NAVIGATING THE CHANGING LANDSCAPE OF LITERACY: CURRENT THEORY AND RESEARCH IN COMPUTER-BASED READING AND WRITING

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A statistic from 1994 supports the assertion that the computer is the most important technological development of our time. In that year for the first time, the number of computers sold in the United States exceeded the number of televisions sold. The phenomenal rise in the sales of personal computer hardware and software from a modest start in the late 1970s is but one indication that the computer is central to how we define our world today as well as how we imagine our future. Given the proliferation of computer-based innovations across diverse everyday activities, it takes little imagination to see that advances in computer technology have become a catalyst for social and cultural change, much as television did almost a generation ago. But, the potential consequences of becoming digital, as one writer has put it (Negroponte, 1995), are likely to exceed exponentially the influence of television. Like television, computer technology promises to effect changes in popular culture; but unlike television, it is likely to effect profound changes in our intellectual lives as well (Lanham, 1993). Most important for the topic of this chapter, electronic forms of reading and writing will both contribute to and support those changes.

In fact, the brief history of the computer's influence on reading and writing is perhaps the best example of how broad and deep its influence has been on contemporary life. The technology of writing changed substantially with the introduction of word processing, which quickly became the most common application used by those who purchased personal microcomputers beginning in the late 1970s. Word processing continues to evolve from its original use as a typographic tool for creating printed documents (see Bolter, 1991) to its increasing use as a digital tool for creating electronic multimedia documents. Another current example is the burgeoning use of the Internet for personal communication through e-mail and for disseminating information through on-line services and browser programs such as Mosaic and Netscape. The rise of the Internet is a major literacy event with indisputable, if not precisely discernible, societal and cultural implications in diverse areas such as education, advertising, mass communication, entertainment, and the political arena.

The pace at which the literate world is shifting from printed to digital forms of reading and writing has accelerated steadily since the introduction of the microcomputer. This trend can be seen at a number of levels. For more than a decade auto parts stores and bowling alleys have exchanged printed catalogs and score sheets for computer displays. More recently, we sign for deliveries using a stylus on an electronic tablet; hospital personnel use the same technology to record patients' medication and vital signs, which are transmitted electronically to a physician's office computer. More electronic encyclopedias are being sold today than their printed counterparts. Students at major universities such as Stanford, UCLA, and MIT, where many dorms have direct Internet connections, are using computers to register for courses, to research topics in libraries around the world, to submit their work to instructors, and to find out who in their dorm wants to chip in for a pizza. At the same time, the number of printed
books and journals purchased by research libraries has steadily declined since 1985, while the number of electronic journals has risen from around 100 in 1991 to more than 400 by late 1994 (Stix, 1994). National Public Radio reported recently that newspaper circulation worldwide has been declining between one and two percent each year since 1991. Increasingly scholars are bypassing conventional journal publication to share their research and ideas electronically as is evidenced by the inclusion of formats for electronic citations in the most recent edition of the APA style manual.

These developments suggest that we have moved beyond a threshold of debate about whether computers will have any long-lasting effect on conceptions of literacy, conceptions that there had been no need to examine when the dominance of print was unquestioned. Our position in this chapter is that we are riding a juggernaut of change that implies a fundamental examination of how we are to conceptualize literacy in a digital, posttypographic world (see Reinking, 1995). Technology can no longer be marginalized as only one among many focal points that capture the attention of educators and scholars interested in literacy. Instead, events dictate that technology move to the center of every research and educational agenda related to literacy. Not to do so, we would argue, will not only relegate much of the past and present literacy research base to obsolescence but will create a vacuum of careful thought based on systematic research. If that happens, literacy researchers will lose the opportunity to influence constructively the changes that seem to be inevitable and to assist educators and students adjust to those changes.

To prevent our efforts from becoming obsolete and to contribute useful understandings, it will be necessary first, for literacy educators and researchers, to acknowledge that important changes are occurring in the way that we read and write and likewise to contemplate the implications of these changes. We have found that doing so is not always easy because of the tendency to view electronic texts as only printed texts displayed on a computer screen. Much as the first automobiles were referred to as 'horseless carriages' a text on a computer screen is sometimes referred to (and made to resemble) a 'page' of text. The distinction between page and screen may seem inconsequential until one has fully considered the important practical and theoretical implications of displaying text electronically. Later in this chapter we elaborate on the critical differences between printed and electronic texts that we believe are useful in understanding the relevance of emerging forms of electronic texts, conceptualizing new ones, and generating questions for research.

Another reason why moving technology to the center of literacy research may be difficult is that doing so often negates the relevance or importance of previous research based on reading and writing printed materials. For example, of what practical significance is current research in teaching children strategies to comprehend printed texts if electronic texts change not only what strategies make sense but also the options for modeling and supporting those strategies? Also, how useful are theoretical constructs such as reader response and intertextuality when the distinction between readers and writers becomes less clear in electronic documents such as hypertexts and when thousands of formerly disjoint texts can be displayed immediately and seamlessly on a single computer screen?

