PRESERVICE ENGLISH TEACHERS ACQUIRING LITERACY PRACTICES THROUGH TECHNOLOGY TOOLS

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ABSTRACT

This study analyzes the uses of various technologies to enhance literacy practices within a multi-genre writing project involving pre-service teachers and middle school students. Twenty-seven English pre-service teachers, simultaneously enrolled in a methods and a technology course, collaborated with middle school students using asynchronous Web discussion to develop hypermedia projects that fostered and promoted the use of technology as a tool. These tools mediated the uses of various literacy practices within the larger activity system of teacher education, whose object is to assist teachers to acquire those practices involved in working effectively with students. Qualitative data were collected through analyzing preservice teachers' development of Storyspace ™ hypermedia projects, the use of asynchronous discussion with their middle school students, and participation on a WebCT ™ bulletin-board discussion. The hypermedia productions with middle school students helped the preservice teachers learn how to model the literacy practices of making intertextual or hypertextual links. The Web-based communication with students helped preservice teachers develop relationships with students in the absence of face-to-face interaction. And, through participation in the WebCT ™ bulletin board, preservice teachers employed different literacy practices ranging from the display of spontaneous thinking to engaging in word/role play.

LITERACY PRACTICES AND TECHNOLOGY TOOLS

A preservice teacher and a middle-school student are exchanging messages on a Web-based bulletin board about a biography project they are working on together on the topic of Princess Diana. The student posts the following message:

> Last night I went on the Internet and found alot of stuff like her will, and her divorce papers and some poems some people wrote about her. I also found some pictures of when she was younger.

The preservice teacher responds:

> Last night I bought a couple of books about Princess Diana that were on sale at the bookstore. One contains a bunch of short little memories of her written by all sorts of people that knew her in her lifetime. I will also print at least 2 articles from the Internet that will be helpful (not too long) for us to think about what we want to write about. See you Wednesday.

This on-line exchange was part of a project involving preservice English teachers working in a semester-long practicum experience with a group of middle-school students, a project that involved extensive uses of technology. Their on-line exchange entails uses of literacy practices such as sharing information and planning activities, practices central to a co-inquiry writing project. This project represents the increasing use of technology as a tool for linking adults with students in schools, an approach that is highly relevant to teacher education.

In many teacher education programs, in addition to their student teaching, preservice teachers are required to complete practicum experiences that involve minimal face-to-face interaction with students.

Technology can enhance preservice teachers' ongoing interaction with students, as well as providing students with positive learning experiences through technology. For example, in the "Fifth Dimension" after-school computer-mediated program operated by the University of California, San Diego, participation in an elaborate set of computer games and activities resulted in increased student engagement, participation, and learning within a community (Cole, 1999). In this program, University undergraduates serve as "wizards" who guide students through a "maze" of activities based on the students' zone of proximal development. Estes, Bronack, and Schoeny (1999) found when students and faculty use both synchronous and asynchronous discussions to communicate about topics within a given course, a "community of emergent professionals" developed along with positive "student-instructor relationships" that fostered growth within the class. In a graduate teacher education program at Ball State University, instructors wanted to move students from a passive into an active role in social communication within their classes and did so by utilizing asynchronous discussion. Eighty-eight percent of the students reported that online discussion helped them understand and master course concepts, and 93% indicated that the peer interaction was "very helpful" (Thompson & Nay, 1999). The asynchronous discussion page they employed increased the chances of student interactions as well as helping the students "dynamically establish a zone of proximal development anytime of the day by simply connecting to the page and asynchronously collaborating with others" (Thompson & Nay, 1999, p. 20). Through participating in these teacher/student exchanges, preservice teachers acquire strategies for interacting with students.

In addition to teacher/student interactions, preservice teachers need opportunities to share reflections with each other in a supportive context. Teacher educators are employing Web-based tools to foster online discussions between preservice teachers regarding issues faced in their programs or in the classroom. The Inquiry Page housed at the University of Illinois is designed to help teachers share teaching successes and collective expertise (Bruce & Davidson, 1996; Bruce & Easley, 2000). Teachers engage in mutual inquiry through their access to resources on teaching and learning, articles, project links, curriculum units, and content resources. Users of the site are themselves the developers who reconstruct the tool as they use it. Participants may share video, photos, graphics, and texts showing people engaged in inquiry in different settings, and access resources involving a dynamic incorporation (using Digital Windmill) of the Open Directory category on Inquiry Based Learning.

This site represents a new generation of Web design that serves the social needs of preservice teachers to mutually engage them in co-inquiry about problems, issues, or dilemmas. Research on uses of these sites indicates the importance of the quality of social interaction in this online co-inquiry. For example, Barab and Schatz (2001) analyzed the development of a Web-based learning site designed to foster sharing of inquiry-instruction ideas by Indiana math and science teachers in terms of the components of evolving activity systems. This Web site was initially designed as a tool by University educators to achieve the objective of more discussion/sharing about inquiry instruction, with the intended outcome being improved understanding of inquiry-based instruction. However, given the lack of participation, the University educators, along with teacher participants, shifted the focus of the Web site to emphasize participants' mutual collaboration at the site around inquiry-based math/science instruction.

Online interaction also has certain limitations compared with face-to-face interactions (Beach & Lundell, 1998). Analysis of interactions between teacher education candidates and supervisors indicated that online interaction was a "cool" medium in that it avoided the more direct exchanges of feelings inherent in face-to-face interactions (Clift, Mullen, Levin, & Larson, 2001). On the other hand, the anonymity inherent in such interaction allowed for more candid feedback than is often the case in face-to-face interactions.

While such research demonstrates the efficacy of technology tools in fostering or mediating problem-solving communication about specific tasks, for example, completion of student teaching, it is also important to recognize that through technology-mediated experiences, preservice teachers are learning

various literacy practices associated with literacy development in English instruction. It is primarily through active participation with technology as opposed to receiving instruction about technology that preservice teachers learn to recognize the value of technology tools.

In this report, we examine the various literacy practices that were fostered within a multi-genre writing project involving pre-service teachers and middle school students through the use of Web-based bulletin-board exchanges and hypermedia productions. We hope to demonstrate that technology tools can serve to mediate and foster the development of a range of different literacy practices within a teacher education program.

TECHNOLOGY TOOLS AS MEDIATING LITERACY PRACTICES

Social-cultural activity theory of learning (Cole, 1996; Engestrom,1987; Wertsch, 1998) posits that learning occurs through social uses of various tools: language, signs, images, and texts, as well as technology tools. Activity theorists believe that people learn the uses of these tools by learning how they are linked to the objects or outcomes driving a specific activity within an "activity system." Russell (1997) defined an activity system as, "any ongoing, object-directed, historically conditioned, dialectically structured, tool-mediated human interaction. Some examples are a family, a religious organization, a school, a discipline, a research laboratory, and a profession" (p. 510).

Central to activity theory of learning is the idea that these tools function to mediate the learning of literacy practices (Bruce & Levin, 1997). Students learn to use a range of tools to engage in these literacy practices. Work in the field of "distributed cognition" (Hutchins, 1995) posits that certain practices associated with an activity become embodied or "distributed" in tools. For example, navigational instruments are used to capture what is known about navigating the seas. They then serve as tools that guide a ship based on human knowledge about navigation. Similarly, expert computer systems are built on experts' knowledge about a certain phenomena such as diagnosing a particular disease. Tools are therefore used within an activity to function as extensions of certain practices involved in an activity (Vygotsky, 1978).

