

# **“You Think for Me, So I Don’t Have To.” The Effect of a Technology-Enhanced, Inquiry Learning Environment on Student Learning in 11<sup>th</sup>-Grade United States History**

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## **Abstract**

In a study investigating the effects of student engagement in inquiry learning through the development of Web sites, nearly every student reported having enjoyed the project, and the majority scored an A or B for their project grade. However, neither enjoyment nor high achievement on this performance task necessarily translated into high scores on the unit test. Therefore, this paper explores why success in a technology rich inquiry environment did not translate to measurable changes in student learning. Results demonstrated that students were not accustomed to this type of pedagogy and that the assessment did not match the task.

For over a decade, social studies educators and researchers have strongly advocated the use of technology, particularly the Internet, within social studies instruction (Braun & Risinger, 1999; Hicks & Ewing, 2003; National Council for the Social Studies, 1994).

Among the benefits of using the Internet often cited are that it offers instantaneous access to sources previously cumbersome or even unattainable (Cohen & Rosenszweig, 2006; VanFossen & Shiveley, 2000) and that, because the Internet has “transcend[ed] geographical distance, political boundaries, and chronological divisions to become genuinely ‘worldwide,’” it has the potential for students to examine differing perspectives, which is an overriding goal of social studies instruction (Hicks & Ewing, 2003, p. 134). These benefits are available on a wide scale, as an Internet connection is available in virtually every school and 93% of instructional rooms in the United States (Parsad & Jones, 2005, p. 4).

Mason et al., (2000) contended that in order for technology to be integrated effectively, it should be used within the context of social studies content and “extend learning beyond what could be done without technology” (p. 107). Additionally, technology use offers the opportunity for curriculum to be taught in a student-centered manner in which students engage in higher order thinking and undertake “real-world” tasks as they contextualize and synthesize information through exploration and discovery in order to develop their own understanding of the content (International Society for Technology in Education, n.d.). Although multiple pedagogical methods enable these outcomes, inquiry is particularly well suited for helping high school social studies classroom students reach their own deduction of an historical event (Booth, 1993). Inquiry refers to asking questions and finding answers, and is defined by Levstik and Barton (2001) as “the process of asking meaningful questions, finding information, drawing conclusions, and reflecting on possible solutions” (p. 13). In so doing, students are actively engaged in the learning process, instead of being merely presented with factual information as in a more didactic approach.

However, this process is not necessarily easy for teachers or students. In their study of technology integration in an undergraduate history course, Milman and Heinecke (2000) described how the two professors in the course subscribed to a philosophy in which students engaged in inquiry learning as they designed Web sites in order to demonstrate their understanding of the American Civil War. The professors asserted that the learning experience was beneficial. Students were able to engage in higher order thinking as they “managed the complexities of finding primary sources, analyzing historical data, and presenting them through the WWW” (p. 555). The process was “very difficult” for students to undertake, however, as students had to learn both history content and the technical components of designing a Web site (p. 555).

It may be presumed that a task considered “very difficult” to undertake in an upper level undergraduate history course would be even harder in a high school social studies classroom, particularly in light of recent research demonstrating that teachers do not necessarily have access to the requisite equipment for effective technology integration (Friedman, 2006; McGlenn, 2007). Potential barriers notwithstanding, teaching social studies using the Internet to foster the pedagogical approach of inquiry is by no means impossible. Milson (2002) found that his sixth-grade social studies students were able to engage in inquiry tasks; however, students approached this task differently depending on their academic abilities.

The Internet can make available a plethora of evidence and perspectives in an easily attainable format, yet the mere provision of materials does not ensure that students will be able to make sense of these sources. Rather, recent research has called for a “pedagogical interface” on Web sites used in K-12 social studies classrooms as a means of both facilitating the search for relevant material and helping to make the material more understandable (Lee & Clarke, 2003, p. 9). Further, Saye and Brush (1999, 2006)

asserted that student learning experiences must be scaffolded in order for students to engage effectively in inquiry learning experiences.

### **Student Technology Use**

Generally speaking, students possess the technical ability to engage in tasks in which they use the Internet and Internet-based resources, as studies have consistently demonstrated that school children desire to use technology, particularly the Internet, and do so frequently (Lenhart & Madden, 2007; Lenhart, Madden, & Hitlin, 2005; Levin & Arafeh, 2002). While Lenhart and Madden's (2007) piece describes how adolescents utilize the Internet to communicate socially, evidence indicates that students also make use of it educationally. However, this educational use does not necessarily transpire during school hours. Stemming from their study of teenagers' online behaviors, Levin and Arafeh (2002) asserted that secondary students use the Internet and view it as an integral part of their educational experience, but the majority of "students' educational use of the Internet occurs outside of the school day, outside of the school building, outside the direction of their teachers" (p. iii).

