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Critical Thinking in and through Interactive Computer Hypertext and Art Education

by Pamela G. Taylor

Computers and technology are an integral component of human lives both inside and outside of school. From e-mail communication to Internet shopping and from grade reports to academic research, computers and technology have altered approaches to living and learning. In turn, as a result of their experience with computers and technology, students today often have different expectations of schooling than their counterparts did in the past. Because of the wealth of information available to them on the Internet and the speed with which they make discoveries with technology, students today are more likely to be accustomed to a faster paced way of learning than what they witness in traditional classrooms; they may also demand more choices, more relevancy, and more ways to connect what they are doing in school with their lives outside of school.

If indeed computers and technology have altered the way many students perceive the learning process, there are apparent implications for approaches to teaching with technology as well. Rather than simply using computer-aided activities to transmit traditional forms of knowledge, instructors now have new opportunities to create activities that facilitate vital forms of critical thinking and analysis among their students. Rather than perceiving their students as mere consumers of knowledge, instructors can utilize new technological resources to help their students construct and actively reflect upon the knowledge they gain in their courses.

This is particularly true in the case of hypertext as a potential learning tool. While the term "hypertext" can be generally applied to the World Wide Web at large, the term can be applied more specifically to any computer program or application that involves linking and connecting or "new windows of text that expand on a topic when the user clicks a 'hotlink' word or icon" (Thorsen 2006, 13). For example, the emergence of varied software packages such as [Inspiration](#), [PowerPoint](#), [Storyspace](#), and [Tinderbox](#) has provided a range of options for educators seeking to adapt hypertext functions to specific learning contexts and thereby foster critical or analytical thinking skills among their students.

In this article, I briefly outline some pedagogical principles that have special relevance for the effective use of hypertext technology in educational settings; with these principles in mind, I then describe some of the ways in which I have employed hypertext technology to promote student learning in two high school art education courses. In doing so, I illustrate some of the ways in which hypertext technology shifts traditional power relations in the classroom, thereby promoting a form of active, self-reflective, and critical learning that would not have been available in more traditional models of instruction.

Critical Thinking Skills and the Role of Hypertext

Critical thinking advocates (Jones et al. 1995; Paul, Elder, and Bartell 1997; Perry 1999; Ennis 2002; Lampert 2005) describe the critical process of thinking as recognizing differing viewpoints, being analytically reflective and driven to expand sources of information, and generating careful and meaningful questions in order to formulate plausible hypotheses and conclusions. In turn, Freire and Macedo (1987) criticize traditional curriculum models that treat knowledge as a mere set of objective facts to be taught or deposited in the heads of students; instead they argue that it is only through the reciprocal process of contemplation, connection, questioning, and interaction among teachers and learners that genuinely critical knowledge comes into being. Although the original study by Freire and Macedo and other publications generated by this study give primary emphasis to social and political forms of critical thinking, the co-learning aspects of their theory—in which the teacher and student learn from each other—are particularly suited to a hypertextual approach to teaching and learning. A co-learning approach to hypertext expands critical thinking to involve

the linking and cooperative critical examination of beliefs, viewpoints, information, questions, research, ideas, and assumptions (van Gelder 2001).

With respect to particular technological applications, the capabilities of such a hypertext application as [Storyspace](#) make it particularly well-suited as a tool to support critical thinking. This hypertext computer software provides three overviews of a constructed web (chart, outline, and map view); readers and viewers can see, access, or comment directly on any or all areas of the web in each of these three views. The map view is a graphic representation of the web in the form of colored squares, rectangles, or boxes as well as arrows that represent the links between them. The boxes, squares, and rectangles designate notes or "writing spaces" that may contain written text, internal links to other writing spaces within the web, and other forms of data such as images, sound, and links to external Web sites. Unlike note cards, books, or papers, this hypertext medium enables the creation of visual links or relationships between thoughts, ideas, images, and parts of images. The changeable nature of such writing spaces thus provides users a site for continual redirection in the process of thinking, interpreting, and responding; by following paths throughout the hypertext web, readers and writers can track elaborate thinking processes with greater precision while having the opportunity to add challenges, questions, comparisons, and new associative paths directly via new writing spaces that can be accessed by a mere click of the mouse. As such features of Storyspace challenge readers to change the structure of the original web and make it more than it was before they encountered it, the application lends itself well to the co-learning approach to critical thinking advocated by van Gelder (2001) as well as Freire and Macedo (1987).