Defining Intertextual Connections Leading to Intermediality

One basic literacy practice involves defining intertextual links between texts. Intertextual links are used to define connections between language, images, characters, topics, or themes based on similarities in languages, genres, or discourses (Fairclough, 1992; Van Dijk, 1998). These links reflect connections associated with establishing and reifying institutional power. For example, characters in Dickens' novels employ discourses of mechandizing, law, religion, science, and government which evoke connections to the institutions represented by these discourses, what Fairclough describes as "interdiscursivity."

Intertextuality may also involve connections built on social meanings in which participants make intertextual links in order to build social relationships or connections (Bloome & Egan-Robertson, 1993). For example, participants in conversation may allude to shared experiences to foster a social bond or an insider reference to exclude others. Participation in on-line chat exchanges engages early-adolescents in using intertextual links to foster social interaction (Beach & Lundell, 1997; Lewis & Fabos, 2000).

Making intertextual links between disparate text types or genres helps students engage in what Semali and Watts-Pailliotet (1999) define as "intermediality": the ability to construct connections between different sign systems, concepts, and technology tools. Students are engaged in making intertextual links through multi-genre writing about a topic, an approach currently popular in secondary writing instruction (Romano, 2000). Multi-genre writing involves using a range of different types of genres -- reports, poems, letters, diaries, stories, advertisements, field notes, photos, drawings, and so forth -- to explore different aspects of and perspectives on a topic. Connecting these disparate genre types requires the

ability to determine how different types of texts yield different perspectives on the same topic or phenomenon.

One technology tool that mediates the practice of making these multi-genre intertextual links is hypermedia. Hypermedia functions as a tool by combining hypertext (texts linked together by multilinear nodes) and multimedia (photos, video, art, audio, text, etc.) to produce an interactive media experience for participants (Jonassen, 2000; Landow, 1997). Because hypertext allows participants to choose optional paths through multimedia, participants can both construct and respond to hypermedia interactively. Students often respond positively to hypermedia texts because it is consistent with their everyday experiences with multi-modal environments that combine images, animation, video, music, and texts (Beach & Myers, 2001; Myers & Beach, 2001).

Learning to produce and read hypermedia requires new, alternative ways of processing texts (Fastrez, 2001; Rouet & Levonen, 1996). In an essay about the pedagogical implications of this shift towards hypermedia, Bolter (1998) argues that hypermedia challenges the traditional emphasis in literacy instruction on understanding or producing unified, coherent texts based on a definitive, single perspective. He calls for teaching a "rhetoric of expectations and arrivals" (p. 10) that help students understand where certain links may take them and how they should respond to where they arrive. And, given the important role of graphic representations in hypermedia, he posits the need for often-marginalized art and video-production instruction to help students respond critically to images. These uses of hypermedia also require students to engage in what Kress and van Leeuwen (1996, 2001) have defined as new modes of verbal and visual communication, requiring an ability to know how verbal and visual texts function to enhance each other's meaning.

Producing hypermedia texts using tools such as Storyspace ™, HyperStudio™, HyperCard™, and various Web authoring programs, involves defining intertextual and hypertext links between a range of different types or genres of texts (McKillop & Myers, 1999; Myers, Hammett, & McKillop, 1998, 2000).[1] These tools serve to mediate the construction of intertextual and hypertextual links (Jonassen, 2000). For example, Storyspace™ (Bolter, Smith, & Joyce, 2001) provides users with visual maps of written and visual texts linked together with lines; produced hypertexts contain hot-links to other texts. Middle-school (McKillop & Myers, 1999), high school students (Beach & Myers, 2001), and college students (Myers, Hammett, & McKillop, 1998, 2000) employed Storyspace™ to represent their responses to literature through links between photos, music, video clips, and texts. Analysis of the nature and types of links constructed in these hypermedia productions indicated that the level and sophistication of links varied according to grade level and ability to engage in critical thinking, as well as the social motivation to construct these links within the classroom as an activity system. In one of the studies, 16 seventh graders and 18 preservice teachers used StorySpace™ to combine original poems, images, and QuickTime ™ movies to explain the various literacy devices used in poetry (McKillop & Myers, 1999). The types of links employed were analyzed in terms of their functions: An "iconic function" was used to illustrate another text, an "indexical function" was used to extend a text to show shared meaning, and a "symbolic function" was used to question the meaning of a text. Most of the seventh graders' links served as iconic illustrations of ideas in poems. There were far fewer instances of links reflecting critical analysis, for example, when students juxtaposed texts to generate contested meanings. The undergraduates were more likely to employ links serving a "symbolic function" that involved critical analysis of texts. This study suggests that users employ links for different purposes representing different levels of critical thinking.

Other research indicates that, with sufficient training, early adolescents are able to use Storyspace™ to construct relatively sophisticated links (Patterson, 2000) based on research on American history and culture (http://angelfire.com/mi/patter/america.html). Students created hypertext narratives with links to information about slavery. The results (http://www.npatterson.net/mid.html) suggest that working with

Storyspace™ shifted students away from simply rehashing information about persons to understanding people and events as shaped by historical and cultural forces.

Hypermedia can also assist in organizing links around central themes or topics in writing instruction. Analysis of first-year college writing class students' construction of hypertexts indicated that students structured information around central ideas and illustrated those ideas through links to other texts or graphics (Duguay, 1999). Using the hypertext as a tool helped students define links between diverse parts of their hypertext because the links made it visually easier to connect the ideas. Ryan (1999) examined college students' construction of hypermedia links using HyperCard™ to write a "Literary Journal" biography of an American author based on a range of different sources and information about that author's life, as well as comments on other students' work and supplementary material. In contrast to the essay format that often constrains exploration of alternative, conflicting perspectives, the hypertext format fostered exploration of alternative, conflicted perspectives about an author's life that resisted closure.

Analysis of the effectiveness of hypertext or hypermedia production requires going beyond comparisons of linear versus nonlinear productions to consider the particular contexts, user characteristics, design options, and types of tasks involved in the production (Rouet & Levonen, 1996). The quality and nature of hypertext links may be a function of participants' sense of the larger object or outcome driving their participation in an activity (Barab & Schatz, 2001). This suggests the need to examine hypertext or hypermedia production in terms of the larger context or activity constituting that production.

Posing Questions and Collaborative Exploration of Issues

Another literacy practice involves posing questions related to the collaborative, inquiry-based exploration of issues (Beach & Myers, 2001; Short & Harste, 1996; Smithson & Dias, 1996). In teacher/student journal dialogue exchange, teachers pose questions designed to encourage students to elaborate on their answers or explore other perspectives, modeling heuristics for exploring topics (Peyton & Staton, 1993). Over time, students internalize these questions and employ them in their own writing, resulting in increased elaboration in their writing. Synchronous computer-mediated written communication between middle-school students involved in responding to issues portrayed in stories fostered elaboration of responses in responses to peers' questions (Beach & Lundell, 1998). Students were also making intertextual connections to other texts and experiences that served to build social bonds between the students.

