Technology-Enhanced Project-Based Learning: 
Effects on Historical Thinking

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We explored several facets of middle school students’ historical thinking before and after they completed a six-week unit on American history from the early to mid 1800s. A central focus of this investigation was the degree to which a technology-supported project-based learning experience promoted growth in academically diverse students’ historical thinking. Responses from 20 purposefully selected students’ interviews, content learning assessments, multimedia projects, and written journal entries indicated tangible benefits of the instructional approach. In addition, our results revealed many similarities in outcome among students with and without disabilities, suggesting that our approach leveled the playing field for many students who typically struggle with learning in secondary classrooms. Technology-enhanced project-based learning (PBL) challenges both teachers and students, yet appears to hold promise as a means for teaching academically diverse groups of students to think historically in inclusive settings.

Reformers argue that approaching history as an inquiry into the past that fosters analyzing evidence, developing arguments, and conveying historical understandings in writing supports student learning (Monte-Sano, 2010). Historical inquiry involves the study of imprecise and ill-defined problems (Bain, 2005), and historical understandings include judgments constructed from evidence and offered as interpretations of events or problems (Lee, 2005). Learning how to construct historical interpretations is necessary to learn more deeply from the past (Reisman, 2012), because doing so affords an opportunity to learn how people in different times and places saw their world and to consider what motivated their actions (VanSledright, 2002). Moreover, if students learn to reason about people in the past, they are likely to develop more sophisticated ways of reasoning about the myriad issues and viewpoints that require critical thinking today (Shanahan, 2008).

Wineburg (2001), and more recently Lévesque (2006), have suggested that technologies such as hypermedia and computer databases have provided new possibilities for the teaching and learning of history. Such expectations for historical inquiry are reasonable, given research (e.g., Asburn, Baildon, Damico, & McNair, 2006; Friedman & Heafner, 2007; Saye & Brush, 2002) that has established how computer-based learning environments and self-contained multimedia resource databases can provide students with meaningful opportunities to apply sourcing and corroboration to primary sources, and subsequently to create multimedia projects. Evidence of the benefits of technology-enhanced learning in history also has come from Tally and Goldenberg (2005), whose work involved secondary students who studied early twentieth century photographs from the Picturing Modern America website (http://www.edc.org/CCT/PMA). Students in advanced, regular, and remedial classrooms benefited from using the website and improved their historical thinking skills. Advances in hardware, software, and web technologies, coupled with increased access to a wealth of digitized historical resources of all kinds, have introduced many innovative pedagogical approaches to the teaching of history.
Historical thinking includes the ability to evaluate evidence and to understand historical accounts as interpretations that are influenced by the purposes of historians (Lee & Ashby, 2000; Monte-Sano, 2010). Moreover, although consideration and citation of evidence is essential in history, there are many ways of thinking associated with evidence analysis. As work in Britain and Canada has highlighted, historical reasoning is not monolithic (Lee, 2005; Seixas, 2007). Indeed, there are multiple facets to historical reasoning and each facet does not necessarily grow in concert with others or in a linear fashion (Lee & Ashby). Based on the work of the Schools Council History Project in Britain, Lee identified second-order concepts—including time, change, empathy, cause, evidence, and accounts—that apply to any field of history.

National organizations and researchers in both the United States and Canada (e.g., National Center for History in the Schools, 1996; Seixas, 2007) have called for benchmarks of historical thinking that provide a framework for educational reform. The Canadian framework defines six concepts that are essential to understanding history: establish historical significance, use primary document evidence, identify continuity and change, analyze cause and consequence, take historical perspectives, and understand moral dimensions of history (Seixas). These concepts define major components of historical thinking, identify what adolescents should learn in history class, and provide the basis for planning instruction.

The ability to interpret primary accounts of historical events also requires knowledge of specific historical contexts, based on particular facts regarding the time and place of the events (Van Drie & Van Boxtel, 2008). In other words, students must interpret evidence in accordance with its context (Haldén, 1997). Adolescents have been observed to have difficulty grasping the nature of historical context (Reisman, 2012), tending to judge past actors and actions by present standards (VanSledright, 2002). In contrast, historians judge the influence of time and place on the motivations of the individual who is being considered as well as the cultural and linguistic norms that existed during the time period in question (Wineburg, 2001).