More recent studies of Internet use among teenagers demonstrate that the vast majority (87%) of adolescents use the Internet and over half (51%) use it on a daily basis (Lenhart et al., 2005). However, rather than simply retrieving information and material from the Internet, many are contributors to the Internet, as well. Lenhart and Madden (2005) reported that the majority of teenagers (57%) provide content to the Internet through the design and development of Web sites, blogs, and digital images. Whether or not it is apparent to students as they create and modify content for the Internet, they engage in inquiry; not only does the development of Internet-based content require synthesis of thoughts and ideas, but it is an active process in which the results are immediately available for the world to view.

Finding the Internet used to foster this type of pedagogy in secondary social studies classrooms is rare. VanFossen (1999-2000), as well as Whitworth and Berson (2003), described Internet use in secondary social studies to consist of students engaging in low level tasks as they access and retrieve factual information. Consequently, given secondary students' familiarity with the Internet and the Internet's successful implementation within a college class, it is important to test whether these outcomes could also be achieved in a high school class.

It is also necessary to test the effect of technology use on student achievement, as despite Martorella's (1997) labeling of technology as social studies' "sleeping giant" (p. 511) and a wealth of literature documenting technology's potential as a learning tool, little empirical research exist to validate its effectiveness in K-12 social studies (Friedman & Hicks, 2006). However, Lee and Hicks (2006) noted that researchers must "begin to examine clearly and to detail how technology influences student learning in both K-12 and teacher education settings" (p. 414).

In order to address the impact of technology on student achievement, we undertook a study in which we utilized quasi-experimental design, whereby the same teacher (Ms. Treece, a pseudonym) taught two sections of the same eleventh grade United States history class at Riverfront High School, also a pseudonym (Friedman & Heafner, 2006; Heafner & Friedman, 2007a; 2007b). During the World War II unit, her third block section was the control group while her first block section was the test group. In the control group, Ms. Treece taught the class using the same pedagogical methods as she normally would; in the test group however, students spent the entire unit in their school's computer lab, engaging in inquiry learning as they answered open-ended, guided

questions in order to develop Web sites in which they described, explained, and interpreted the events of World War II by using primary and secondary source documents. At the culmination of the unit, both groups were given the same test in order to compare the impact and effect of different types of instruction on student achievement.

The results of this study showed differences in student achievement between groups, as measured by the multiple-choice, fact-recall unit test. On average, the control group scored 5 points higher than the test group, and there was greater variability among students within the test class. Comparisons in student performance on the summative test for this unit of study show greater differences in test scores than previous units of study. Additionally, students in the test group scored on average 12 points higher on their Web site project than their unit test ( $M = 92.19$ ,  $SD = 9.26$ , compared to  $M = 80.8$ ,  $SD = 12.5$ ), and only two students received a worse score on the Web sites than they did on the test. In terms of traditional measures of student achievement, the use of the Internet to engage in inquiry learning did not significantly and, quantitative data would suggest, did not positively impact student learning. Yet, learning is a much more complicated process than can be deciphered through student grades.

To unravel the intricacies of student learning, a deeper and richer understanding was necessary to evaluate technology's impact on student attitudes and ability. Therefore, to further explore and understand these facets of student learning, a second set of research questions were posed and are explored in this paper:

1. What is motivating and enjoyable from a student perspective about a technology rich inquiry environment?
2. Why was success in this environment not necessarily translated to success on a unit test?

### Method

In order to answer questions pertaining to student attitudes and perspectives, on the culminating day of the World War II unit students in the test class were asked to complete a six-item questionnaire, which can be found in [Appendix A](#). The questionnaire contained both Likert-scale and open-ended items. Fifteen of the 16 students in the class participated (one student was absent), and of the respondents six were male and nine were female. The questions pertained to what students liked (and did not like) about the project, in general, what they learned, and whether they would like to undertake a project of this type again. In order to analyze these responses, the researchers used descriptive statistics for the Likert-scale items and grounded theory, as described by Strauss and Corbin (1998), for the qualitative responses. In so doing, the researchers "allow[ed] the theory to emerge" from the student responses, in order to "offer insight, enhance understanding, and provide a meaningful guide to action" (p. 12).