The success of these exchanges requires the ability to adopt a collaborative, exploratory stance that serves to invite mutual exploration from participants. This requires participants' willingness to be open to entertaining others' beliefs as valid and rational, something that Davidson (1984) refers to as the "principle of charity" (p. 126). As Porter (2001) notes, "because communicators cannot assume shared meanings, they must assume a shared world; if they assume that they share neither a language nor a world, there would be no possibility for communication" (p. 586). It also requires the ability to frame statements of beliefs or opinions as tentative hunches or hypotheses, what Davidson refers to as "passing theories" (p. 45). The concept of "passing theories" refers to the idea that participants are willing to modify their established "prior theories" to be open to entertaining and integrating others' beliefs into one's own beliefs (Dasenbrook, 2001). In classroom discussions of literature, when students framed a new topic in a tentative, exploratory manner, other students were more likely to follow up on that topic than when the topic was framed in a definitive manner (Beach & Phinney, 1998). In the middle-school students' synchronous computer-mediated classroom interaction (Beach & Lundell, 1998), as well as on AOL Buddy Chat exchanges (Lewis & Fabos, 2000), early adolescents learn to adopt a tentative, brainstorming stance; adopting a rigid, hard-line stance is often socially unacceptable in these exchanges. In preservice teachers' on-line discussions, how discussions are initially framed has a strong influence on the level of substantive exchange of ideas (Harrington & Quinn-Leering, 1996).

Adopting a collaborative, exploratory stance also involves recognizing differences in social status. Engaging in on-line tutoring requires preservice teachers to balance their status as authority figure with the need to establish a collaborative, working relationship with students (Brecke & Gebhardt, 2001). As Tannen (1984) notes, in this negotiation, participants may use conversation as "symmetrical," to maintain equal status, or, as "asymmetrical," to establish a dominant/subordinate relationship. On-line discussions serve to minimize some of the nonverbal aspects, therefore reducing "asymmetrical" status differences in face-to-face interactions (Walther, 1996). Differences in uses of "asymmetrical" practices may also be related to gender stances (Bergvall & Remlinger, 1996; Gonzales, 2001), with, in some cases, males assuming a more dominant stance (Kramarae & Taylor, 1993).

Analysis of differences in college students' engagement with synchronous versus asynchronous exchanges is that, without the time pressure to post messages immediately, participations had more time to reflect on their messages, resulting in longer, more thoughtful comments than in a synchronous mode (Reed et al., 2001).

One limitation of on-line exchanges in an asynchronous mode is that participants may simply post messages without explicitly seeking a response or reply, even when an instructor attempts to facilitate discussion (Topper, 2001). Or, participations may never receive a response or reply, leading them to opt out of the discussion. Without models of effective on-line discussion or a sense of obligation to participate in a discussion, participants may not engage in substantive exchange of ideas.

All of this suggests that the successful participation in on-line exchanges requires preservice teachers to employ the literacy practice of adopting tentative, exploratory stances and attending to status differences between preservice teachers and students.

Adopting Multiple Voices and Perspectives

Another basic literacy practice involves adopting multiple voices and perspectives through making "double-voice" intertextual references or evoking or mimicking the languages or styles from other texts or worlds (Bakhtin, 1981; Knoeller, 1998). Speakers and writers employ these intertextual references to establish social relationships and identities (Bloome & Egan-Robertson, 1993). Through interaction with others, participants construct identities by performing in ways that position them in relation to others' positions -- "it is in the connection to another's response that a performance takes shape" (McNamee, 1996, p. 150). As Bakhtin argued in his concept of "answerability," people's utterances reflect their relationships with others' potential, anticipated reactions to their utterances. In participating with a range of diverse perspectives and voices in a computer-mediated context, students learn to consider alternative perspectives different from their own (Taylor, 1992). The more open students are to experimenting with alternative ways of being and knowing, the more open they are to entertaining alternative values, as opposed to a rigid, monologic perspective on the world (Lewis & Fabos, 2000). Middle-school students engaged in synchronous exchanges employed parodies of peers, teachers, and school discourses, for example, mimicking the pedantic language of textbook "discussion questions" (Beach & Lundell, 1998).

This research indicates that a range of different literacy practices can be fostered through uses of technology tools. This raises the question as to whether technology tools associated with on-line exchanges and hypermedia production can be used to foster various literacy practices involved in a project in which preservice teachers were working with middle-school students.

PRESERVICE ENGLISH TEACHERS' PARTICIPATION IN A CO-INQUIRY MULTI-GENRE WRITING PROJECT

This research project examined the following questions related to preservice teachers' uses of technology tools to acquire various literacy practices involved in working with middle-school students in a multi-genre writing project.

The participants in this project were 27 preservice English teachers enrolled in a composition-methods course taught by Beach and an instructional technology course taught by Doering in the Fall Semester, 2000 at the University of Minnesota. Preservice teachers (hereafter "teachers") in the composition methods course learned various strategies for engaging in inquiry-projects and for teaching multi-genre writing. The purpose of the instructional technology course was to help teachers acquire a set of technology tools they could employ in teaching English.

In conjunction with these courses, participants were engaged in a semester-long practicum experience in a magnate middle school that draws a highly diverse student population from a wide range of both urban and suburban districts in the St. Paul, Minnesota area. The school curriculum is organized around interdisciplinary inquiry projects in which students are engaged in constructivist exploration of topics across different subjects. The students represented a wide range of socio-economic backgrounds and ability levels, with many students testing at a relatively low reading level. The teachers each worked during weekly visits with one or two students in each of two different class periods.

A Multi-Genre Writing Project

The teachers and middle school students worked together on a multi-genre project involving writing a biographical sketch, a newspaper report, and a narrative about famous people ranging from Martin Luther King Jr. to Princess Diana. They employed Inspiration™ as a tool for creating visual maps of different aspects of their writing and links between these aspects. They conducted research about their person using the Web and other sources based on questions posed about the person, generating information they used to write a biographical sketch. Students then wrote a newspaper article about some aspect of the person's life employing ClarisWorks™ to create a news article format. The project concluded with students writing a fictional narrative about their person in which they adopted that person's or another person's first-person point of view to describe some event in the person's life. This required students to imagine the person's subjective experience in an event, along with descriptions of dialogue; setting; and the person's feelings, attitudes, and beliefs about the event.

For the final presentations of their multi-genre projects, the students shared the results of their work in short 10-minute presentations in small groups. Students employed a range of multi-modal presentations acting out a scene from their lives, a skit, interviewing the person, a piece of art in the person's form, an overhead, slide presentation, news report/sportscast, and dramatic reading.

Hypermedia Production

As part of their instructional technology class, the teachers created their own hypermedia production based on their students' multi-genre writing. They used Storyspace™ (Bolter, Smith, & Joyce, 2001) as a tool to develop and link multimedia material within windows that can include or be embedded in other hierarchical windows. (Given the lack of access to computers in the middle school and the expense of the Storyspace™ software, the teachers, in discussion with their middle-school students, developed the hypermedia versions of the multi-genre writing at their University site. In an ideal situation, the teachers and the students would have developed the hypermedia at the middle school site.)

Constructing the hypermedia production to share with their students involved teachers in a constructivist approach to teaching in that they had to draw on the information about the individual to construct their own interpretation of the person's life through making intertextual links between texts, images, and sounds. This change in learning when using hypermedia sometimes causes problems as learners struggle to integrate information, themes, and stances into a hypertext document (Jonassen, 2000). To explore their knowledge as related to their audience, they initially developed concept maps using Inspiration™ to represent their knowledge prior to creating the hypermedia production. These concept maps were used as guides to help the teachers choose what links they believed were important as well as what types of media they may have wanted to employ (graphics, video, sounds) to represent their knowledge in StorySpace™.

The hypermedia productions were analyzed by the investigators in terms of the types of texts -- images, written texts, sounds, and so forth -- teachers included in their productions, as well as the types of links they employed in connecting these texts.