**Academic Diversity and Learning Outcomes**

The diversity in students’ learning abilities in today’s general education classrooms presents considerable challenges for teachers (Buckley, 2005; Van Hover & Yeager, 2003). Studies have indicated that students with learning disabilities (LD) often receive little instruction in history classrooms other than as a vehicle for enhancing basic literacy (Gersten, Baker, Smith-Johnson, Dimino, & Peterson, 2006; O’Brien, 2000). Students with LD often struggle in history classrooms. They find it difficult to actively transform information and to differentiate relevant from irrelevant details (Bulgren, Deshler, & Lenz, 2007). Moreover, students with LD have been shown to have limitations in their ability to consider multiple perspectives (Bouck, Okolo, Englert, & Heutsche, 2008) as well as misconceptions about the processes involved in historical reasoning (Ferretti, MacArthur & Okolo, 2007). Finally, students with LD generally know less about historical content than their peers without disabilities (De La Paz, 2005). Thus, researchers must establish instructional approaches that benefit this particular group of learners as well as their peers who are not identified with LD.

**Project-Based Learning**

Project-based learning (PBL) may provide one viable option. It is a student-centered pedagogical strategy that is focused on helping students not only learn the content but also make meaning and establish personal relevance with the subject matter (Chen, 2010). The term student-centered indicates a move away from the teacher-centered practice that is most common in schools. When students and their activity are placed at the center, the role of the teacher must change by necessity. The teacher becomes more of a designer, director, coach, and advisor than a dispenser of information and instructions on how to do things in the classroom (Thomas, 2000).

PBL appears particularly well suited to achieving goals of the history curriculum, because it allows students to “engage in authentic learning and experiences that prepare them to become knowledgeable, informed members of the global community” (Garran, 2008, p.389).
Thus, in PBL one goal is to help students learn how to learn in ways that more closely resemble real-world situations, dealing with problems and issues that cannot be contained solely in their textbooks. PBL activities start with a central or driving question (Caron, 2005) that helps students relate the relevance of the content they are studying to their ability to address the central question successfully. Because good central questions are deliberately poorly structured, teachers generally organize students into collaborative groups to build in a multiplicity of perspectives and abilities and to help students develop so-called 21st century skills that include problem solving, critical thinking, multiple ways of communicating information, and effective collaboration (Partnership for 21st Century Skills, 2009).

Of particular relevance to the present investigation, Ferretti, MacArthur, and Okolo (2001) evaluated the effects of PBL with academically diverse students who created multimedia presentations. The students worked in small groups to conduct research on their topics. They engaged in collaborative discussions that focused on using evidence to support their position, then used various software programs to create group projects and present reports to their peers. Results from these studies revealed that students with and without disabilities made significant gains in historical knowledge and historical reasoning, although students without disabilities made larger gains.

We believe it is important to explore further how technology can be employed to enhance learning outcomes because contemporary technologies—websites, digital video, interactive programs, and hypermedia software—are uniquely capable of supporting rich, complex, and nonlinear representations of knowledge and understanding (Daley, 2003; O’Brien, Grill, Schwartz & Schlicht, 2006). These appear to be ripe tools that can enable all students to develop both factual knowledge and historical thinking skills.

**Aims of the present investigation.** The present study was designed to explore how technology could be employed to enhance both students’ content learning and specific aspects of historical reasoning by using technology-enhanced PBL as a means of instruction. We wished to determine whether this form of instruction could have a positive effect on students’ ability to engage in contextualized thinking, a particular facet of historical reasoning that reflects students’ understanding of how historical events are situated within a particular time period and place. Further, we attempted to clarify learning outcomes for students with LD and students without disabilities after all students completed group projects that focused on historical inquiry. We pursued two specific research questions:

1. Can involvement in a technology-enhanced historical inquiry multimedia group project facilitate students’ content learning and historical understandings?
2. How do students with disabilities compare to peers who are not identified as having learning problems with respect to learning outcomes?

**Method**

This study examined how one teacher, Mrs. Peabody (not her real name), and her middle school students used technology-assisted PBL to explore American history from the early to mid 1800s in three regions of the United States (Northeast, South, and West). To accomplish these goals, we analyzed student interviews, examined their mastery of standards-based factual content and how they constructed their multimedia projects, and examined their written journal entries before and after they completed the multimedia unit.