In order to further discriminate between differences in students and the potential effect of Web site creation on student achievement, for the purpose of data analysis students were divided into two groups based on how they rated their enjoyment on this project. Enjoyment was determined by the first question of the questionnaire, which asked students the extent to which they liked the project on a scale of 1 (Hated it!) to 5 (Loved it!). Five students rated this question a 5, an additional five students rated it a 3, four students rated it a 4, and one student rated it a 1, for an average score was 3.8 ( $SD = 1.15$ ). Qualitative responses offer deeper insight as to the reasons students liked (or disliked) it. Of the 15 surveys, nine (60%) answered this question with a 4 or 5; these students composed one group, and the remaining six students were considered part of the other.

To cross-validate quantitative data, observational field notes, teacher and student interviews, and a summative student questionnaire were collected to determine the impact that technology integration had on student achievement. Data provided evidence to evaluate student like and interest in social studies in addition to student motivations for learning social studies. The researchers (both licensed social studies teachers) were participant observers, as they helped teach the test class the technical components of Web design and created a Web-based resource that contained pertinent primary and secondary sources. In so doing, the researchers collected field notes, as described by Marshall and Rossman (1999). Data were also gathered from the classroom teacher through informal interviews both during and at the conclusion of each of the eight class periods of this project and through a formal interview 4 weeks after the project was completed.

In order to establish themes from the qualitative data to determine what students enjoyed (or did not enjoy) about the project and how it influenced their learning, the researchers individually coded this data with specific attention given to patterns that provided information to help understand the impact of technology on student learning. In order to establish interrater reliability, subsequent to the individual analysis the researchers met to exchange, read, and sort through the initial analyses to identify possible themes collectively, and agreed with the other's assessment of student responses with 100% unanimity. After themes were identified, data were sorted into domains (as in LeCompte & Schensul, 1999). Specific examples from qualitative data sources were identified and cited to support each of the emergent themes.

Finally, in order to measure the effect of this Web site development on student achievement, it was necessary to know how each had performed antecedent to this project. To this end, we obtained the full record of grades for each student from throughout the marking period. These data were used to determine whether this project had an effect on students who had previously experienced differing achievement levels in social studies.

## **Results**

### **Contextualizing the Learning Environment**

Ms. Treece was in her fourth year teaching, although this was her first at Riverfront High School, and her teaching style was apparent the moment after the bell rang to commence class. Because students lacked prerequisite knowledge of states and capitals, she began each day with a blank map of the United States, pointed to the state, and asked the class "What state is this?" Students were to say the state's name out loud in unison. This question was typically followed up with, "What's the capital?" Again, the class as a whole was expected to answer. This pattern was repeated for about four other states (usually in the same region of the country), and if the students had difficulty identifying one of the states, it was then reviewed again. Clearly, she taught her class in a fact-driven, teacher-centered format. She stated that she did so in order to ensure that her students would not only pass, but do well on the end-of-course test.

Riverfront High School prides itself on the end-of-course test scores of its students, which have traditionally been the best of the county's six high schools. Ms. Treece (as well as her department chairperson) credited this success to common planning, a uniform pacing guide that the entire social studies department uses, and the benchmark mid- and end-of-quarter tests based on the end-of-course test. The pacing guide, a portion of which can be found in [Appendix B](#), details the specific standards to be covered for each instructional

day, as well as the facts (such as people, dates, and terms) students are responsible for knowing at the conclusion of each day's instruction.

### **Student Attitudes and Interest**

The nature of the task, as well as the student and teacher role, was distinctly different from other units of study in this U.S. history course and, for some, their experiences in 11 years of school. Although the students were accustomed to Ms. Treece lecturing fact-driven content, in this unit they had to work through and analyze primary and secondary sources independently in order to develop a Web site. For the students who rated the project a 4 or 5, this difference in instruction was a primary reason behind their high rating, as their reasons revolved around two main themes: that the project was both different and fun. For example, three students (all of whom rated this project a 5) expressed that they "loved it because it was fun," and another (who rated it a 4) commented that he had "never made a website before so that was cool." The notion of this project being a break from the ordinary was reflected by a student (who rated it a 4), who wrote that he "liked it because you were able to go at your own pace and it was not a complete bore." Another student who rated it a 4 commented that she "really enjoyed it better than [sic] sitting in class being lectured."