Web-Based Teacher/Student Communication

As part of a federally-funded technology-development program, an asynchronous Web-based teacher/student communication site was created to foster communication between the teachers and students during the time when they were not working with each other in school. To address potential security and privacy issues, the middle school students would click on the name of their assigned preservice teacher and then engage in conversation about their projects or personal matters. Only the pupils assigned to the teachers could access those particular teachers. Because the communications were asynchronous, teachers and the middle school students could post and respond to questions relating to their cooperation on the project at any time.

These exchanges served to create a sense of "situatedness," commonality, interdependency, and infrastructure essential for creating a computer-mediated community of practice (Hung & Chen, 2001). The middle school students and the preservice teachers were able to participate in the "sociocultural practices of a community" (Lave & Wenger, 1991, p. 29), as they were situated in a rich context of practice that involved sharing information about each other while working on completing the biography project. They were therefore sharing in a common activity that required their joint efforts in completing the project. They were dependent on each other: the students providing the materials for the projects and the teachers providing the technical support involved in the hypermedia production. And, they were operating within an infrastructure that involved a sense of accountability to completing the project.

Transcripts of the Web-based communications were analyzed in terms of the amount of participation as determined by the number of comments employed, defined in terms of a complete "thought unit," a procedure employed in research on on-line communication (Schallert, Reed, Dodson, Benton, & Boardman, 2001; Reed et al., 2001). Each "thought-unit" was defined as constituting reference to one particular idea or thought. A constant comparative method (Glaser & Strauss, 1967) was employed to guide the development of the significant categories and patterns in the data in terms of the types of topics discussed and the literacy practices employed. The types of topics and practices were then cross-checked with an experienced English teacher for further verification (Merriam, 1998). The interjudge-agreement rate was 92 % confirming the selection of the topics and practices.

WebCT™ Bulletin-Board Discussion

The teachers also participated in an asynchronous discussion on the course WebCT™ site. For this site, teachers were asked by the course instructor to make at least one posting a week; they were told that they could respond to topics or issues in the course discussions, readings, or practicum experiences, as well as other topics outside the course. Other than these minimal requirements, the instructor did not attempt to direct the discussion through specific assignments. The instructor hoped that through participation in this bulletin board exchange, students would gain some experience with uses of a bulletin board as a learning tool for use in their own future teaching. The instructor also hoped that the students would acquire an understanding of how writing is driven by social purposes or needs related to participating in a community constituted through a bulletin board exchange. Transcripts of the WebCT™ discussion were analyzed in terms of the types of literacy practices employed in the exchanges using the same analysis methods employed with analysis of the teacher/student interactions.

RESULTS

Hypermedia Productions

Development of the Initial and Following Nodes Analysis of the hypermedia productions based on the students multi-genre writing projects indicated that 80 % of the teachers began their multimedia development with a picture of the person with links to the "major nodes" or events of the person's life. It was these major events that lent themselves to links where the students explained the person in more detail using various media. For example, one student studying Martin Luther King, Jr. began his multimedia development with a picture of Martin Luther King, Jr. with four links underneath the picture leading to nodes about "Enemies and Resistance," "Awards and Supporters," "Biographical Information," and "Civil Rights Efforts." Each one of these four major nodes had a short written description that explained Martin Luther King, Jr.'s relationship to each node. In the "Civil Rights Efforts" node, the teacher developed five sub-nodes that described Martin Luther King Jr.'s efforts. These nodes were "Sit-in Demonstrations," "Passive Resistance," "Montgomery Bus Boycott," "Writings," and "Marches and Speeches." Within each of these nodes, the teacher used images, texts, or clips to represent the civil rights theme. Within the "Writings" node, the teacher listed and included writings from Martin Luther King, Jr.'s books. These writings were obtained through searching the Internet and incorporated within a separate "exploding" Storyspace™ node. To represent the "Montgomery Bus Boycott," the teacher decided to use a video clip she also obtained from the Internet. And to represent the "Passive Resistance" theme, she scanned in pictures that were obtained through a family trip. She further expanded the node as she made links to Dr. Martin Luther King, Jr.'s quote in *Parting the Waters: America in the King Years, 1954-63* (Branch, 1988) where he stated, "We're going to work with grim and bold determination -- to gain justice on buses in this city." The quote was followed by a timeline to illustrate the relationship between Dr. King's request for justice and the events that followed. Through the development of these links, the teachers were placing a wide range of media texts into a historical/cultural context within their productions that allowed them to adopt a critical stance.

The teacher showed a clear pattern of critical thinking as nodes illustrated the teacher's thinking surrounding the topics John F. Kennedy, Fidel Castro, Cuba, Bay of Pigs, and the Cuban Missile Crisis. Links to text and images were developed to show how relations between the United States and Cuba worsened when Castro's government took control of oil refineries owned by American and British firms. This node development was further refined as images and sounds were employed to show when Eisenhower granted the CIA permission to secretly train Cuban exiles for an invasion of Cuba and how Kennedy learned of this operation 9 days after his election. The analysis of the Cuban Missile Crisis was shown as students linked from the Cuban Missile Crisis node to a map showing where Cuba's missiles were located and the extent in miles they could have reached within the interior United States. This is just one example how teachers integrated a wide range of media texts into their productions, frequently selecting texts most readily available from the Internet using multiple sources from both United States and world perspectives.

Other teachers chose to limit their biography to detailed portrayals of a specific period in a person's life because information about that period was more available and they preferred to develop a specific aspect of a person's life. As one teacher indicated in her learning log, she would rather research the person's life "using depth, rather than breadth, and develop an understanding that was more meaningful."

All teachers used digital pictures copied from the Internet or scanned from books. Thirty percent of the teachers also used QuickTime™ movies obtained from the Internet that showed the event in detail. As they indicated in their learning logs, teachers believed that these video clips effectively conveyed ideas they wanted to portray about their person. In addition to pictures and movies, 20% of the teachers used sound clips that they prerecorded using SoundEdit Pro ™ or that they captured from the Internet to add narration to their project.

Through these hypermedia productions based on the students' writing, the teachers were using multi-media links to model uses of technology for their students as a tool for portraying a range of different biographical elements of their subjects' lives. Because the clips were extracted from related historical or

cultural contexts and events, teachers were going beyond simply presenting biographical information to examining individuals' lives as constituted by participation in larger historical and cultural contexts. Drawing on material portraying these contexts, for example, the world of the segregated South in portraying Martin Luther King, teachers represented individuals in terms of the forces shaping their lives. This led them to interrogate individuals' practices as challenging or failing to acknowledge these prevailing historical or cultural forces. For example, students who looked at the Montgomery Bus Boycott did not look only at why Rosa Parks did not give up her seat, but they made links to the larger activity system reflecting the many events surrounding the Civil Rights Movement such as the Civil Rights Act, Martin Luther King's "I Have a Dream" speech, and Lyndon B. Johnson being elected president.

Analysis of the Links Employed The 27 projects indicated that the most common link use was directly from a picture or words placed under a picture that described themes for analysis. For example, when placing a picture of the "Montgomery Bus Boycott" in a node, a reader would click on the picture to move to an explanation of the boycott and then link back to another node with another theme when finished. Sixty-five percent of the teachers used this approach of simply linking images and texts without use of hypertext links from individual words.

The other 35% of the teachers used hypertext links in which certain words were linked to other words or texts. One teacher described the life of John F. Kennedy and made links to words that he found most difficult for a reader to outside nodes that either described the word through text, a graphic, or both. These were words teachers believed would improve the students' reading experience. Of the 35% that used hypertext links for development, over 80% of them had five or more links within each biographical description. The words that were most commonly linked were those that the teacher believed would provide background knowledge for readers assumed to have no previous knowledge of the person. For example, the links in the nodes on John F. Kennedy included the Cuban Missile Crisis, Bay of Pigs, Marilyn Monroe, Fidel Castro, and Camelot. These words were linked to additional nodes that explained John F. Kennedy's relationship to each of these nodes. This reflects a rhetorical awareness of their middle-school student audience's level of prior knowledge.