**Participants and Setting**

**Teacher and School**

We recruited Mrs. Peabody to collaborate in the study based on her reputation as a highly skilled social studies teacher in the district. She had taught for 33 years, with her five most recent years at the eighth grade. Her course covered the American Revolution, the early republic, westward expansion, the Civil War, and reconstruction. Demographic information for the school indicated that 3% or fewer students were African American, Pacific Islander, Filipino, or American Indian/Alaska Native; 11% were Asian; 18% were Hispanic or Latino; 63% were White; and 2% provided multiple or no responses. School personnel identified 11% of the students as having a disability. Socioeconomic information revealed that 15.5% of the students qualified for free or reduced lunch.
Students

A total of 87 students completed the technology-enhanced PBL unit and were part of a larger study, which compared students’ ability to learn historical information at two schools from the same district in Northern California. Because we wanted to take a closer look at the learning and thinking of students who participated in the PBL unit, the current study provided deeper analyses of the students’ content learning and historical thinking as noted from interviews, multimedia projects, and journal entries. To do this, we chose to limit all analyses to 10 students who were identified with a high-incidence disability (eight with LD, one with ADHD, and one with Asperger’s syndrome) and 10 students without disabilities who were matched according to gender, ethnicity, first language spoken in the home and—when possible—the topic that they had studied during the multimedia inquiry project.

Students with disabilities. The participants included six boys and four girls; four were White, three were Hispanic, two were multiracial, and one student did not have information regarding his ethnicity in the school files. All but one of these students received English language arts instruction from a special education teacher. Examination of course objectives indicated that it was not equivalent in difficulty to a general education class. The students’ average Verbal Intelligence Quotient (VIQ) was 98.5 (σ = 12.80), the average Performance Intelligence Quotient (PIQ) was 95.8 (σ = 11.15), and the average Full Scale Intelligence Quotient was 97.1 (σ = 11.40).

Students’ most recent semester grades in English and social studies ranged from C- to A, with an average of 2.8 (σ = 0.81) in English and 2.5 (σ = 0.76) in social studies. Results from students’ most recent group-administered standardized achievement test (the Stanford 9) using National Curve Equivalent (NCE) scores revealed student performance between the 27th and 93rd percentiles in reading and language arts (Stanford 9) with an average of 63.3 (σ = 18.34) in reading and 59.44 (σ = 17.24) in language arts. The average score for this group of students on the written subtest on the WIAT-2 was 110.7 (σ = 12.12). Results from a series of ANOVAs, one for each demographic variable, indicated that before the project began students in the two groups were similar with respect to English grades, but differed significantly with respect to all other measures. This made sense, as students with disabilities received modified English language arts instruction in a resource room setting.

Multimedia Unit

Before the study began, Mrs. Peabody and the authors decided to focus on the topic of westward expansion. This was possible as the state content standards indicated focus on “the divergent paths of the American people from 1800 to the mid-1800s and the challenges they faced” in three regions (the Northeast, the South, and the West). Therefore, we were able to determine the extent to which they learned not only about their assigned region but also the other two regions. Finally, Mrs. Peabody formed six heterogeneous groups (two for each region) within each of her four classes. In making up the groups she considered each student’s potential for leadership, learning difficulties, gender, and personality.

Instructional Procedures

Preliminary planning led to the development of a six-week unit that began with a two-day overview in which we demonstrated the software to be used, formed groups, established three overarching questions, and explained the inquiry process, which would be done in groups of five to six students. Individual accountability for the projects would come in the form of grades on a content test that covered all three regions after the project ended, and for parts of the project for which each student was responsible. There would be two groups within each class studying
each region, allowing the groups to work together as well as alone. Students knew from the start that they would be responsible for the learning of their peers who were working on the other topics, and that there would be a class presentation of the completed project as well as an open house to which their parents/guardians would be invited.

Because students were engaged with primary and secondary sources, we held whole class discussions on how sources need to be examined in a broad context in relation to each other. We discussed how paintings and newspaper accounts might be considered secondary sources (consider, for example, that a newspaper account written at the time of the Boston Massacre might have been based on the accounts of witnesses who recalled the event to the writer). Paintings, which students routinely considered primary sources, were in fact secondary sources if they depicted an event the way the artist wanted the public to remember it rather than the way it actually was (e.g., Thomas Hill’s painting, “The Last Spike,” commemorating the 1869 completion of the transcontinental railroad, in which he focuses on the industrialists who promoted the interests of the Central Pacific Railroad rather than the men who drove the final spike).

We then demonstrated the approach to content and design using a sample project that incorporated content from the Boston Massacre as an illustration, using the mPower software that students would use to create their projects. We selected this particular tool because it seemed ideal for creating multimedia presentations, was relatively easy to learn, would allow students to make nonlinear connections, and was generic. We believed that the potential to make nonlinear connections had important implications for learning, as each element in a scene could be linked to a new scene if the student wished to provide more depth on a given subtopic. We emphasized the need for students to engage in planning as they prepared to engage in a two-week period that focused on acquiring factual content about their assigned topic and subtopics.