The last query on the questionnaire, whether students would like to do this type of project again, was answered similarly. Twelve out of the 15 students stated that they would like to undertake a similar project for a future unit of study, two would not, and one was undecided. The reasons they gave for wanting to replicate this project were similar to the first question responses. Of the 12 students who answered in the affirmative, 10 used the words "enjoyable," "fun," or "different." One student (who rated the project a 3), wrote, "It was fun [and] it was different and better than just sitting around and taking notes." Another student (who rated the project a 5) wrote that she would "love to do it again because it was [a] fun and hands-on project." The difference in class structure was also noted, as two students who rated the project a 3 described. This project was "a lot better than lectures," and "I like getting out of the classroom and I kind of like getting involved."

The reasons why some students thought of this as a positive experience, however, is reflected in why others found it to be a negative one. Of the five students rating it a 3 and the one rating it a 1, the most common drawback was that it required a greater amount of work than was normally assigned; therefore, they tended to concentrate on completing the specific tasks for the assignment in order to finish and achieve a good grade on the project. One student (who rated it a 3) indicated that she "learned stuff but I concentrated more on just getting the work and criteria in," which was reflected by another student who expressed that the project "was alot [sic] of stuff to learn in a little time." Finally, the student who rated this project a 1 stated that "finding images was very time consuming," and that "the directions were not as direct as I would have liked."

### **Time Consuming**

Despite the availability of primary and secondary sources for students on a Web site developed by the researchers, many students spent a significant amount of time searching for images using search engines and electronic encyclopedias, particularly Google images (<http://www.images.google.com>) and Wikipedia (<http://www.wikipedia.com>). These sites were often the first place students sought information about and images of World War II. Researchers as well as the teacher had to remind students that there had been a Web site designed to provide them with resources to complete their Web site development class.

To understand student reluctance to use the provided Internet resources, the researchers asked why students were seeking other sources of information than the class Web site. Students responded: "I want to find my own pictures," "I like looking for pictures. It's fun," and "I always use this [images.google.com] to find pictures when I do projects for school." These explanations were reinforced by teacher feedback. For example, one student who had independently located all of his images was praised by the teacher who in previewing his Web site stated, "You deserve the award for the best images." Student comments reflected a desire for autonomy over project images as well as a dependency upon approaching tasks using the same strategies to which they had become accustomed.

It should be noted, however, that the students who utilized the class Web site for images and information—approximately half of the class—progressed more quickly through the project and were able to spend more time interpreting images and understanding what happened in World War II than did their peers who had spent too much time searching for resources. The student who was praised for his images became so obsessed with finding just the right pictures for each page that he did not complete the project. He complained in the follow-up interview that "it was difficult to find good pictures" and that "searching for pictures took a lot of time."

Along these same lines, students were asked what they liked the most and the least about this project. Based on students' overall rating of the project, it might be presumed that there would have been a larger degree of positive comments from the nine students who rated the project a 4 or 5, and contrarily, the six students who rated it a 3 or less might have had more negative comments. However, comments from both groups of students reflected that a break with the teacher's traditional pedagogical approaches was well received by both sets of students. Specifically, four students noted that they enjoyed the opportunity to work with digital images. One student who rated this project a 4, wrote that "some of the pictures were awesome." A student who rated it a 3 welcomed "using photos to explain our pages," and the student who rated the project a 1 noted that the best part was "finding cool propaganda posters."

Similarly, students in both groups expressed satisfaction with the project in terms of giving them, in the words of a student who rated the project a 3, "a chance to be creative." Five students agreed. One student who rated the project a 4 liked "how much freedom we had," and another student who rated it a 4 expressed satisfaction that he "was able to go at my own pace so I did not get bored or fall asleep."

In terms of the worst part of the project, themes carried across both groups as well. For example, four students (two in each group) commented on technical issues regarding Web site development, with an additional five remarking that they disliked having to explain why they chose certain images. Further, this inquiry learning environment was not without frustration and resistance, as some students complained that it "required me to think" and students were accustomed to a pedagogical approach described by Ms. Treece as, "You think for me so I don't have to." This was reinforced by Kevin (a pseudonym) who expressed that he "like[s] to have exact directions...because that's the way it's been for eleven years."

### **Comparisons Among Student Achievement and Enjoyment**

In order to fully understand the ratings and comments of students, it is necessary to contextualize the survey data in terms of their previous achievement level. The grades for these 15 students prior to the World War II unit are listed in Table 1.

