning from multiple-document inquiry tasks, and in concert with the other instructional interventions discussed above, seem a promising avenue toward helping students to gain the most from writing-to-learn activities.

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