Hard and soft scaffolds (Saye & Brush, 2002) were provided to students, including planning worksheets, mini-lessons, and help in the computer lab. Students were given a rubric for the final assessment of their multimedia documentary along with a checklist designating both process and product features such as using a minimum number of primary and secondary sources; engaging in some planning (e.g., via a storyboard or outline) before starting to use the software; and considering aspects related to media use, navigation (e.g., could they backtrack or stop the presentation if they liked), and appearance. We chose the Boston Massacre to use as a demonstration project, as the topic had been reviewed at the beginning of the year and because it did not overlap in content with our focus on westward expansion.

In the subsequent weeks, we continued our efforts to help students understand historical sources with a series of lessons that were designed to move from reading the district-adopted textbook (The American Nation: Independence Through 1914; Davidson, Castillo, & Stoff, 2000), to reading supplemental secondary source excerpts (e.g., “Erin’s Children in America: Three Centuries of Irish Immigration to the United States”; Diner, 1996), to reading and examining primary source images and excerpts, each of which was designed to extend and deepen students’ understanding of historical content. The secondary sources (all text) were chosen to align with the respective content standards and gave students the opportunity to learn more background than their textbooks provided. We were able to provide students with a range of primary sources including images, texts, and in some cases songs that had been written during the time period (e.g., Stephen Foster’s “Hard Times Come Again No More”). Students had access to the collection of materials via laptops (one for every two students) that had been reserved by the teacher for their use in the classroom for seven consecutive days.

Additional scaffolds were provided before students examined primary sources to guide them in their inquiry. We provided a procedural facilitator that prompted students to consider: (a) five wh- questions, “Who was the document written to or for, when and where was it written, why do you think the author wrote it, and what do you know about the author;” (b) the message or story in a cartoon or photo; and (c) questions, both within and across sources, and to check how the primary source “fit” with the secondary source.

Students had a copy of this facilitator as well as the content standards for their unit as they read and examined the sources.

During this time period, students also initiated requests for additional materials. These requests included more than 49 different queries (these were noted on the teacher’s classroom whiteboard, where students posted requests in their respective classes) ranging from requests for speeches,
diaries, or biographical information about specific people (e.g., Denmark Vesey, Henry Clay, Sam Houston, Charles Carroll, Nat Turner, Sojourner Truth, and Moses Austin) to queries about topics such as how White and Black Americans were treated in the South when they went to church; information about what survivors said about the Alamo; how Mexicans felt about the annexation of Texas; basic facts or speeches regarding developments such as the cotton gin; Andrew Jackson’s 1829 State of the Union Address; and Henry Clay’s thoughts on territorial expansion. We also scanned 76 unique images from the textbook that students could use as part of their projects. Samples included graphs, pictures, maps, and illustrations.

After the two-week note-taking period, we provided students with additional instruction on how to use the software and time to create multimedia plans, and we moved to the school’s computer lab for the next two weeks. Mrs. Peabody brought five additional social studies texts for students to use in the lab. She also established organizational expectations by asking students to create an introduction, table of contents, bibliography, and designation of each author’s contribution(s) to the overall project. After students finished their individual scenes, the group leader integrated them together.

In general, students had few problems learning to use the software; however, difficulties arose when the groups had to integrate the individual scenes into a single project, since this functionality was not easy to understand in the software and the slow speed for network operations in the lab led to some confusion. Despite these problems, all groups were able to finish their projects on time. The final three days of the unit were reserved for in-class presentations, in which each group presented their project and reviewed each scene and all accompanying content. Students used a study guide to take notes on the material that was presented, as they would be tested on all three regions—not just the region on which their group had worked—after the presentations. Students were reminded to speak clearly and demonstrate the navigational features of their projects.

Additional instructional features. Because students were tasked with using factual content that was stipulated by state standards to construct historical scenes, we wished to give further opportunities for them to think about how the historical content could be understood in a broader context. Therefore, as a homework assignment, we asked students to write a journal entry from the perspective of an individual who had lived during the time period they were studying. We supported their efforts by providing a lesson on describing a scene in a different historical time. The lesson involved writing a phrase, sentence, paragraph within a composition, or an entire composition as well as the function of description as an organizational device through location (e.g., far to near, for example) and time (from earlier to later, or from morning to night). Students could choose from more than a dozen topics for their writing assignment after using their textbooks to gain basic background knowledge. Mrs. Peabody asked students to write in the first person and to incorporate sensory details in their writing to make their journal entries realistic and engaging.