While some of the links represented what McKillop & Myers (1999) describe as "iconic" or "indexical" functions in that they were used simply to illustrate a text, the teachers more commonly employed links for a "symbolic function" to interrogate or challenge idealized or mythic biographical versions of individuals' lives. This demonstrates that creating hypertext links as a literacy practice can contribute to developing a critical stance. In making connections, teachers created dissonant comparisons between positive versus negative aspects of an individual's life, connections that implied contradictions or problematic aspects of their lives. For example, links to the "Bay of Pigs" or "Marilyn Monroe" served to challenge the idealized image of John F. Kennedy. Creating these links juxtaposed disparate texts in ways that reflected a critical analysis of individuals.

Web-Based Communications Between Teachers and Students

Analysis of the Web-based communication between teachers and students indicated high levels of participation. The students expressed a high level of engagement with this site, expressing disappointment when they did not receive responses from their teachers. Given the infrequency of face-to-face meetings during the practicum, this Web-based communication served to enhance the quality of teacher/student relationships and provide for frequent collaboration on the project. Through their exchanges, teachers and students were acquiring a number of literacy practices.

Building Personal Relationships Analysis of the Web-based communication between teachers and students indicated that the teachers initiated all the comments on the asynchronous discussion board. The initial conversations during the first two weeks of the semester typically began with three-to-five sentence personal anecdotes that served to help establish a personal relationship between the teacher and students. The interaction and writing style during these initial exchanges was relatively formal.

Many of the middle school students described how they enjoyed the ability to communicate on-line to build a better relationship with the teacher before they started the co-inquiry multimedia project. One student said, "because we're able to communicate online, it was easier to get to know the practicum teacher because it gave me more time to think about what I would want to know from them and how I might want to answer their questions." Another student said, "I was always excited to check the discussion area when I got home so I could see if my practicum teacher had sent me a message back." The middle-school students expressed some disappointment to their teachers when the teacher did not respond immediately to their posting, an indication of their interest in hearing from their teacher.

In the following example, a teacher and student used the discussion board to establish a personal relationship.

Getting to know you
From: Middle School Student A
Date: 9/13/00
Time: 2:12:02 PM

Comments

1. How old are you? 2. What subject of teaching do you want to teach? 3. Why do you want to teach that subject? 4. When did you decide to be a teacher? 5. Whats your favorite animal? Why? 6. Whats your favorite color? Why?

Re: Getting to know you
From: Teacher A
Date: 9/13/00
Time: 6:00:47 PM

Comments

This year I hit the big 3-0. I am sure to you 30 sounds really old, but in some ways I feel like high school ended just moments ago. I am planning to teach high school English. My 1st college degree was pre-med, but I realized by the time I was ready to graduate that I didn't really want to become a doctor. I wanted to become a teacher. Both of my parents teach, so perhaps it rubbed off on me somehow. Surprisingly, both of them told me not to go into teaching. Why English? I think it is because I love reading and write fairly well and want to help others get enjoyment from these two things. Also, I want to stay in touch with young adults and look forward to having summers off to relax and spend time with family.

My favorite animal...dogs. My very favorite animal... my old silver schnauzer named Gretzky. My family had to put him to sleep a couple of years ago because his kidneys were failing, but now we have his son Max. Gretzky is probably one of the coolest things about my life so far.

Favorite color...lately it has been orange. I used to hate orange but now I really like the brightness and energy it emits. I have a concert t-shirt from the Oasis show that is orange and I really want to order a pair of orange leather pants from a catalog, but perhaps that would be a bit much.

Now tell me some things about you. What is your name? If you could go to another country where would you go and why? Who is your favorite musician? What do you do for fun?

Nice chatting with you.

These exchanges served the important function of building a social relationship between the teacher and student, a relationship essential for both their face-to-face and on-line collaboration. When responses were elicited on research progress, 85% of sharing included Internet addresses where students had found information they believed could contribute to the final project. Teachers and students were learning the literacy practice of using intertextual links to establish social relationships (Bloome & Egan-Robertson, 1993). In the example above, the teacher makes references to experiences with pets, t-shirts, and a rock band, references that serve to build a social relationship based on what the teacher assumes are familiar, shared experiences. And, in sharing Internet addresses, teachers and students were defining ways to establish a social working relationship. Moreover, in formulating their messages rhetorically within an early-adolescent's zone of proximal development (Vygotsky, 1978), teachers were learning the literacy practice of framing communication in ways that are consistent with their audience's developmental level.

Planning and Development As illustrated by the initial example of work on the Princess Diana project, as the semester progressed, the conversations focused more on planning and developing the multi-genre writing project. While the students normally posed a topic that was directly related to the media and the popular culture, many of the teachers encouraged students to select topics that they found, as one teacher noted, "would be more meaningful and easier to obtain quality information" on. During these exchanges, the sentences became much shorter than during the initial exchanges, with incomplete one to two sentence responses. The interaction and writing style also became more informal as participants were mutually engaged in a shared activity designed to produce a final report.

The discussion board served to support the teachers and students in sharing ideas about the content of their multi-genre writing project, and this sharing involved literacy practices such as posing questions. In the exchanges, teachers frequently posed questions to students regarding further elaboration about their projects, questions that they may then have internalized to think about different aspects of their projects. In this case, the teachers were learning to stretch the borders of the students' zone of proximal development by challenging them to develop novel ways of thinking about their writing topic.

The assignment of working with two to four students, each of whom was creating a different project was a bit overwhelming for the teachers. The teachers often did not have time during their face-to-face meetings to respond to all of their students' questions. They and their stuents therefore used the discussion board to address questions related to the projects. The discussion board also helped the teachers monitor the students' progress on the project to insure that they completed it on time. Some of the teachers commented on the convenience of being able to send multiple messages to the middle school students and determine their progress through their responses. As one teacher noted, "I am able to keep in constant communication with them up to the days I meet with them. We are then able to get much more accomplished as we have been communicating and know what the plan is when we will see each other." In sharing message, teachers and students were also creating a paper trail that allowed them to refer back to decisions about work on their projects.

In the exchanges about the multi-genre project, the teachers were more likely to dominate the discussion. Seventy percent of the conversation focused on direction and control comments where the teachers were guiding the students in their research, asking them about the progress they were making on research, or reminding them what was due the next time they were able to meet. One possible explanation of this disparity was that the students had minimal access to computers in their school and simply did not have the time to write extensive answers. While students could also access the site from their homes, many students did not have computer access in their homes. Another factor may have been that some students had minimal writing skills, limiting the amount they were able to write. The fact that the students wrote longer entries when they were discussing their own lives and shorter entries when they were discussing their projects suggests that teachers considering employing this tool need to include a focus on autobiographical topics, as well as topics related to tasks.

Analysis of the exchange based on gender differences indicated that male and female students who collaborated with female teachers had a 35% greater quantity of discussions overall than with male teachers. Students were also 52% more likely to employ what was categorized as "personal" topics with female teachers than with male teachers. There was also a difference within the student group; female students communicated more frequently and also contributed more project-related information than their male counterparts.