**Table 1**  
*Student Achievement Comparisons with Student Enjoyment Ratings*

<b>Student Achievement</b>	<b>Students who Rated Project 4 or 5 (n = 9)</b>	<b>Students who Rated Project 3 or Less (n = 6)</b>
Overall Average	72.44 (SD = 20.72)	75.50 (SD = 22.88)
Test Average	72.72 (SD = 15.81)	82.58 (SD = 6.11)
Reading Quiz Average	56.85 (SD = 24.52)	56.23 (SD = 44.34)

These data demonstrate that both groups of students had a nearly identical reading quiz average, and that their overall average was within 3 points. However, the test average of the students who rated this project a 4 or 5 was nearly 10 points lower than the other group. It should be noted once again, however, that all tests in Ms. Treece’s class were given in a multiple-choice, fact-recall format.

In order to discover other differences between the groups, it is helpful to discern data on student performance on this particular unit. As Table 2 demonstrates, students who rated this project a 4 or 5 achieved higher scores on the Web site than the students rating it lower, but worse grades on the World War II test. These data show a clear disparity between achievement on the Web site and on the World War II test. This inconsistency may be further examined by analyzing student perceptions of whether (and how) this project helped them to learn about World War II. All 15 students were asked this question; each answered in the affirmative. However, the subsequent question inquired as to *how* they learned, and it was in this question that differences could be found in the two groups.

Five of the nine students in the group rating the project a 4 or 5 described this learning as being reflective of an inquiry-oriented pedagogy, while five out of the six students rating the project 3 or less described their learning as being more rote in nature. For example, one student in the group rating the project a 4 or 5 stated, “I had to know what I was typing [and] it wasn’t just reading something,” while another wrote, “We got to see other views of World War II rather than just the book and [the teacher].” One student who rated the project 3 or less expressed that the project “helped me learn not understand. Learning and understanding are 2 completely different things.” Another articulated that “it covered all the events in the war.” Also, the test scores improved by nearly 4 points in the group that rated the project a 4 or 5; however, there was a slight decrease in test scores (less than a point) for those that rated the project 3 or less.



**Table 2**  
*Student Achievement on World War II Unit Comparisons With Student Enjoyment Ratings*

<b>Student Achievement</b>	<b>Students that Rated Project 4 or 5 (n = 9)</b>	<b>Students that Rated Project 3 or less (n = 6)</b>
Website Scores	92.78 (SD = 6.11)	91.83 (SD = 11.71)
World War II Test Scores	76.11 (SD = 15.54)	82.50 (SD = 6.58)
Previous Test Average	72.72 (SD = 15.81)	82.58 (SD = 6.11)

Despite these benefits, students who were engaged in inquiry learning scored lower on the standards-driven unit test than their counterparts who received traditional instruction. Although the inquiry-oriented environment improved access to curriculum materials, access did not equate to improved student achievement and understanding of the content for all students. Many of these students were enthralled with pictures they found, but could not make sense of these other than that the images were intriguing. As a result, some were not able to make connections to the content they were studying and the primary source materials they encountered without pedagogical intervention. When students were able to converse with the teacher about primary source images they were able to have a better understanding of the impact of World War II. However, this understanding did not occur independently, as most students lacked the cognitive skills and background information to make sense of primary source materials. This limitation may have attributed to the lower achievement of students in the test group.

Nearly every student reported having enjoyed the Web page development, and the majority scored an A or B for their project grade. However, neither enjoyment nor high achievement on this performance task necessarily translated into high scores on the unit test for the test class. Disconnect between the project and summative assessment performance may be attributed to the pedagogical differences that students encountered in the test group. For example, on the day of the unit test a student asked Ms. Treece, “If we didn’t do anything beyond that project, are we going to do well on the test?” She responded, “I have many students who do all the readings and attend class, but still make 60s on the test.” Ms. Treece continued, “Test: This is goal 10. I know that we have had an unconventional last few weeks, but remember the rules about tests.... No down time when you are finished [with the test]. You have to go back to the old style of doing notes. You’ll need to write notes on your own. I have activities planned for tomorrow and I don’t want to have to give you lecture notes...”

**The Teacher’s Perspective**

Ms. Treece’s hesitations about the nature of the project were emphasized both during the project and in her follow-up interview. Although the design and development of Web sites was taught using content-related materials, much less content was covered on the first day of the project than Ms. Treece had used in her traditional pedagogical methods, as the thrust of that day’s lesson was on technical components rather than on history content. After the second day of the project, she very strongly considered abandoning it, as she did not feel her students were learning the content that needed to be covered according to the

pacing guide, she reconsidered after we modified the assignment by including more fact-based content.