After the students completed a posttest on content knowledge we interviewed them again and they wrote a second, unsupported, journal entry for formal evaluation. We then held a final discussion with each of the four class sections to probe if students could infer why projects on the same topic were different across groups and the degree to which they could connect their learning experiences to the more general process in which historians constructed history, and to ask for suggestions for improving the project.

Data Sources
This study used a mixed methods approach (Burke Johnson & Onwuegbuzie, 2004) to explore students’ learning in history. Because one of our goals was to compare the benefits of technology-enhanced PBL with respect to mastery of historical content and students’ thinking about history across different types of learners, we provided quantitative comparisons of their content learning and quality of writing responses among students with and without disabilities. However, we also sought a close examination of the work they completed and their thoughts about history, leading us to conduct qualitative analyses of students’ interviews, multimedia projects, and journal entries. It also is important to note that because we were facilitating instruction in Mrs. Peabody’s classes, we did not collect fidelity of implementation data at the teacher level. In contrast, we used fidelity data at the student level (c.f., O’Donnell, 2008) to learn the degree to which the students completed the unit as designed.
Standards-based Content Learning

Content learning by students with and without disabilities was measured by a 50-item multiple choice test on California state social studies Content Standards 8.6, 8.7, and 8.8 (in nearly equal proportions). This was administered before and after students completed the multimedia unit. Questions included released items from the previous state, district, and county tests, as well as two items that Mrs. Peabody created from district-adopted textbooks in an effort to balance the number of items corresponding to each standard. Mrs. Peabody shared this test with two eighth grade U.S. history teachers from a neighboring school (they had participated in the larger study), and revised early drafts of the test using their feedback as a means to establish adequate construct validity. We estimated the test’s internal reliability using Salvia, Ysseldyke & Bolt’s (2011) recommendations, with a resulting split half correlation estimate of .703 using all available pretests from the original number of students in Mrs. Peabody’s classes (which was well above their suggested criterion of .6 for situations in which group means were reported). We subsequently conducted between-group comparisons using a one-way ANOVA at pretest and posttest to determine the extent to which the students with differing academic profiles were comparable in terms of what they knew before and after completing the multimedia unit.

Interview. Our 20-minute individual interview began with questions that elicited student understandings about how historians constructed interpretations about the past. Sample questions included:

1. “I want to show you two documents” [Show sources.] Let’s read them together. [Read each document aloud.] What can you tell me about these documents?
2. What do you think life might have been like for [name of individual]?
3. What do you think life was like for [others who both shared and differed in important ways from the previously named individual]?

We asked students these questions to learn how they thought when using the sample primary and secondary sources and whether they could make more general inferences about their use. We recorded students’ answers to each question both before and after the project to encourage more extensive responses.

Multimedia Unit

Figure 1 shows three screen shots from the students’ work, revealing both navigational features (the first two scenes corresponding to the unit question on the North) as well as evidence of historical thinking from one student with a disability (the interpretation on the impact of the Mexican American war), although the latter scene shows an admittedly text-heavy presentation.

Interpretive thinking with sources. We wished to evaluate students’ ability to consider evidence, because this skill is central to demonstrating historical thinking (Monte-Sano, 2010). We rated work at Level 0 when students presented factual information literally (i.e., they merely listed facts or a combination of facts and quotations). Level 1 was awarded when students provided historical evidence (i.e., claims and warrants) as facts without having evaluated them for credibility. To illustrate, consider one student’s scene on the Mexican American war. The student wrote the following:

President of the United States, James K. Polk, wanted California and New Mexico territories from Mexico. Polk’s plot was to pull the Mexican provinces into the union through war. Mexico and the United States had disagreements on where the border for Texas and Mexico should be. The conflict began when the Mexican officials decided not to meet an agent of Polk’s to make an agreement. After the Mexican officials decided not to attend, Polk planned for...
This student presented an integrated series of ideas, but did not show an understanding that reporting on an event in history requires more than an authoritative presentation of content.

In contrast, our highest level was awarded when students demonstrated an understanding that claims in history must be supported—for example by using a quote, a citation, or factually accurate examples. Thus, a scene with claims and a quote or a citation in support of a claim earned a Level 2. To illustrate, in one student’s scene, titled “What were Jackson’s thoughts on the Bank of the United States?” the student wrote:

Jackson thought the Bank of the United States was absurd. He thought the bank was unconstitutional. He believed only states, not the federal government, had the right to charter banks. He also felt that the bank helped aristocrats at the expense of the common people. He warned: When the laws undertake … to make the rich richer and the potent more powerful, the humble members of society—the farmers, mechanics, and laborers— … have a right to complain of the injustice of their government.