Analyzing all of the asynchronous discussions, teachers employed 73% of "thought units," while students contributed only 27%. Overall, the focus of the discussions moved from initial personal conversations to project-related conversation during the middle of the semester to personal conversation at the end of the semester. In the middle of the semester, the fact that the participants were mutually engaged in working on the biography project provided some reason for sharing messages regarding their joint efforts on completing the project. From an activity theory perspective (Cole, 1996; Engestrom, 1987), participating in a shared activity designed to achieve the outcome of completing the project provided a reason for using the exchanges: The teachers and students recognized the value of a technology tool for accomplishing their purposes. They learned to perceive the value of Web-based communication as a tool for engaging in collaborative co-inquiry. Rather than having to wait for their weekly visits, they could contact each other at any time regarding issues associated with completing the project. This suggests the importance of organizing Web-based communication around a shared activity.

Teachers' WebCT™ Bulletin Board Communication

Analysis of the topics addressed in the WebCT™ class bulletin board exchanges between teachers indicated that teachers used the exchanges to discuss a range of different issues, particularly those associated with education: teachers as role models, vouchers, censorship, testing, and so forth. And, teachers shared their experiences with working in the middle-school practicum, as well as personal experiences. In doing so, they employed a number of literacy practices that served to foster productive exchanges such as spontaneous thinking, inviting others' participation, engaging in word/role play, and self reflection.

Display of Spontaneous Thinking Teachers used the postings to openly think through a topic or issue, creating a written record of their unfolding thought. Rather than formulate their ideas prior to writing and then write an organized statement, teachers were spontaneously writing out their thoughts in a free-writing mode. They would then entertain alternative, even contradictory perspectives as they formulated their thoughts in a posting. For example, in discussing the issue of teaching expository versus narrative forms to middle-school students, one teacher, responding to another teacher's belief in the value of narrative writing, noted,

> As we discussed in class earlier, there is clearly something going on with my middle-school student that makes the narrative form a richer expressive medium for him. I will, of course, take a look at your link. Also, I would like to see more of the research on this. The stuff we've gotten in the program points specifically to class-differentiated processing. But your post suggests that there is also research pointing to a broader conclusion. But before I do I wanted to affirm your idea about narrative processes superseding linear logical processes in decision-making. I know for myself that the work that I do when I am reflecting on a difficult problem often resembles a conversation more than a reasoned, bulleted list. I wonder where conversational dialogue fits in this paradigm?

The spontaneous nature of his thinking is evident in the fact that he poses questions to himself ("I wonder where conversational dialogue fits in this paradigm?") which then stimulate him to further thinking about the issue. He also openly reports that "I shouldn't say more 'til I've read some," implying that he will continue to think further about the topic.

The fact that these teachers explicitly shared how they are grappling with an issue provided other participants with a window on the reasoning employed, allowing others to react to that reasoning. The informality that characterized much of exchanges provided a window into how teachers were thinking about issues, revealing the conflicting perspectives shaping their decisions. While such informality is certainly found in face-to-face conversations, the Web-based exchanges allow participants to reflect on written records of each other's thinking, reflecting that leads to substantive reactions often lacking in face-to-face conversation (Walther, 1996).

Inviting Others' Participation The teachers commended each other for their comments and invited others to participate or to respond to their postings. The positive comments and invitations implied that they valued the need for others' perspectives as useful, rational beliefs about a topic, an enactment of Davidson's (1984) principle of charity. For example, in discussing the topic of future employment in the job market, one student reacted to another student's description of an interview with a school administrator about her hiring practices:

> I liked what you said here…. First of all, way to ask a relevant questions [sic]. Along with finding hope in her answer, I'd like to pose an equally practical question. When and how should we be going about searching out opportunities for our own future employment. I am lucky to have a few friends in high places when it comes to the job-search issue, but I think it would be wonderful to be getting some direction on this subject in class. Anyone else have any insights or information for me???

By framing their postings in a tentative, exploratory manner -- as "passing theories" (Davidson, 1984) -- teachers were more likely to evoke responses than if they posted messages in a definitive mode. Adopting a tentative stance invited or evoked the need for further verification -- agreements or disagreements -- from their peers. For example, in discussing the topic of grading writing, one teacher formulated his position on the need to provide feedback during the entire composing process:

> So, my two cents: I kind of see grading as a process that begins when the paper is assigned and ends when we hand back that last draft. Plus, it bears great weight (some insist that grading should be done away with in comp classes) in terms of the whole process, their process, of addressing and completing a writing assignment. Does this make sense to anyone?

In his positing, he hedges his comments with words such as "my two cents" and "kind of see." He also notes that others hold different perspectives on grading. And, his final invitation, "Does this make sense to anyone?" implies that he himself is trying to "make sense" out of his own ideas about evaluating writing. His invitation evoked a number of reactions in which teachers mutually explored the issue of evaluating writing.

Again, the informality of a Web-based exchange served to encourage participants to adopt more tentative, exploratory stances that invite or evoke reactions from others (Beach & Phinney, 1998).

Engaging in Word/Role Play The teachers also frequently engaged in "double-voiced" word play (Bakhtin, 1981), mimicking or parodying persons or discourses. Within the course, the teachers had also participated in a large-group role-play based on the 2000 Presidential election in which they adopted various roles and exchanged written memos with each other. They compared their WebCT™ exchange with this role-play session in terms of using written texts to engage in verbal play through writing. As one teacher noted,

> The experiences with WebCT has [sic] really opened up my ideas on communication and possibilities therein…I think both WebCT and the role play offer something priceless to learning, i.e., play. It's learning of and appreciation for multiplicity. There were so many contexts overlapping in that classroom that multiple uses and abuses are inevitable, and, I think, productive. The same is true for the WebCT.

This dialogic word-play included intertextual references to stances and discourses operating in the group and the teacher education program. By mimicking or parodying the language of these stances or discourses, student were formulating oppositional stances reflecting their own beliefs and ideas about teaching and learning. All of this served to enhance their appreciation for the complexity of teaching.

Self-Reflection on the Process Teachers also explicitly reflected on or described their stances or attitudes adopted in their postings. In some cases, they apologized for repeating themselves, making overly-assertive statements, or sharing complaints. For example, one student noted: "Whoops, I just browsed back up the thread and realized I'm repeating myself!" After posting a long message, one student commented, "Sorry to drop such a wide load here on the CT, but it was cathartic."

They also valued the fact that they could openly express their opinions within their group without necessarily being concerned about offending others. One student noted, "could you just imagine if we were afraid of speaking our souls for fear of offending someone. Our class would be pretty damn quiet if that were the case."

An international student from Korea noted that the site served to foster development of open expression, something she finds lacking in her Korean student peers: "we are too concerned about hurting others people's feelings to think out loud…I think Korean students have to learn to be more assertive in order to exchange their thoughts." She noted that she was more intimidated by-face-to-face large-group discussion and less intimidated by sharing her emotional concerns on the bulletin board.

Teachers also noted some of the difficulties specific to participating on a bulletin board discussion. One teacher commented on the difficulty of conveying her attitudes: "I don't know exactly how or why, but threaded discussions transform words. Unless the writer is incredibly skilled, the tone is hard (if not impossible) to communicate. Perhaps it is the instantaneous nature of it that is its main draw and downfall…? Her comment reflects one of the limitations of on-line communication: the lack of the non-verbal components inherent in face-to-face conversation (Walther, 1996).