Ms. Treece, in a reflective evaluation of the project's success during the follow-up interview, commented that she would definitely restructure this project if she were to use it again. She said there needed to be much more structure for students to understand what "they need to know for the test." In discussing student performance on the unit test, Ms. Treece indicated that she was not surprised by the lower grades of the test class and said "It's hard when they are not getting lecture."

She insisted that students could not learn without her help. As an example, she described how Danny (a pseudonym) was adversely affected by the project. Danny's unit test score (71) was significantly lower than his test average ( $M = 90$ ).

Danny also was the only student who strongly opposed doing the project and noted much dislike for the task. Ms. Treece continued, "Danny does only the bare minimum. He is a minimalist. He is capable of doing, but is dependent upon me for content. He has this mentality of "you think for me so I don't have to." Danny just sits back in class and enjoys the show. When I call on him, he knows the answers. He is very bright and scores well on all tests, but won't learn without me.

Ms. Treece's follow-up interview suggested that technology requires a different way of thinking and learning. Her initial perception that students were not learning as many facts as they normally would may have been correct. She noted that students in the class with technology were "able to learn about WWII in more detail, study stuff they wanted to learn more about such as rationing, the Holocaust, 'Wreathes', and effects on the Homefront...and had more 'aha moments.'"

The control class received more prescriptive content instruction in a more teacher directed approach and were, according to Ms. Treece, better prepared for the summative test. However, in addition to the lack of factual comprehension among students, a major drawback of this inquiry pedagogy was that it was very time consuming, as she felt as if her students would be rushed to finish a future project of this type in the few days that her pacing guide allows for each unit.

In this study, inquiry pedagogy impacted student achievement, but it was not as visible as a significant jump in test scores. Despite these drawbacks however, particularly her skepticism about students' ability to learn without her intervention, Ms. Treece said that she would definitely do the project again because, "students really enjoyed the project and they were able to creatively work with content."

### **Implications and Recommendations**

Although the quantitative results did not indicate significant improvement in student grades, qualitative results showed positive gains in student learning. The overwhelming majority of students (14 out of 15, or 93.3%) indicated that they at least somewhat enjoyed the project. However, skeptics of technology use will invariably say "So what? Students had fun. But did they learn?" It is important not to ignore the motivational benefits of having students engaged with the task as well as content, as the latter is foundational to improving student historical understanding. Pedagogical methods that can help students interpret content while improving self-efficacy are essential to impacting student learning. However, this is a skill that needs to be taught and developed over time and not necessarily a task that can be accomplished during one singular unit of

study. Students have to be trained to think independently before the benefits of inquiry learning can be maximized. Even though this approach can offer instruction that is more visually appealing, interactive, and engaging, it cannot take students' learning to a higher cognitive level without teacher scaffolding, which is similar to the findings of Saye and Brush (1999, 2006). The results also reflect Milson's (2002) study, which found that students of dissimilar academic abilities may undertake inquiry activities differently.

Comparisons between student achievement and enjoyment suggest that enjoyment did not translate into higher academic achievement. Motivation for engaging with a task should positively affect student learning. Contradictions in these data call into question the nature of the assessment. The assessment used for this unit followed the same format as all other assessments for the entire course, as all unit tests are departmental tests and always contain multiple-choice questions derived from a departmental testbank. Although the pedagogical format for the task for World War II changed, the assessment did not.