This student presented his claim about Jackson’s belief regarding the federal bank and supported it with a citation.

An independent reader who was blind to the purpose of the study and the students’ identities rated all 20 students’ work independently with 80% exact agreement.

**Student fidelity.** After the project ended at the intervention school, Mrs. Peabody shared her grade book for the unit. This information gave scores for each student on his or her scenes, her evaluation of the work that was contributed to the team project, scores on the oral presentation, a grade on the journal entry that had been assigned as homework, a grade on the students’ notes that had been taken early in the six-week unit, and an overall grade for the unit that provided evidence of students’ work completion as indication of their participation.

**Writing**

After completing the unit, we asked students to write a journal entry in first person in which they conveyed content that they learned from working on the project in a narrative form. To do this, we gave students one full
day to plan their compositions, and we allowed them to focus on the region they had learned about in class. The directions asked students to select from several points of view and issues that were relevant to their region. Issues included: (a) living conditions, (b) opportunities and hardships in their daily life, (c) significance of a topic relevant to each region, or (d) beliefs about a topic relevant to each region. Students used their notes and multimedia projects from the unit to form a written plan that could help them compose a journal entry, and used a second day for writing.

We evaluated the quality of the students’ writing using a holistic rubric from 0 to 6 and compared their overall performance using statistical comparisons between groups. In our qualitative analysis, we examined the degree to which students’ writing showed evidence of contextualized thinking using Seixas’ (2009) criteria (as described above for the analysis of interview data). Although Seixas’ assessment of historical thinking suggests six fundamental historical concepts, initial reading of students’ essays indicated far fewer elements—in part because of the tasks that students were given. We followed the same iterative process in coding as described above and found evidence for two codes, “uses evidence and understanding of the historical context to explain why people acted the way they did,” and “makes judgments about actions of people in the past, recognizing the historical context in which they were operating.” The first and second author read students’ journal entries independently and established interrater reliability at 92% and 86% for scoring these two aspects of contextualization.

Results

This section includes findings among students with and without LD regarding content learning and historical reasoning via responses to interview questions, analysis of their multimedia group projects, and their written journal entries. Descriptive information on these outcomes highlighting comparisons of students’ content learning, evidence of students’ historical thinking from their multimedia projects, and the results related to the length and quality of their writing follows. These statistical comparisons show the extent to which students with disabilities were comparable to their normally achieving peers on important outcomes in the study.

Standards-based Learning

The ANOVA analyses did not show differences in content learning between the two groups of students on our 50-item multiple choice content test before \( F(1, 18) = 3.469, \text{MSE} = 37.494, \rho = .079 \) or after the unit \( F(1, 18) = 4.69, \text{MSE} = 18.028, \rho = .502 \); in addition, comparison of effect sizes indicated there was a knowledge gap between students without disabilities and those with LD that became narrower after instruction (ES = 1.09 at pretest and .30 at posttest). Pretest content scores averaged 12.10 (\( \sigma = 7.3 \)) for the general education students, and 7.0 (\( \sigma = 4.67 \)) for the 10 students with disabilities. Posttest content scores averaged 42.2 (\( \sigma = 4.21 \)) for the general education students, and 40.9 (\( \sigma = 4.28 \)) for the 10 students with disabilities. These results appear positive, demonstrating that students with and without disabilities learned content from each other’s projects, as well as from the information they were responsible for creating in the multimedia project.

Interviews. Four aspects of historical thinking were evident in students’ interview responses, reflecting both how students reasoned with the primary and secondary sources and their understandings of how sources such as these could be used to learn historical content (see Table 1 for examples of statements that exemplify each benchmark). The responses indicated that 55% of the students used the primary sources to construct an original account of an historical event (50% of the students with disabilities and 60% of the students without disabilities), and that 75% of the students used sources to build a context for interpreting historical events. To be fair, three students (15%) included anachronisms in their responses (two students with disabilities and one student without disabilities), indicating that students may have begun to draw on their own ideas about what happened during the historical periods.