Literacy researchers, individually and collectively, may understandably be reluctant to embrace technology when it threatens their substantial investment in print-based research. Nonetheless, the changes that are occurring, almost daily, around us make it increasingly difficult to ignore the current and potential implications of electronic forms of reading and writing. But to navigate through a changing literacy landscape, many researchers will need a map that orients them not only to what is happening and its potential consequences but also to how their interests centered in conventional print might be transformed in a world of electronic reading and writing. That is our aim in this chapter.

We have divided this chapter into two main parts. The first part focuses on theoretical perspectives and research aimed at identifying the fundamental differences between printed and electronic texts. The second part identifies several generalizations and supporting research concerning the computer's role in the acquisition of literacy. We believe these latter generalizations may help researchers develop pedagogical theories for integrating computers into literacy instruction and to generate useful research questions aimed at studying the effects of electronic reading and writing in classrooms. However, we wish to emphasize that there is considerable overlap between the content of these two sections and they are separated only for the sake of an orderly presentation. That is, understanding the differences between printed and electronic texts has implications for pedagogy, and studying the use of computer technology in classrooms is enriched by understanding the uniqueness of electronic texts. Ironically, our limited ability to deal with this overlap is an artifact of the fact that we must conform to the linear and hierarchical structures expected by readers of a printed text. As we discuss subsequently, hypertext, an electronic text based on association, would easily accommodate a more realistic representation of this overlap.

THEORETICAL PERSPECTIVES AND RELATED RESEARCH

Establishing well-defined theoretical perspectives is a mark of maturity in the study of any phenomenon or in efforts to demarcate a domain of research. Striving for such maturity, according to Thomas Kuhn's often-cited argument, is a defining characteristic of research when there is a major shift in scientific paradigms or world views. Given current trends, we do not think it is an overstatement to suggest that emerging forms of electronic reading and writing require a paradigmatic shift in traditional conceptions of literacy. If so, seeking useful theoretical perspectives can be a gateway to greater understanding of the changes that are occurring and consequently what research is most needed.

We wish to emphasize that citing Kuhn and mentioning theory in the context of scientific paradigms does not mean that we think theoretical speculation about electronic forms of reading and writing should be limited to positivistic
Also, we cite existing or potential research that illustrates the writing remains relatively narrow, focusing predominantly on views, and participant observations. Thus, it becomes especially important to identify, as pre- to enhance comprehension and reading ability. By comparison, the empirical research related to electronic forms of how word processing affects the writing of conventional printed texts (see the review by Reinking, & Bridwell-Bowles, 1992, 1994; Reinking, & Chanlin, 1994).

**Differences Between Printed and Electronic Texts**

Underlying an argument that new conceptions of literacy are needed is the assumption that electronic texts are substantially different from printed texts. Such differences, as we have noted at the outset of this chapter, may not be intuitively clear because of a natural inclination to conceptualize electronic texts in terms of the more familiar printed texts. Thus, it becomes especially important to identify, as precisely as possible, the new characteristics and capabilities of electronic texts that may be most basic to changing conceptions of literacy. We highlight these differences here although they have been more fully elaborated elsewhere (see Reinking, 1992, 1994, 1995; Reinking, & Chanlin, 1994). Also, we cite existing or potential research that illustrates the kinds of questions that an awareness of each difference might generate.

For the most part, this research is aimed at investigating the effects of electronic forms of reading and how the unique characteristics of electronic texts might be used purposefully to enhance comprehension and reading ability. By comparison, the empirical research related to electronic forms of writing remains relatively narrow, focusing predominantly on how word processing affects the writing of conventional printed texts (see the review by Reinking, & Bridwell-Bowles, 1991). Nonetheless, there has been increasing theoretical speculation about how unique electronic forms of writing, specifically hypertexts, suggest new areas of empirical investigation (see Hawisher, & Selle, 1991; Selle, & Hilligoss, 1994).

**Interactivity and Malleability.** A major characteristic of electronic texts is that they are interactive because they are so malleable. As stated aptly by Kaplan (1991), "In the digitized world, texts are intrinsically fluid, malleable, protean. . . . And, it is no longer possible—even for the naive, atheoretical reader—to understand or even to approach them as fixed, stable, linear objects" (p. 19). The frequent description of reading as an interactive process, which preceded any serious attention to electronic texts by more than a decade, has had a metaphorical meaning when applied to printed texts because printed texts are inert, fixed, entities that challenge readers to make sense of them. Using the terms interaction or transaction, in the case of printed texts, is meant to emphasize that comprehension is the result of factors within texts and within readers and that readers must be cognitively active in relating textual information to their own knowledge. Electronic texts, however, can effect a literal interaction between readers, writers, and texts because texts presented digitally are by nature dynamic entities easily capable of being modified in response to the contingencies of a particular situation or the needs and wishes of individual readers or writers.

The term interaction when applied to electronic texts, therefore, can be much more like the give and take of a dialogue (Reinking, 1987). An electronic text, for example, can be programmed to monitor a particular reader's actions and evolving knowledge during reading, and it can adjust the textual presentation accordingly. An early study conducted by L'Allier (1980) illustrates how an awareness of this characteristic might generate research on new types of reading. In that study he adjusted expository texts using a complex algorithm that monitored individual student's reading rate, comprehension accuracy, and response times. In this adaptive reading condition, high school students who were identified as low achieving readers comprehended as much as their high achieving peers. Such an application suggests interesting pedagogical options for increasing learning from texts.