Although I do not equate critical thinking per se with Freire and Macedo's idea of raising critical social and political consciousness, the idea of recognizing multiple viewpoints as a component of critical thinking via hypertext can often have social and political implications. As the following account will indicate, for example, some of my students' work addressed issues of capitalism and consumerism in its exploration of art; other student experiences that are not shared directly here also addressed questions of personal and social control (Taylor 2000). In the process of exploring the interconnective nature and capabilities of computer hypertext through guided practice, students have greater opportunities to discover, interrogate, and analyze the links that exist between the object of their study and the broader social world that informs their object of study (for further discussion of hypertext and critical thinking, see [Exhibit 1](#)).

Hypertext in Art I and Art II: A Case Study

In a two-year study (Taylor 1999), 170 high school students linked their art class work and experiences in computer hypertextual webs. A fine arts elective selected from courses in visual art, drama, and or music was required for graduation from this high school. The Art I class was an introductory course in art history, technique, and manipulation of media. The Art II class, known as Art and Design, had a prerequisite of Art I and involved students in a more in-depth study and practical application of two-dimensional art. Advanced Art (Art III and IV) was more individually designed with particular attention paid to a student's chosen style, media, and career or higher education goals. Through student participation in the creation of hypertextual spaces, the students and I aimed to explore the ways that the linking features of computer hypertext enabled them to connect and thereby expand their educational experiences in ways that were not possible in traditional curriculum models.

Communal Web Constructions

In Art I and II, I introduced the notion of hypertext to the students through a discussion of a work of art. Once I saw students' eyes wander, I stopped and asked them what they were thinking about and what in our discussion caused them to think that way. We then drew a chart of sorts on the board with the original discussion as a block or circle and the wandering thought connected with an arrow. On the arrow, we wrote the context or reason for the link. We continued this activity with a variety of questions generated by our discussion. Questions were then linked to possible ways to find the answers. This exercise visually demonstrated the ways that learning and knowing can be personally constructed. It also involved the

students directly in challenging their ideas that learning occurs in a singular and neat linear format. Through the cooperative construction of a tangled web of lines of arrows on the board, the students and the teacher began to become comfortable with the idea that discovery, learning, and knowing occurs in multi-linear directions.

Hypertext Templates

As a further step to introduce students in Art I and Art II to hypertext web constructions, I created a computer template for them to modify in a preliminary exercise ([Exhibit 2](#)). I scanned and placed graphic images of the works of art that we studied in class and placed them in the hypertext web template on the computer. I also created boxes for the students' journal entries and art. Once the students completed the prescribed templates and had a base from which to work, they were free to create links and add other personally important information. Beginning any new way of working is a difficult task for even the most technologically savvy student. The template became a working tutorial of sorts for both the software and the linking/associative process of hypertext.

Once students became more involved in the process of adding and connecting their own images, ideas, and discoveries, the linking component and visual interface of the software inspired and indeed provoked them to more critically analyze, explain, and propose new relationships and meanings among the objects of their study. In other words, the visual interface of the software enabled them to contrast and compare ideas and information in boxes directly on their computer screen. As they saw similarities, connections, and possibilities for further research or reflection through these comparisons, they were able to immediately create visible links with the hypertext software. In so doing, the students looked more deeply at the information, reflected longer, and created more personally meaningful links and notes than they did in their previous ways of working in art in which they simply took notes in a linear fashion.