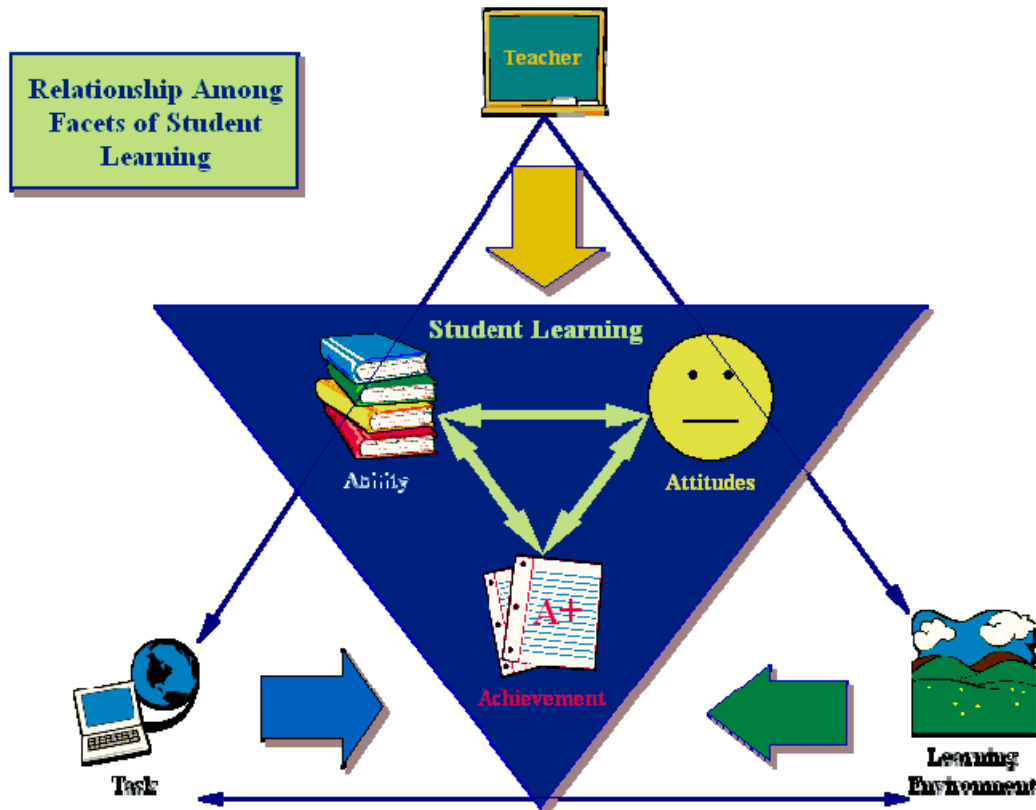
Given that the students identified pedagogical differences in the World War II project, one conclusion that can be drawn is that the assessment did not align with the nature of the task. Each student learned, but a reason success was not "translated" was that the test required a different way of thinking than the type of thinking required by the technology-based project. From an instructional design perspective, this is very important, as the evaluation measure did not reflect the teaching methodology and unravels a critical component of technology integration: Although technology may help to bring about inquiry-based teaching and learning, assessments must reflect this pedagogical divergence as well.

Thus, lower student achievement can be attributed to shifts in pedagogy evoked by technology. These limitations are further explained by qualitative data indicating student frustration and often resistance to inquiry-based learning, because it "required me to think," while students were accustomed to a "you think for me so I don't have to" teacher-oriented pedagogical approach.

This study also suggests that technology has limited benefits and possibly a negative impact on student achievement when it is used for a single unit of study and is not integrated as a common and familiar pedagogical tool. A different type of instruction and learning took place, and there can be little argument that students learned. However, what students learned could not be found on the test, as they learned such tasks as asking questions to themselves as well as the teacher while analyzing and evaluating primary and secondary sources in order to develop a Web site. Clearly, engagement in this type of inquiry learning was a foreign approach for many students. Thus, lower student achievement can be attributed to a shift in pedagogy that redefined the learning environment.

These data reveal the complexity of student learning. Student learning is not just achievement but is an interaction among many variables. We depict student learning as a circular-flow type of relationship among internal and external variables to impact overall learning outcomes, where equitable interaction between all facets are necessary to ensure student learning (see Figure 1). The inner triangle represents the internal facets of student learning, which are a composite of student ability, attitudes, and achievement. The deductive orientation of the triangle explains student achievement as an outcome of the relationship between student ability and student attitudes, which are positively impacted through increases in student skills while impacting student self-efficacy as byproducts of improvements in academic achievement. For example, if a student enjoys a task and possesses familiarity with the skills needed to accomplish the task, then there is

a greater likelihood of the student being successful on the evaluation of the task. Positive achievement then improves student self-confidence and skills. The outer elements are external facets of student learning and include the teacher, task-orientation, and the learning environment. The teacher is at the top, as the teacher is the greatest determinate of student success. The teacher creates the task and builds the learning environment through pedagogical decision-making and, as described by Thornton (1991), is the “gatekeeper” in terms of what is allowed in, or taught to students (p. 237). A reciprocal relationship exists between the nature of the task and the learning environment, which are important determinates of student learning.