Since this early example, several other researchers have studied the effects of applications aimed at making reading more interactive (Blohm, 1982, 1987; MacGregor, 1988a, 1988b; Reinking, 1988; Reinking, & Rickman, 1990; Reinking, & Schreiner, 1985; Salomon, Globerman, & Guterman, 1989; Tobias, 1987, 1988). The conceptual basis for these applications has been the realization that computers make it possible to offer various forms of assistance to readers while they are reading. Cumulatively, the research on these applications suggests that providing such on-line assistance produces superior levels of understanding when compared to conventional printed texts (see Feldmann, & Fish, 1991, for an exception). For example, Reinking and Rickman (1990) had middle-grade students read several science texts presented either in a printed version accompanied by a conventional glossary or in an electronic version that provided on-line access to meanings of difficult words in the text. When reading the electronic version, students investigated the meanings of
more words, recognized the meanings of more difficult terms used in the passage, and demonstrated greater comprehension of the scientific principles discussed.

A study by Salomon et al. (1989) illustrates how existing theoretical perspectives related to printed texts can apply to a consideration of electronic texts' interactivity and malleability and how such a perspective might lead to theory-based instructional applications. In that study the researchers designed a computer application they described as a "reading partner" aimed at simulating the interactions between a reader and an "intellectual, pedagogical partner" (p. 621). Vygotsky's (1978) sociodevelopmental theory and his idea of learning within a zone of proximal development guided the development of the application and the experimental hypotheses. Results indicated improvements in 7th-grade students' development of the application and the experimental hypotheses. The study also illustrates how existing research in this area can be extended to electronic reading and writing, highlighting the potential importance of electronic media in moving textual meaning away from the alphabetic code.

Several writers from various theoretical perspectives have highlighted the potential importance of electronic media in moving textual meaning away from the alphabetic code. Walter Ong's (1982) seminal work on the relation between orality and literacy is a frequently cited example in the current literature. Although he was writing at a time when microcomputers were a relatively new phenomenon, he predicted that the computer would play a role in furthering a "second orality" in which modern communication technology would restore some of the social and psychological orientations characteristic of primary oral cultures. More recently, writers such as Bolter (1991) have pointed out that electronic forms of reading and writing are reminiscent of primitive picture writing. Also, Lanham (1993) has pointed out that digital texts tend to draw a reader's attention to their visual characteristics as opposed to printed texts, which are typically designed to be transparent representations of meaning. In other words, we look more at the visual representation of electronic texts to derive meaning, not just through the visual representation of letters and words, as is the case in conventional printed texts. He has argued that this difference moves digital texts into a rhetorical position and away from the philosophical position occupied by conventional printed texts. Another example is Lemke (1994) who has pointed out the special relevance of semiotic theories in expanding conceptions of literacy to include multimedia documents.

Some existing theoretical perspectives that have been developed with conventional printed texts in mind remain relevant when applied to electronic texts. For example, Paivio's (1986) dual encoding hypothesis argues that textual information is more memorable when it is encoded both visually and linguistically. In fact, given the expanded possibilities of integrating visual (as well as auditory) material with written prose in electronic texts, it is likely that such a theory may be especially useful in guiding future research involving electronic reading and writing. Salomon's (1979; Salomon, Perkins, & Globerson, 1991) theoretical approach to defining...
media, based on the interaction of technologies and symbol systems in effecting cognition and learning, is applicable to electronic texts. Using that theory, Reinking (1987) argued that printed and electronic texts can be defined as different media from a cognitive perspective. It might be argued from current trends that electronic texts are becoming different media in a sociocultural sense as well.

There is relatively little research examining the multimedia capabilities of electronic texts, and the existing research has several limitations (see Reinking, & Chalin, 1994 for a comprehensive review of the literature and an extended discussion of these limitations). One limitation is that much of the research is atheoretical and aimed at investigating whether displaying essentially identical texts on paper or screen produces differences in reading performance. Such studies have produced little evidence that relatively superficial differences in the visual display produce any notable differences in reading performance, especially in areas such as comprehension and recall (Reinking, 1992). Another limitation, at least from the standpoint of literacy researchers, is that much of the available research focuses on comparing various types of graphical representations displayed on a computer screen without considering their relation to written prose. For example, there have been several studies comparing the effects of learning from static graphics in printed texts and animated graphical representations in a comparable electronic text (e.g., Rieber, 1990). These studies have found advantages for computer animations only under highly constrained conditions, and then only inconsistently. However, in these studies the relation of the animated graphics to the written text has not been carefully considered. A more useful approach can be found in a series of studies reported by Hegarty, Carpenter, and Just (1991) in which sophisticated eye movement equipment was used to monitor readers' attention to static and animated graphics showing the operation of a machine. They also systematically varied how the accompanying text related to each of the graphical representations. A finding that points to the potential value of this type of research is that participants in the experiment who had low mechanical ability benefited more when the accompanying text was coordinated with the animated graphical representation.