Group Assignments

The larger Art I and Art II classes worked together in groups to create hypertextual responses to their art study, and the students' communal hypertext webs became part of every lesson and unit. The students were required to use their hypertext webs for continual review and reflection of our studies in the art class. Following each unit of instruction, students were required to perform several activities ([Exhibit 3](#)). These activities were used as initial connective challenges to involve students in inquiry practices that through analysis and reflection could reveal some of the many ways that the students' study in the classroom could be connected to their other realms of experience. In this way, for example, the students were responsible for seeing and explaining how an art class topic such as consumerism in the art of Andy Warhol was related to their responses to television commercials they watched at home. Students were free to organize their webs in whatever ways they deemed appropriate. Some created boxes or notes that represented each specific theme studied in the class and then placed other boxes or notes within these spaces so that all their research and writing for each theme would open on separate screens. Other students did not feel the need to organize their webs and simply placed everything on the same screen creating a mass of boxes, lines, and arrows. These varied organizational approaches demonstrated that the students were moving beyond the original template and becoming comfortable with visually demonstrating the interconnective ideas and ways of knowing they were seeing in and through computer hypertext.

Critical Reflection

Throughout the process, students formulated questions for further inquiry and challenged each other to discover answers, find other connections, and analyze and reflect upon their choices as well as their interpretations. For example, Bobby asked Ben why his original drawing—an appropriation of Wood's *American Gothic*—included images of dollar bills coming out of a refrigerator. Ben answered by creating links from his drawing to a note that contained information, ideas, and his personal reflections concerning capitalism and consumerism. Bobby responded with his own concerns that capitalism and consumerism are

the cause of society's somewhat apathetic view of such environmental issues as overflowing landfills. Bobby then linked this space to artist Rebecca Howland's installation entitled *Environmental Place Setting* that featured a dinner table filled with ceramic money bags, hazardous barrels as drinking glasses, and plates that feature drawings and text reminding the viewer of the effects of toxic waste on our environment. Ben linked their discussion of capitalism and consumerism with a box containing images of Andy Warhol's soup cans and explained that this link inspired them to research more of Warhol's work ([Exhibit 4](#)).

In addition to conducting hypertextual discussions with each other, the students invited me, their teacher, to participate by creating a teacher comment box in their hypertext web. I typically read and commented in the students' hypertext webs weekly and discovered many possibilities for my own learning as well as opportunities for future class topics or themes. For example, one student brought in a music video by Rage Against the Machine as a result of our study of artistic appropriation techniques (Taylor 2005). Following his presentation of the video *People of the Sun* to the class, many of his classmates wrote about the varied images they saw in the video. They posed questions, made comments, offered interpretations, and made links between this discussion and other areas in their hypertext web ([Exhibit 5](#)). Through the hypertextual study of a music video the students were teaching me, their teacher. They were empowered to open and design the curriculum and become "masters of their thinking by discussing their own ideas and views of the world" (Freire 1994, 105). This empowering way of thinking and knowing also may be linked to Freire's idea of critical consciousness in that the students were involved in actively challenging and altering an implicit political infrastructure—the curriculum itself. In the process, they were restructuring the fundamental dynamics of what counts as knowledge in the art class (for a detailed summary of strategies for using hypertext to promote critical thinking, see [Exhibit 6](#)).

Assessment and Evaluation

I approached grading the hypertext webs in several different ways throughout this study. Challenging students to offer suggestions in grading themselves and the other members of their team, for example, helped to ensure that students who added little or nothing to the web were not successful in class. However, the quantity of information that a student provided through additional notes and links was not always an accurate measure of that student's hypertextual thinking. Therefore, in my assessment I looked for concrete answers, meaningful and significant links, and evidence that the students had approached the hypertextual constructions in an intertextual way. I looked for evidence that students not only completed the directions but that they had thought about what they were writing in their web; I looked for indications of growth in their thinking, of their ability to offer clearly established connections, and of their inclination to take what they had learned in the art class and apply it to other areas of their experience (for information on the final exam, see [Exhibit 7](#)). During the grading process, I also noticed how students informed and taught me at the same time that I evaluated how much the students learned. As a result of this assessment experience, my purposes as a teacher began to change. I began to see myself more as a co-learner, actively engaged in learning both with and through my students' experiences (Freire 1994).