At the same time, four students without disabilities and two students with disabilities (30% of the entire group) demonstrated more advanced understandings in their thinking with the sources. These students demonstrated an understanding that one might pursue an understanding through documents, not in documents; and five students without disabilities and three students with disabilities (40% overall) provided statements that showed an ability to analyze the primary source for the purposes, values, and world views of the author.
Multimedia Projects

Interpretive thinking with sources. A one-way ANOVA was conducted to compare the performance of students with and without disabilities with respect to level of historical thinking in their multimedia scenes. Statistical analyses failed to show main effects for evidence of historical thinking in the multimedia projects, $F(1, 18) = 1.8$, $MSE = 0.444$, $\rho = .091$. Mean scores of students without disabilities were 1.6 ($\sigma = 0.52$) and students with disabilities averaged 1.2 ($\sigma = 0.79$). These results indicated that students with and without disabilities frequently provided claims, and that many but not all of these claims were substantiated; in all, 40% of the students with disabilities and 60% of the students without disabilities earned a rating of Level 2 for the use of evidence in their multimedia scenes.

Fidelity of implementation. On average, students in both subgroups received nearly equivalent scores on their individual scenes and group work, as well as on their overall unit grades (range = 82 to 96% for the summative scores, with a standard deviation of just over 4%). These data indicated a high degree of work completion during the multimedia unit.

Writing

Narrative quality. A one-way ANOVA was conducted to compare subgroups of students and the quality of their journal entries as measured by the holistic rubric. Statistical analyses failed to show main effects for students’ writing with respect to quality, $F(1, 18) = 1.471$, $MSE = 0.85$, $\rho = .241$. Mean scores of students without disabilities averaged 3.90 ($\sigma = 1.0$) and students with disabilities averaged 3.40 ($\sigma = 0.84$). These results indicated that holistic writing scores for students in each subgroup were essentially at the same level of quality.

Contextualized thinking. Our qualitative analyses of student writing focused primarily on students’ ability to contextualize their characters within the time and place they had selected and their ability to present factually relevant information about the challenges that people similar to their characters faced given the time and location of the setting they had created for their journals. (See Table 1 for benchmark examples.) Fully 65% of the students’ writing (70% of the students with disabilities and 60% of the students without disabilities) demonstrated an understanding of the historical content to explain why people acted the way they did, and 35% of them (half of

### Table 1

**Historical Thinking Benchmarks Noted in Students’ Interviews and Journal Entries**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Student Excerpt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses primary sources to construct an original account of an historical event.</td>
<td>Life for Harriet Tubman was rough because when she finally escapes slavery she keeps working to help other slaves.</td>
</tr>
<tr>
<td>Uses primary sources to build a context for interpreting historical events.</td>
<td>Life for Harriet Tubman was better but not very good because slaves couldn’t bear arms, get into groups, could only practice religion.</td>
</tr>
<tr>
<td>Pursues an understanding “through” documents not “in” documents.</td>
<td>Primary sources give a first hand account of how the person or people around them felt.</td>
</tr>
<tr>
<td>Analyzes primary sources for the purposes, values, and world views of the author.</td>
<td>The letter from Douglass shows that he respects her – what we can infer about him.</td>
</tr>
<tr>
<td>Uses evidence and understanding of the historical context to explain why people acted the way they did.</td>
<td>“…We found out it was the President Andrew Jackson who took our land and forced us to move west. Our neighboring tribe the Black Foot weren’t as lucky, most of the men were killed...”</td>
</tr>
<tr>
<td>Demonstrates knowledge of specific historical contexts by including relevant facts from a given time and place or event.</td>
<td>“…People say [the cotton gin] was the most brilliant invention of their time because it cut down the work for most slaves but...cotton buyers want it more, and that meant more work for slaves...”</td>
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the students with disabilities and two students without disabilities) demonstrated in their writing knowledge of the specific historical context based on particular facts regarding the time and place of events.

Discussion

This study provided a deep analysis of the effects of a project-based learning experience on important elements of historical thinking among 20 eighth grade students with and without disabilities. Results from qualitative and quantitative analyses of student interviews, multimedia scenes, journal entries, and a measure of content learning provided converging information that the technology-enhanced PBL multimedia unit enhanced academically diverse students’ factual learning, their ability to think contextually, and their ability to reason historically (i.e., to understand how historical interpretations are constructed and to construct their own interpretations) after completing the group projects.

Findings from student interviews indicated that, after completing the project, at least half of the students used sources to construct historical interpretations and engaged in contextualized thinking about individuals from the past. Although students without disabilities did both more frequently, differences between the two groups of students were not statistically significant. Moreover, about one third of all students demonstrated relatively more advanced understandings regarding how primary source documents could be used to understand and construct historical interpretations.