The audiovisual capabilities of electronic texts also suggest new possibilities for enhancing literacy instruction. For many years there has been ongoing research addressing such possibilities using synthesized or digitized speech (McConkie, 1983; Olson, Foltz, & Wise, 1986; Olson, & Wise, 1987; Reitsma, 1988; Roth, & Beck, 1987; Wise, 1992). For example, Reitsma used a computer to assist 6- and 7-year-old children with the pronunciation of unfamiliar words during independent reading. He found that this condition effectively increased reading rate and reduced reading errors when compared to oral reading guided by a teacher and reading while listening to a tape-recorded version of the experimental texts. In our own current work we are investigating the effects of providing early readers with phonic analogies under various conditions while they read computerized versions of children's books (McKenna, 1994). Much more research is needed to investigate how audiovisual effects might be used with written prose in electronic texts.

Expanded Boundaries of Freedom and Control. Conventional printed texts exist within relatively limited boundaries of freedom, in terms of a reader's options for obtaining access to a particular text upon demand, and of control, in terms of a writer's options for restricting a reader's access to textual information during independent reading. For example, in the first case, if one is reading a text that alludes briefly to a particular automobile engine about which one wishes more information, it may be tedious, at best, to obtain another text that provides the desired elaboration (e.g., a trip to the library). On the other hand, in the second case, many teachers have experienced the frustration of admonishing students to note a particular feature of a text (e.g., a table) at a particular point as they read an assignment knowing that many students will choose to ignore that admonition. Both of these limitations, in one case the lack of unencumbered access to text and in the other limited ability to exert control over what readers attend to during independent reading, can be removed by electronic texts. As illustrated by the burgeoning use of the Internet, electronic texts expand the boundaries of freedom to flexibly access many texts in many geographical locations upon demand. Perhaps less obvious, and often less welcome or appreciated by many (see Reinking, 1994), is the fact that electronic texts provide the opportunity to exercise unprecedented control over what a particular reader may attend to during independent reading. And, that control can be exercised contingently for different readers reading the 'same' text.

More freedom and more control in accessing texts when they are available electronically create a need for new theoretical perspectives that suggest ways in which such capabilities might affect literate activities. Some authors have attempted to do so, although most of the speculation and research available has focused on the ability to limit access to text. For example, Wilkinson (1983) pointed out that texts displayed on a computer screen were viewed as if through a window providing the capability to limit readers' access to various units of text. Daniel and Reinking (1987) pointed out that the capability to limit readers' access to texts during independent reading allowed writers to make decisions about the placement of text in three dimensions. In addition to arranging texts on the two-dimensional space of the printed page, writers of electronic texts have available a third dimension: time; that is, they can make decisions about when a reader can view a particular portion of a text. Interestingly, this capability has been used as a literary tool by serious writers of hypertextual fiction (see Coover, 1993), which is ironic in the sense that hypertexts have typically been cited as an example of how readers have more freedom when reading electronically. A review of Stuart Moulthrop's Victory Garden (Bolter, Joyce, Smith, & Bernstein, 1993) points out how Moulthrop occasionally uses "guard fields" as a literary device in this example of hypertextual fiction. Guard fields are a mechanism in hypertextual writing by which an author can ensure that specified textual nodes are unavailable to readers until other specified nodes have been selected.

One straightforward example of research using the capability of the computer to control readers' access to text is the
work of Tobias (1987, 1988). He investigated the effects of inserting questions in electronic texts that mandated review of relevant textual information when a reader answered a question incorrectly. That is, readers were not able to access subsequent portions of a text until they had reviewed an earlier portion of the text and corrected their response. Under such conditions he found that information related to the questions was better recalled in a posttest but that unrelated-information was not recalled as well by readers who read the text and answered the questions without mandatory review, thus exacerbating a problem found in previous studies of inserted questions in printed texts. He hypothesized that readers who were required to review attended only to portions of the text containing information relevant to the question. Testing that hypothesis, Reinking, Pickle, and Tao (1996) found that readers did spend more time on paragraphs containing relevant information but the researchers also were able to use the capabilities of the computer to change that strategy by providing readers with a new question after mandatory review.

There has been relatively little theoretical speculation and research about the computer's capability to expand readers' freedom to access texts. Some literary theorists (e.g., Bolter, 1991; Landow, 1992; Lanham, 1993) have speculated broadly about the potential societal implications of this capability, but there has been no systematic theoretical speculation about how this capability might affect the reading of particular texts or the teaching of literacy in schools. Clearly, however, there are implications for accessing multiple texts in reading and writing and for helping students acquire strategies for locating and using information from diverse sources, which may require creative use of key word searches using Boolean principles of inclusion, exclusion, and overlap. Existing research derived from the concept of intertextuality, such as the work of Spivey and King (1989), is not clearly applicable to electronic reading and writing because that research is based on a conception of distinctly separate and disjoint texts that are written with the assumption that they will be read in relative isolation from other texts.