Ultimately, I decided to take yet another step in the grading and assessment process. I challenged my students even further by explaining that a portion of their grade would be based not on how much they learned from me, but on how much I learned from them. This proclamation became empowering for everyone: I, as the teacher, was humbled and honored daily by the wealth of information my students brought to the class, and the students were excited that their teacher was interested in the ideas and research they were engaged with outside of class.

Granted, this study took place for only two years, but I learned a great deal from my students during that time. They revealed historical and contemporary sources and ideas that I did not know. They shared ideas and interpretations that were based on their own beliefs, their other classes, and other media such as television, film, and music. Most importantly, they reaffirmed the idea that learning is limitless and is something we do or should continue to do throughout our lives. As Elizabeth, a student involved in this study, observed in a classroom discussion: "We just can't know enough anymore." Elizabeth's comment may exemplify the kind of

student we as teachers often feel that we can only dream to have. In this case, Elizabeth was one of many students who, because of the way their hypertextual experiences provoked interconnective ways of thinking, began to see and indeed require that their learning be an enduring and exciting process limited only by their imagination. Also, the fact that they were learning with their teacher empowered them to move beyond and alter the prescribed curriculum in innovative and meaningful ways.

Summary and Implications

The hypertextual experiences described in this study did not simply involve the use of computers. The students used the computer to research, think about, analyze, challenge, and critically connect their studies. Because of the hypertext webs, the students were able to critically see how their discoveries could be connected with other aspects of their schooling and lives. My own view of teaching and learning was challenged again and again by the students' hypertextual experiences. The discovery and the struggle that resulted were all part of the process of growing, learning, and knowing. One student, Ben, summarized his hypertextual experiences as follows:

With hypertext, it is a deeper kind of thinking than I would normally do. Like in biology, I never remember the stuff I take notes on. But, creating the web myself, instead of just taking the teacher's notes, is more fun. I am linking and researching something I am interested in. Art is a great class to start this. Everything can be connected to art more than to science or math, you know. I think it's great that we are teaching you (the teacher) for a change. It's a different way of thinking about school. I don't think I could go back because it's part of me now. Some of my friends and other teachers don't like it because I don't accept everything anymore. I ask them too many questions now, they think. But, you have to look deeper into stuff. I think that is what this hypertext thing is about—looking deeper. I really think you have to. Because if you don't, you can't really know.

Put simply, students began to think about their thinking as a result of their hypertextual experiences. As they saw the connections between history, ideas, art, and popular culture, they created electronic links; as they created links, their thinking became more complex and critically reflective so that they could explain the significance of those links. The more they worked on their computer hypertexts, however, the messier those hypertexts became. Opening a student file and finding a computer screen filled with a dizzying array of lines and arrows amidst many boxes often disoriented readers ([Exhibit 9](#)). However, as Caine and Caine state, "We are meant to learn from naturally complex and 'messy' experiences" (1997, 11). As Spiro et al. (1991) call for a form of cognitive flexibility in teaching and learning that emphasizes the inherent complexity of expanded critical thinking, students' "messy" hypertexts were indicative of the complicated process of meaningful learning. Throughout this study, the more links students made in their hypertext constructions, the more they wanted to find and create. Working in a hypertext environment promotes such complex, multilinear, and intertextual learning dispositions because hypertext tools become catalysts for finding and making connections as well as reflecting upon the validity of those connections. Increased possibilities for such alternative and multiple ways of knowing intensifies the meaning and relevancy of learning, provoking greater student investment in the process.

By offering a way for students to discover new ways of learning, hypertext offers them new ways of redefining their human experience. Moreover, by allowing both students and teachers to rediscover that learning is not static but constantly in a state of change and growth, hypertext may provide the space, the site, and the tool for a [liberatory](#) struggle in our classrooms.

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