In addition, examination of students’ multimedia scenes revealed comparable levels in the use of evidence when incorporating primary and secondary sources, and students with and without disabilities each substantiated much of the evidence they included in their scenes. Not surprisingly, we found that students’ journal entries were based in large part on the material they studied in the multimedia unit. Moreover, entries for more than half of the students conveyed general contextual information about the time and place of their main character, and about one-third of the students provided elaborated information that conveyed knowledge about the specific time period they had studied. Our review of students’ journals also revealed that students with disabilities often were as capable as their peers without disabilities. We also were encouraged by our results on writing quality, because the quality of students’ written journal entries was not significantly different, despite the fact that students with LD had more limited initial writing ability.

Together, these findings provided converging evidence that students with disabilities were able to think about history and contribute to group work with products that were in most ways similar to their peers without disabilities. We believe our results were so positive because in this experience all students were given the opportunity to work in a less traditional learning environment. The mPower software turned out to be ideal for the creation of multimedia projects, perhaps because it functioned as a generic form of what Rose and Meyer (2002) called “adjustable software tools,” which we found could support all learners including those with identified disabilities. In addition, the instruction in the study included hard and soft scaffolds (Saye & Brush, 2002) in the form of planning worksheets, access to help in the computer lab while working on the projects, and minilessons on analysis of primary and secondary sources. Finally, students had access to technology and were allowed to demonstrate content learning in a nontraditional format, along with the responsibility of sharing a group presentation and having to learn the rest of the unit’s content from the other group presentations. Students did not use technology to simply access rich, preexisting multimedia content created by someone else but instead had the opportunity to create their own content in a meaningful context—i.e., with consequences for its use.

Limitations

As with any study, this investigation had real limitations that should be considered as part of the context of the project. First, we did not collect fidelity of implementation at the teacher level because we cofacilitated instruction. In other words, the instruction described here is not a replicable intervention. This relates to a second, and more important limitation: Mrs. Peabody was a master teacher of history but a novice user of technology. In the two years after this study leading up to her retirement, she did not use mPower with her students in group work. This was despite her claim that, in this particular year of teaching, she had accomplished more teaching of content in less real time because students were learning from each other as well as from her. Third, we readily acknowledge that historical thinking involves more than what was measured...
here. Our focus was on teaching students the process of constructing ideas about historical events rather than any of many other key concepts such as learning to consider the relative significance of historical events. Although we felt constrained by the need to focus on standards-based learning in our PBL unit, future research should explore how to use technology-enhanced learning as a means to address other goals in history education.

Conclusions

The goal of presenting and meeting the same learning goals for students with and without disabilities has been difficult to realize in the context of traditional classrooms (e.g., Bouck et al., 2008; Gersten et al., 2006). In this study we overcame some challenges by holding the same expectations for all students to engage constructively in small-group activities, and students with disabilities participated along with every other student in this unit while still having access to their customary dedicated supports. The students participating in this study were able to engage in work that exemplified best practices in technology integration and PBL (Means & Olson, 1994): an authentic task; the opportunity to practice advanced skills; work in heterogeneous, collaborative groups with their teacher as a coach; and work during an extended period of time.

The findings presented here provide new evidence that technology-enhanced PBL can be used to support historical thinking in significant ways as the majority of the students, both with and without disabilities, were able to make developmental approximations toward important historical benchmarks (prior work with similar findings include studies by Bouck et al. 2008; Ferretti, et al. 2001 and 2007; Gersten, et al. 2006). In the current project, we found that the benefits of the PBL project were robust because elements of historical reasoning were evident across sources (from students’ interviews, their multimedia projects, and when asked to write about the historical period they had studied).

Our findings also suggested that PBL may be a viable option for teachers to use as they include students with disabilities in the classroom by having them work collaboratively with peers in the context of ambitious but well-supported projects, Such projects help all students not only master standards-based subject matter content but also develop historical reasoning; both goals are necessary and achievable. Finally, we believe that, especially for students with disabilities, instruction similar to the current study should be prioritized over general social studies instruction that does not allow students opportunities to generate meaningful connections with which to approach history (Lee, 2005). In addition to serving as an example of good instruction, this type of learning can have the added benefit of providing students with disabilities full access to the general education curriculum and educational opportunities that are available routinely to their academically more capable peers.

References


**Endnotes**

1. Using state standards, we created one question and seven sub-questions for each region.

2. Primary sources included a letter by Obour Tanner to Phillis Wheatley at pretest and a letter by Frederick Douglass to Harriet Tubman at posttest. Secondary sources, which came from encyclopedias, provided biographical information on each person.

3. Codes included (a) uses primary sources to construct an original account of a historical event; (b) builds a context for interpreting historical documents; (c) pursues an understanding through, not in documents; and (d) analyzes a primary source for the purposes, values, and world view of the author.

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