A recent study by Stahl, Hynd, Britton, McNish, and Bosquet (in press) illustrates the type of research that might be conducted to address the possibilities for teaching and learning created by the computer's capability to expand teachers' and student's freedom to access textual information. They used the computer to provide high school students with a wide array of historical documents and commentaries concerning the Gulf of Tonkin incident leading to the U.S. entry into the Vietnam War. They hypothesized that providing easy access to these source documents might lead students to approach this historical event more analytically like historians as opposed to focusing only on factual information. Although they found some evidence supporting this hypothesis, they concluded that students may need more exposure to this type of reading activity and perhaps instruction that helps them compare and contrast critically information from various sources.

The increased control that electronic texts allow has brought to the surface previously subtle ethical and philosophical issues related to the appropriateness of limiting readers' access to texts. Reinking (1994) has argued that such control is exercised with printed texts but is often not obvious. For example, financial expediency frequently dictates that teachers only acquire what they consider to be a limited number of "good" books for children to read in the classroom, thus limiting their choices by default. On the other hand, setting up what have been called "fire walls" to prevent children from accessing certain information on the Internet is an explicit act of control. Relevant to such considerations is the pragmatic perspective in literacy research provided by Cherryholmes (1993), who states that "It is often useful to accede power to texts because texts, in turn enhance the readers' power in other situations . . . " (p. 13). Such issues merit more discussion among researchers and educators who are attempting to understand more fully the implications of electronic reading and writing.

**Alternative Textual Structures.** A defining attribute of printed texts is that they have linear, hierarchical organizational structures. At the most basic level identifying some writing as a text has meant that it has a beginning, middle, and end. In addition to being linear, texts typically have implicit or explicit markers that indicate hierarchical relations among various elements or ideas contained in the text. In a narrative there are protagonists, major and minor characters, key events that advance the plot, and events of lesser importance that may be little more than interesting diversions. Most expository texts are radically hierarchical with many visual features such as headings to indicate explicitly the difference between super- and subordinate ideas and facts. Beginning writers and readers are explicitly taught to be aware of the linear, hierarchical characteristics of printed texts and to use that awareness as a guide to their own writing and reading. It is not required, of course, that conventional printed texts be written or read sequentially, or that readers or writers organize textual information hierarchically, but not to do so typically requires working against rather than in concert with the technology of print. An index or concordance is an example of how print-based texts acknowledge the legitimacy of nonlinear, nonhierarchical access to textual information, but such tools are post hoc constructions; no writer would consider starting the writing of a book by creating an index or concordance. Also, readers who begin an extended reading of a book with the index or concordance would soon find their task tedious and frustrating.

The technological capabilities and characteristics of electronic texts, on the other hand, do not demand linear and hierarchical structures; in fact, they invite more flexible organizational structures. It has been argued that a hierarchy is the most natural structure for electronic texts (Duchastel, 1986). An obvious example is that most informational computer programs are menu driven. Menu driven programs invite a reader to explore the information in idiosyncratic sequences, and the writers of such programs typically provide efficient tools for a reader to locate diverse information flexibly across the various menu options.

The best example of how electronic texts have the potential to reduce the dominance of linear, hierarchical structures in texts is a genre of electronic texts referred to as hypertext. Hypertext has existed as a relatively obscure concept since the early 1940s and as a term since the 1960s, but
it has recently become an increasingly familiar concept inside and outside of the academic community. The most common defining attribute of hypertexts is that they are not linear and hierarchical. In hypertexts separate but related segments of hyperlinks are connected, or linked, in associational networks (Jonassen, 1986) not strictly organized into hierarchical outlines. A graphical representation of several hypertexts is shown in Figure 10-1a-c. Each labeled box in the figure is a...
textual node containing a segment of text, typically a single or several paragraphs in length. The lines indicate links created by the author allowing readers to move from one node to another. As can be noted by comparing the three examples, the associational networks can be simple, and thus more restrictive to a reader who has fewer options, or they can be more complex, and thus less restrictive to a reader who has many options for moving through the network. Smaller boxes within larger boxes indicate textual information subsumed by a superordinate text, thus demonstrating that hypertexts need not abandon hierarchical, and sometimes linear, structures entirely.

Several writers have presented theoretical perspectives that characterize the organizational structures of hypertexts and what effect they have on literacy. For example, Duchastel (1986) suggested that printed texts can be semantically structured or format structured. A linear, hierarchically structured text, such as a psychology textbook is semantically structured because any particular portion of the text is dependent to some degree on what comes before or after it. On the other hand, an airline schedule is format structured because it is designed to facilitate individualized searches for specific information. He argues that electronic texts, when compared to printed texts, enable a wider range of written materials (e.g., the psychology text) to be presented as format structured texts that are more individualized.

Bolter (1991), on the other hand, has focused on how structure can be viewed in terms of the dominant writing space, which he defines as the "physical and visual field defined by a particular technology of writing" (p. 11). Writing spaces produce what he calls the hard structures because any particular portion of the text is dependent to some degree on what comes before or after it. On the other hand, an airline schedule is format structured because it is designed to facilitate individualized searches for specific information. He argues that electronic texts, when compared to printed texts, enable a wider range of written materials (e.g., the psychology text) to be presented as format structured texts that are more individualized.

Bolter proceeds to discuss the possible hard and soft structures that may be associated with hypertext. For example, the computer screen is a hard structure that dictates to some degree the structure of electronic writing (as noted in the previous section where we discussed how it provides opportunities for controlling access to texts), and a link between hypertextual nodes might become a soft structure that could influence how writers and readers organize textual information.