Construction of a Student-Driven Site The teachers therefore used their exchanges on the WebCT™ bulletin board discussion as a tool for sharing and coping with various issues associated with teaching. Teachers could garner perspectives and advice on issues from a range of different perspectives. They then began to value the site as a support system for coping with problems. All of this occurred with little or no deliberate intervention by the instructor, who assumed that by having the teachers pose their own questions and problems, they were more likely to perceive the bulletin board as driven by their own framing of issues and problems. While there is considerable debate about the need for instructor control and intervention in on-line discussions (Topper, 2001), this suggests that for some groups, such intervention may not be necessary. It may be the case that when participants perceive a site as constructed primarily by themselves, they experience a sense of commonality and interdependency (Hung & Chen, 2001) not found in a teacher-led site.

SUMMARY

The results of this study indicate that the teachers and middle-school students were employing the technology tools of hypermedia production and Web-based communication to engage in literacy practices involved in their multi-genre writing project and in communicating with each other (see Table 1). These tools served to mediate the uses of various literacy practices within the larger activity system of teacher education, whose object is to assist teachers to acquire those practices involved in working effectively with students.

Table 1. Literacy Practices Through Technology Tools

Literacy Practice	**Technology Tool(s)**
defining intertextual connections	hypermedia based tool = storyspace, hyperstudio, Web development, inspiration
posing questions & collaborative exploration of issues	computer-mediated written communication between students and teachers - synchronous or asynchronous
adopting multiple voices and perspectives	asynchronous computer-mediated written communication between students
Adopting a collaborative, inquiry stance	asynchronous computer-mediated classroom interaction

The teachers used the Inspiration™ and Storyspace™ tools to define intertextual and hypertextual connections between the texts included in their multi-genre writing project. These hypermedia tools allowed teachers to combine written texts, images, sounds, and video to portray the characteristics of a person in a Web-based production for sharing with others, including their students. Teachers and students learned to employ links to historical and cultural contexts leading them to critical interrogation of biographical information (McKillop & Myers, 1999). They were also learning the literacy practice of using intertextual links to establish social connections with others.

Knowing how to communicate in a multi-modal format using computer tools is becoming an essential literacy practice (Kress & van Leeuwen, 1996, 2001). Students also need to know why they are using these tools to achieve certain objects or outcomes in an activity (Cole, 1996; Wertsch, 1998). They are more likely to acquire an understanding of the uses of these tools as participants in a community of practice organized around a shared activity such as the biography co-inquiry project described in this study.

The teachers and students used the Web-based communication site as a tool for establishing social relationships and for planning their multi-genre writing projects. This site provided teachers with continuous, on-going interaction with their students, something often lacking in practicum experiences with infrequent school visits. The written exchange allowed teachers to model a range of literacy practices -- building personal relationships through intertextual links, mutual planning and development based on shared information and question-asking -- practices students then demonstrated in their own responses.

One problematic aspect of the exchange was the fact that the teachers dominated the interactions by a ratio of four to one. While this may have been a function of student access to computers or their level of writing ability, it may also have been simply a function of novice teachers' working with students for the first time in their careers in a relatively unfamiliar computer-mediated site. There were also marked gender differences, with female teachers eliciting more participation from students than male teachers through uses of "personal" connections, suggesting the need for teachers of both genders to employ such connections. This suggests the need for training teachers to conduct on-line exchanges as equally important to training in leading and facilitating oral discussions. Such training should examine issues of teacher domination, especially as related to gender. And, the training should help teachers define the range of literacy practices students are acquiring through participation in the interaction.

Through their participation on the WebCT™ bulletin board, teachers employed the literacy practices of displaying spontaneous thinking, inviting others' participation, adopting an exploratory stance, engaging in word/role play, and reflecting on the process. They were also recognizing how participating in an active, on-line community helped them explore issues and concerns related to education. And, they also perceived the site as constructed through their own participation without the need for instructor direction,

enhancing their sense of communality and interdependency (Hung & Chen, 2001) as a community of practice. Given this experience, they may then be more likely to participate in similar Web sites or employ such sites in their own teaching. And, through that participation, they were employing a number of literacy practices that they could model as participants in teacher/student Web-communication. All of this points to ways in which technology serves to mediate both preservice teachers' acquisition of teaching strategies and the development of literacy practices.

NOTE

1. One of the issues, however, in the uses of these commercial hypermedia tools is that of access. Storyspace™ and HyperStudio™, for example, are relatively expensive commercial products. Furthermore, sophisticated hypermedia production often requires access to high-end computers, scanners, or digital recording equipment. These financial considerations remain a major challenge for implementing wide-spread use of these tools in schools.

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REFERENCES

Bakhtin, M. (1981). *The dialogic imagination.* Austin: University of Texas Press.

Barab, S., & Schatz, S. (2001). *Using activity theory to conceptualize online community and using online community to conceptualize theory.* Paper presented at the American Educational Research Association, Seattle, WA.

Beach, R., & Lundell, D. (1998). Early adolescents' use of computer-mediated communication in writing and reading. In D. Reinking, M. McKenna, L. Labbo, & R. Kieffer (Eds.), *Handbook of literacy and technology*: *Transformations in a post-typographic world* (pp. 93-112). Mahwah, NJ: Erlbaum.

Beach, R., & Myers, J. (2001). *Inquiry-based English instruction: Engaging students in life and literature*. New York: Teachers College Press.

Beach, R., & Phinney, M. (1998). Framing literary text worlds through real-world social negotiations. *Linguistics and Education, 9*(2), 159-198.

Bergvall, V., & Remlinger, K. (1996). Reproduction, resistance and gender in educational discourse: The role of critical discourse analysis. *Discourse & Society, 7*(4), 453-479.

Bloome, D., & Egan-Robertson, A. (1993). The social construction of intertextuality in a classroom reading and writing lessons. *Reading Research Quarterly, 28*, 304-333.

Bolter, J. D. (1998). Hypertext and the question of visual literacy. In D. Reinking, M. McKenna, L. Labbo, & R. Kieffer (Eds.), *Handbook of literacy and technology: Transformations in a post-typographic world* (pp. 3-14). Mahwah, NJ: Erlbaum.

Bolter, J. D., Smith, J., & Joyce, M. (2001). *Storyspace*. Cambridge, MA: Eastgate Systems Inc.

Branch, T. (1988). *Parting the waters: American in the King years, 1954-63.* New York: Simon and Schuster.

Brecke, C., & Gebhardt, N. (2001). *Fear and teaching on the hybrid network.* Paper presented at the meeting of the National Council of Teachers of English, Baltimore, MD.

Bruce, B. C., & Davidson, J. (1996). An inquiry model for literacy across the curriculum. *Journal of Curriculum Studies, 28*(3), 281-300.

Bruce, B. C., & Easley, J. A., Jr. (2000). Emerging communities of practice: Collaboration and communication in action research. *Educational Action Research, 8*(2), 243-259.

Bruce, B. C., & Levin, J. (1997). Educational technology: Media for inquiry, communication, construction, and expression. *Journal of Educational Computing Research, 17*(1), 79-101.

Clift, R., Mullen, L., Levin, J., & Larson, A. (2001). Technologies in contexts: Implications for teacher education. *Teaching and Teacher Education, 17,* 33-50.

Cole, M. (1996). *Cultural psychology.* Cambridge, MA: Harvard University Press.

Cole, M. (1999). Cultural psychology: Some general principles and a concrete example. In Y. Engestrom, R. Miettinen, & R. Punamaki (Eds.), *Perspectives on activity theory* (pp. 87-106). New York: Cambridge University Press.

Dasenbrook, R. W. (2001). *Truth and consequences: Intentions, conventions, and the new thematics.* University Park, PA: Pennsylvania State University Press.

Davidson, D. (1984). *Inquiries into truth and interpretation.* Oxford, England: Clarendon Press.