**Figure 1.** Diagram of relationship among facets of student learning.

Breaks in the interactions among these variables create gaps in learning outcomes. As evidenced in this study, a technology-rich inquiry-based learning environment increases student motivation for learning content and engagement with content. Students in this study were motivated to learn and possessed the technical skills to accomplish the task; yet, this environmental change did not transfer to achievement outcomes. Changes in the learning environment or nature of the task cannot significantly impact student learning when the teacher’s pedagogical approach and assessment strategies do not train students for the skills needed for success in an inquiry-based learning environment. The conditioning of students to a “you think for me so I don’t have to” mode of learning, reinforced by evaluation measures, creates a pedagogical paradox engendering gaps in student learning. To repair these gaps, a pedagogical interface that supports and contextualizes content understanding is necessary.

Although students in the test group seemed to enjoy the task, we wonder whether they would enjoy it as much if it was not such a break from the ordinary. In other words, if this type of instruction was provided over a few units, would it be as much fun? Also, the fact that there were three licensed social studies teachers in the room should not be overlooked. Because nearly every student had individual questions, with the researchers being participant-observers, not only were questions answered more rapidly than if Ms. Treece was on her own, but if students were “stuck,” there was a much greater likelihood that they would not go off task.

In order to address these issues, we are in the process of developing a Digital Literacy Tool (DLT). This is an Internet-based catalogue of primary sources, thematically organized and searchable, accompanied by specific directions of how to break down sources and make meaning. Each source is supported by scaffolding questions that serve as a pedagogical interface (Lee & Clarke, 2003) to guide student interpretation and highlight contextual information, such as historical facts about the time period, geography, people, and cultures. We hope that this resource will address the issues of time and standardized tests. Because the DLT will contain guided questions for each source, it will be a more efficient use of time, as students will be guided as they analyze primary sources. We also hope that it will discourage copying and pasting of text, as students will answer questions in order to demonstrate actual understanding. Perhaps most importantly, by contextualizing content students may be better able to excel on fact-based standardized tests. Primary sources will no longer be analyzed in isolation, but instead among other pertinent facts, and as a result a coalescence will begin to form between technology-rich, inquiry-based instruction and a fact-based high stakes testing environment.

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**Appendix A**

**Student Questionnaire**

**WWII Webpage Scrapbook Project Evaluation**

1. Did you like the project? (Circle the number that best represents your feelings about this project.)

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Hated it!	A Little	Somewhat	A lot	Loved it!

Why did you select this rating? Please provide specific examples.

2. Did you like learning about WWII? (Circle the number that best represents your interest in WWII.)

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Hated it!	A Little	Somewhat	A lot	Loved it!

Why did you select this rating?

3. Do you think the webpage scrapbook project helped you learn about WWII?  
**Yes** or **No**

If you answered **yes**, how did the assignment help you understand WWII?

If you answered **no**, please explain why you think the project was not helpful.

4. What was the best thing about this project? Explain your answer.
5. What was the worst thing about this project? Explain your answer.
6. Would you like to do this kind of project again? **Yes** or **No**

Please provide reasons for your decision.

## Appendix B

### United States History Pacing Guide - Unit 10 Syllabus American Vision - Chapters 24-27

**Goal: World War II and the beginning of the Cold War (1930s-1963)** - The learner will analyze the war's influence on international affairs in following decades.

#### EOC Objectives:

10.01 - Elaborate on the causes of World War II and reasons for United States entry into the war.

10.02 - Identify military, political, and diplomatic turning points of the war and determine their significance to the outcome and aftermath of the conflict.

10.03 - Describe and analyze the effects of the war on American economic, social, political, and cultural life.

10.04 - Elaborate on the changes in the direction of foreign policy related to the beginning of the Cold War

10.05 - Assess the role of organizations established to maintain peace and examine their continuing effectiveness.

<u>Date</u>	<u>Obj.</u>	<u>Notebook</u>	<u>Topic</u>	<u>Reading</u>
4/25 (T)			4 1/2 Week Test	708-712
4/26 (W)	10.01	54	Causes of WWII	712-718
4/27 (Th)	10.02	56	U.S. Entry into World War II	725-730
4/28 (F)	10.03	55	Holocaust	719-724
5/1 (M)	10.02	57	War In Europe	742-747
5/2 (T)			No School – Election Day	
5/3 (W)	10.02	57	War In Europe	755-759
5/4 Th)	10.02	58	War in Pacific	764-772
5/5 (F)	10.02	58	War in Pacific	742-745
5/8 (M)	10.03	56	Home Front	749-754
5/9 (T)	10.04 10.05	59	Origins of the Cold War	778-782
5/10 (W)			<b>Unit 10 Test</b>	

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