Other writers such as Lanham (1993; see also Landow, 1992) tend to view structural differences between printed and electronic texts in literary terms. For example, he argues that the structure of electronic texts, particularly their ability to draw attention to their visual appearance, makes them a more rhetorical medium when compared to printed texts, which are inherently more philosophical and somber. Similarly, Bolter (1991) points out that the logic of philosophical arguments and the mental discipline necessary to present them are subverted by hypertexts because hypertexts provide a mechanism for presenting ideas in a format more consistent with the divergent and often circuitous routes characteristic of uninhibited thinking.

Some researchers are beginning to study the effects of hypertext on reading and writing. For example, Spiro, Coulson, Feltovich, and Anderson (1988) have found evidence that medical students recall less factual information but are better able to apply the content of medical texts when it is presented in a hypertext instead of a conventional printed text (see also Mannes, & Kintsch, 1987). Leu and Hillinger (1994) and Horney (1994) have studied readers' strategies in using hypertextual information, especially when they have access to a variety of on-line assistance. Other researchers have focused on the navigational aids that may be needed to help readers orient themselves with complex mazes of hypertextual information (e.g., Beasley, & Lister, 1992; Gay, Trumbull, & Mazur, 1991). More research is needed to investigate the effects of hypertexts on writing, reading, and learning.

The New Pragmatics and the Sociopolitical Dimensions of Literacy. Becoming literate has always included learning about the pragmatics of reading and writing, which includes an awareness of the social and political aspects of literate activity. Included in this domain are awarenesses as diverse as knowing that a comic book and a Dickens novel carry entirely different cultural connotations, knowing when a handwritten letter may be more appropriate than a typed one, and understanding the capabilities, motives, and potential effects that influence a newspaper's decision to print some stories and reject others. This dimension of literacy, typically learned informally, is emphasized by Brandt (1990) when she states, "Learning to read and write is not learning how texts stick together but how people stick together through literate means" (p. 42).

It is becoming increasingly clear that electronic reading and writing are affecting the pragmatics of literacy. The most prominent example is the widespread use of e-mail for communicating with individuals and with various groups whose members share some common interests. The evolution of accepted forms, contents, and practices related to e-mail communication is not complete and these issues are eventually addressed by the members of virtually any e-mail discussion group. Such groups focus on questions such as: Who should be included or excluded from the group? What types of content are appropriate to post to the whole group? When is it acceptable to forward a message to someone without permission of the original sender? Are there guidelines for when it is better to reply to an individual rather than to the entire group? Should one be allowed to publicize a product or service in which one has some financial interest?

Beyond establishing practical conventions of appropriateness related to these questions (often referred to as netiquette), e-mail leads to other questions that are beginning to attract the attention of literacy researchers. For example, what are the characteristics of e-mail that promote what seems to be a greater degree of informality and openness in writing? Do writers who resist expressing themselves in printed forms do so more readily in e-mail? Does e-mail
encourage candidness, imperiousness, confrontational rudeness (often referred to as *flames*), and so forth. If so, why and what effects does participation in e-mail writing and reading produce on individual readers and writers? Fey (1994) has conducted research addressing the latter question using a feminist perspective to examine the interactions among participants in an on-line college course. Is e-mail a catalyst for subverting established hierarchies of authority and decision making? Some studies suggest that it does in corporations (Kiesler, 1986) and in high schools (Neilsen, in press). How might e-mail be used to enhance the instruction of preservice teachers (e.g., Gallego, 1992; McIntyre, 1992; Myers, 1993)?

More studies are needed to address these and similar questions because the rise of e-mail and other forms of electronic texts is a major literacy event with far-reaching societal implications. For example, Rheingold (1993) has reflected extensively on his long-standing involvement with what he calls "virtual communities" on the Internet. He believes that electronic communities are analogous to the agora of ancient Greece "where citizens met to talk, gossip, argue, size each other up, [and] find the weak spots in political ideas by debating about them" (p. 14). And, as a free forum for expression he sees it as a powerful tool for extending democratic ideals. At the same time e-mail threatens some firmly entrenched notions about literacy. For example, the conversational informality of e-mail de-emphasizes the importance of accurate spelling and other mechanical aspects of writing. At another level, e-mail and other electronic forms of communication call into question the utility of current conceptions of copyright, plagiarism, and fair use. Also, it is beginning to undermine the utility of printed scholarly journals as the most efficient ways to disseminate and advance research (see Stix, 1994). Indeed, electronic texts advance postmodern views of literacy (Murphy, 1988) and have the potential to undermine the literary canon in the humanities (Bolter, 1991; Landow, 1992; Lanham, 1993). Issues of interest to the general public such as children's access to pornography on the Internet must also be addressed.