Duguay, K. (1999). The pedagogical and electronic contexts of composing in hypermedia. In C. DeWitt, & K. Strasma (Eds.), *Contexts, Intertexts, and Hypertexts* (pp. 15-38). Cresskill, NJ: Hampton Press.

Engestrom, Y. (1987). *Learning by expanding: An activity theoretical approach to developmental research.* Helsinki: Orienta-Konsultit. [Online]. Available at http://communication.ucsd.edu/MCA/Paper/Engestrom/expanding/toc.htm

Estes, T., Bronack, S., & Schoeny, Z. (1999). *Creating optimized learning environments: A course using interactive Web elements.* Paper presented at the Society for Information Technology & Teacher Education International Conference, San Antonio, TX.

Fairclough, N. (1992). *Discourse and social change.* Cambridge, England: Polity Press.

Fastrez, P. (2001). Characteristic(s) of hypermedia and how they relate to knowledge. *Education Media International, 38*(2/3), 101-110.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory.* Chicago: Aldine Publishing.

Gonzales, M. (2001). Networking gender, voice, and technology. Paper presented at the meeting of the National Council of Teachers of English, Baltimore, MD.

Harrington, H., & Quinn-Leering, K. (1996). Considering teaching's consequences. *Teaching and Teacher Education, 12,* 591-607.

Hung, D., & Chen, D. (2001). Situated cognition, Vygotskian thought and learning from the communities of practice perspective: Implications for the design of Web-based e-learning. *Education Media International, 38*(1), 3-12.

Hutchins, E. (1995). *Cognition in the wild.* Cambridge, MA: MIT Press.

Jonassen, D. (2000). *Computers as mindtools for schools: Engaging critical thinking.* Columbus, OH: Prentice Hall.

Knoeller, C. (1998). *Voicing ourselves: Whose words we use when we talk about books.* Albany, NY: SUNY Press.

Kramarae, C., & Taylor, H. (1993). Women and men on electronic networks: A conversation or a monlogue? In H. Taylor, C. Kramarae, & D. Ebben (Eds.), *Women, information technology and scholarship* (pp. 52-61). Urbana, IL: Center for Advanced Study.

Kress, G., & van Leeuwen, T. (1996). *Reading images: The grammar of visual design.* New York: Routledge.

Kress, G., & van Leeuwen, T. (2001). *Multimodel discourse: The modes and media of contemporary communication.* London: Arnold.

Landow, G. P. (1997). *Hypertext 2.0: The convergence of contemporary critical theory and technology.* Baltimore: Johns Hopkins Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, England: Cambridge University Press.

Lewis, C., & Fabos, B. (2000). But will it work in the heartland? A response and illustration. *Journal of Adolescent & Adult Literacy, 43*(5), 462-470.

McKillop, A. M., & Myers, J. (1999). The pedagogical and electronic contexts of composing in hypermedia. In S. DeWitt & K. Strasma (Eds.), *Contexts, intertexts, and hypertexts* (pp. 65-116). Cresskill, NJ: Hampton Press.

McNamee, S. (1996). Therapy and identity construction in a postmodern worlds. In D. Grodin & T. Lindlof (Eds.), *Constructing the self in a mediated world* (pp. 141-155). Thousand Oaks, CA: Sage.

Merriam, S. (1998). *Qualitative research and case study applications in education.* San Francisco: Jossey-Bass Inc.

Myers, J., & Beach, R. (2001). Hypermedia authoring as critical literacy. *Journal of Adolescent & Adult Literacy, 44*(6), 538-546.

Myers, J., Hammett, R., & McKillop, A. M. (1998). Opportunities for critical literacy and pedagogy in student-authored hypermedia. In D. Reinking, M. McKenna, L. Labbo, & R. Kieffer (Eds.), *Handbook of literacy and technology: Transformations in a post-typographic world* (pp. 63-78). Mahwah, NJ: Erlbaum.

Myers, J., Hammett, R., & McKillop, A. M. (2000). Connecting, exploring, and exposing the self in hypermedia projects. In M. Gallego & S. Hollingsworth (Eds.), *What counts as literacy: Challenging the school standard* (pp. 85-105). New York: Teachers College Press.

Patterson, N. (2000). Weaving a narrative: From teens to string to hypertext. *Voices from the Middle, 7*(3), 41-47.

Peyton, J., & Staton, J. (1993). *Dialogue journals in the multilingual classroom: Building language fluency and writing skills through writing interaction.* Norwood, NJ: Ablex.

Porter, K. (2001). A pedagogy of charity: Donald Davidson and the student-negotiated composition classroom. *College Composition and Communication, 52*(4), 574-611.

Reed, J., Boardman, A., Coward, F., Beth, A., Benton, R., Dodson, M., Kim, M., & Schallert, D. (2001). Perceptions of psychological engagment when technology enters the classroom. Paper presented at the meeting of the National Reading Conference, San Antonio, TX.

Romano, T. (2000). *Blending genre, altering style.* Portsmouth, NH: Heinemann.

Rouet, J., & Levonen, J. (1996). Studying and learning with hypertext: Empirical studies and their implications. In J. Rouet, J. Levonen, A. Dillon, & R. Spiro (Eds.), *Hypertext and cognition* (pp. 9-24). Mahwah, NJ: Erlbaum.

Russell, D. (1997). Rethinking genre in school and society: An activity theory analysis. *Written Communication, 14*(4), 504-554.

Ryan, G. (1999). "Epistemic Conversations: Creating Socratic Dialogue in Hypertext," In S. DeWitt & K. Strasma (Eds.), *Contexts, intertexts, and hypertexts* (pp. 65-116). Cresskill, NJ: Hampton Press.

Schallert, D., Reed, J., Dodson, M., Benton, R., & Boardman, A. (2001). What does it mean to be psychologically engaged in an electronically- mediated classroom discussion. Paper presented at the meeting of the American Educational Research Association, Seattle, WA.

Semali, L., & Watts-Pailliotet, A. (1999). Introduction: What is intermediality and why study it in U.S. Classrooms. In L. Semali & A. Watts-Pailliotet (Eds.), *Intermediality* (pp. 1-30). Boulder, CO: Westview Press.

Short, K., & Harste, J. (1996). *Creating classrooms for authors and inquirers,* 2nd ed. Portsmouth, NH: Heinemann.

Smithson, J., & Dias, F. (1996). Arguing for a collective voice: Collaborative strategies in problem-oriented conversation. *Text, 16*(2), 251-268.

Tannen, D. (1984). *Conversational style: Analyzing talk among friends.* Norwood, NJ: Ablex.

Taylor, P. (1992). Social epistemic rhetoric and chaotic discourse. In G. Hawisher & P. LeBlanc (Eds.), *Re-imagining computers and composition* (pp. 131-148). Portsmouth, NH: Boynton/Cook.

Thompson, J., & Nay, F. (1999). *Distance interaction through the World Wide Web in graduate teacher education: A follow-up analysis of student perceptions.* Paper presented at the Annual Meeting of the Mid-Western Educational Research Assoication, Chicago, IL.

Topper, A. (2001). *Merging technology, teaching and learning: Developing and using learning environments supported by technology.* Paper presented at the meeting of the National Reading Conference, San Antonio, TX.

Van Dijk, T. A. (1998). *Ideology: A multidisciplinary approach.* Thousand Oaks, CA: Sage.

Vygotsky, L. (1978). *Mind in society: The development of high psychological processes.* Cambridge, MA: Harvard University Press.

Walther, J. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23,* 3-43.

Wertsch, J. (1998). *Mind as action.* New York: Oxford University Press.