These developments and potential outcomes suggest that literacy research in a posttypographic world must gravitate even more toward a consideration of pragmatics particularly with regard to the social and political issues related to electronic reading and writing. Issues of policy must be carefully considered and researchers must seek to address questions that inform these discussions. In schools too we need to integrate a consideration of electronic literacy into the language arts curriculum (Reinking, 1994). Finally, in addressing issues related to pragmatics with regard to a changing literacy, we will benefit from taking an historical-analytic perspective (e.g., see Kaufer, & Carley, 1993), a perspective that has been less crucial when print was the only dominant form of reading and writing. By understanding more clearly the historical reasons that account for our conceptions of print-based literacy it will be easier to conceptualize and understand the transformations in literacy that we are currently experiencing.

### GENERALIZATIONS CONCERNING LITERACY ACQUISITION AND CLASSROOM-BASED RESEARCH

During the 1980s most of the studies investigating instructional uses of computers for reading and writing were ad hoc comparisons of individual computer applications and conventional reading and writing activities. Focusing primarily on skill-based outcomes or specific products, these studies were not typically driven by any explicit psychological, social, or pedagogical theory (Reinking, & Bridwell-Bowles, 1991). However, more recent studies have followed the turn in literacy research toward conducting contextualized investigations of instruction taking into account the dynamic factors that shape teaching and learning in classrooms. Researchers interested in investigating the role of computer technology in shaping literacy in classrooms have begun to realize the inadequacy of limiting their investigations to conventional experimental designs (Baumann, Dillon, Shockley, Alvermann, & Reinking, 1996; Reinking, & Pickle, 1993). We believe that a few tentative generalizations can be made on the basis of this emerging research and that they can be useful in generating questions for research as well as in formulating a pedagogical theory for using computers in literacy instruction. In this section we present several representative generalizations along with examples of research that relate to them; however, we wish to emphasize that our list of generalizations is not exhaustive.

**The effects of using computers for instruction are dependent upon a teacher's instructional philosophy and goals as much as upon the characteristics of the computer application or activity.** Much of the interest in using computer technology in schools is based on the belief that it has the potential to expand instructional options and to transform positively the standard modes of teaching and learning in schools (Cuban, 1986; Newman, 1990; Papert, 1993; Sheingold, 1991). Yet, many writers have cautioned that there is nothing intrinsic to computer technology that will bring about educational reform (Cochran-Smith, Kahn, & Paris, 1990; Greenleaf, 1994; Mehan, 1989; Weir, 1989; Zorfass, & Remz, 1992). Indeed, a review of the literature examining the effects of using technology across the curriculum clearly indicates that simply introducing computer-based applications or activities into classrooms is not enough to achieve that potential (Means et al., 1993).

This conclusion holds when focusing exclusively on the language arts curriculum. The most extensively researched example is Bruce's long-term investigations of QUILL, a comprehensive application emphasizing process writing and reading for meaningful purposes in the middle grades (see Bruce, & Rubin, 1993 for an extensive summary). Across several years and many classrooms, Bruce and his colleagues concluded that teachers shaped the QUILL activities to fit their own views of reading and writing, sometimes subverting the specific intent of the program. They state that "rather than the new technology radically reshaping the learning environment, the computers themselves were shaped to fit the already established patterns" (Michaels, & Bruce, 1989).
p. 12) and that "... no innovation, no matter how well conceived, and ... how well intended or executed, can in and of itself be assured of achieving positive change in instruction" (p. 35). Yet, reflecting on their many years of experience Bruce and Rubin state that their "detailed, self-critical appraisal of the evidence [about QUIII] yields surprises and reveals a richness in what students and teachers do that belies both optimistic and pessimistic visions of technology in relation to educational change" (p. 1).

Bruce's conclusions are supported by several other studies examining diverse computer programs across the elementary grades. For example, Miller and Olson (1994) found that a 1st-grade teacher who was enthusiastic about integrating technology into her language arts curriculum advanced her own pedagogical goals for writing when implementing various story writing software into her classroom. Over time, the researchers documented how her use of the software enhanced her instruction but did not move her in new directions despite the possibilities offered by the software. Similarly, our own work (Labbo, Murray, & Phillips, 1995–96) documents how one primary grade teacher was guided by her literature-based philosophy of literacy instruction in creating computer-based writing centers. Likewise, Dickinson (1986) found that the classroom writing system a teacher had already established fashioned how students used word processing software.

On the other hand, there is evidence that under certain circumstances, usually over an extended period of time, appropriate software or computer-based activities can effect changes in the modes of teaching and learning in classrooms. For example, Cooper and Selfe (1990) report that computer conferencing in college courses gives students authority to resist an academic agenda that does not meet their needs or values. Landow (1992) also describes how replacing a conventional textbook in an undergraduate course on Victorian Literature with a hypertext that mingles texts created by faculty and graduate and undergraduate students radically reconfigures modes of teaching, learning, and assessment. Again, in our own work (Reinking, & Watkins, in press), we found that over an entire school year introducing multimedia book reviews into middle-grade classrooms as an alternative to the conventional book report tended to disrupt conventional modes of instruction in ways that were often pleasant and appealing to teachers and students. We observed that for some teachers the various activities associated with this project led them to consider new instructional activities as extensions of the multimedia book reviews.

**Integrating computers into reading and writing activities in the classroom can foster increases in collaboration and thus has potential to change the social organization of classrooms.** A popular concern is that computers will create individuals who work in isolation and who prefer to interact with the computer rather than with people. There is no evidence to support this concern. Furthermore, we believe that the opposite conclusion is more accurate in classrooms. Computers, whether used to link people worldwide over the Internet or to engage students in classroom reading and writing activities, promote interaction and collaboration. In making this generalization we are drawing heavily on our own research experiences in classrooms, but other studies too lend support to our position.

Several studies have highlighted the increases in social interaction that occur when word processing activities are introduced into classrooms. For example, Dickinson (1986) found that children who worked with a classroom writing buddy (often necessitated by virtue of the fact that few classrooms and labs have had enough computers for every student) discussed plans for their writing and reacted to each other's writing when they worked at the computer. Bruce, Michaels, and Watson-Gegeo (1985) found that computers encourage students to write in a variety of ways that include collaborations involving sharing notes, writing articles for the class newspaper, and reviewing books or plays. Heap's (1986) ethnographic study of 1st-grade students' writing provides evidence that the computer brought together peers of almost equal ability leading to interactions that allowed one or both to work within Vygosky's (1978) zone of proximal development. Mehan (1989) noted that when 2nd-through 6th-grade students were allowed to work together on word processing, they were able to work out ideas collaboratively and were frequently made aware of points of view that differed from their own.

In our own work (Reinking, & Watkins, in press) we found that engaging students and teachers in learning Hypercard (a relatively simple but powerful authoring tool for creating computer presentations) and using it to create multimedia book reviews had noticeable effects on the social interaction and organization, at least during the times that students were engaged in that activity. For example, the ratio of student-to-teacher talk was greater during the activity, and teachers seemed to enjoy the fact that students often had more expertise than they did. Lower-ability students frequently took on a different persona when working on computer-based activities, frequently exhibiting more confidence and leadership when interacting with their high achieving peers. We also found that student-to-student interactions related to learning about the technology and meeting the challenges of programing their book reviews led to incidental sharing of information about enjoyable books. These findings are consistent with other studies that have found increases in social interaction when computers are integrated into various other areas of the curriculum (Friedman, 1990; McGe, 1987; Riel, 1989; Turner, & Depinto, 1992).

We believe that collaborative forms of reading and writing are likely to increase as electronic texts become more common in schools. As we have mentioned in a previous section, electronic texts blur the distinction between reader and writer by inviting readers to adapt and modify the texts of the original author, a possibility that could make writing and reading literally a socially constructed dialogue. Hypertexts in particular lend themselves to collaborative writing as Shirk (1991) has predicted; she states that "Writers will no longer create in solitary environments; they will become contributing members of hypertextual development teams" (p. 198). Classrooms may come to reflect what Landow (1992), in writing about the potential societal effects of electronic reading and writing, calls "a society of conversations in which no one conversation, no one discipline or..."
ideology, dominates or founds the others" (p. 70). More research is needed to investigate these possibilities in classrooms.

**Computers can promote the integration of reading and writing activities for purposeful communication.** Research has confirmed the intuitive belief that students write and read better when they are engaged in personally meaningful and purposeful tasks (Kirby, & Kirby, 1985). However, during the 1980s the use of computers in classrooms too often worked against this principle. Many writers (e.g., Smith, 1984) pointed out how commercial software dominated computer-based reading and writing in classrooms and how most of that software focused on teaching, drilling, practicing, and assessing isolated skills.

That criticism is less valid today for diverse reasons including the increased sophistication and availability of hardware and software as well as an increased technological astuteness among teachers and students. For example, more than 10 years ago a project using computers to link students in two schools, one in California and one in Alaska, was noteworthy; today such links are commonplace as is evidenced by a recent report that found that in 1994 more than 35% of the nation's schools had at least one Internet connection (Heaviside, Malitz, & Carpenter, 1995). Due to such developments more attention is being paid to how a variety of engaging computer-based activities can serve as a springboard to meaningful reading and writing across the curriculum. There are even preliminary indications that the dominance of the conventional textbook is being seriously threatened. For example, it has already been several years since the state of Texas qualified computer-based science programs as alternatives to conventional textbook adoption list.

There has been relatively little research focusing on how computers can promote integrated and meaningful reading and writing activities but a few examples can be cited. Labbo, Field, and Watkins (1995) reported preliminary findings from an ongoing study investigating the opportunities for literacy development that occur when the Internet is used to connect 3rd-grade students in two schools, one in the Southern United States and one in Taiwan. The children in both schools were motivated to interact frequently through e-mail which is more immediate, affordable, and accessible than letters or telephone calls. In their interchanges they raised questions about their counterparts' culture and they wrote descriptive reports in a hypertext format about family life, school life, cultural activities, and forms of government. The available technology allowed them to scan photographs of their families and to include transcripts and audio segments of interviews with their school principal and teacher. They also wrote journal entries about typical daily activities. Another example is a study by Turner and Depinto (1992) which found that students who composed hypermedia documents were motivated to think about how to present information that made sense to their peers. Such computer-based reading and writing has all the characteristics of meaningful, authentic reading and writing tasks that are currently being promoted among literacy educators, and they stand in stark contrast to both early uses of the computer in classrooms and to conventional academic tasks. More research is needed to guide continued expansion of these types of activities in classrooms.

**Computers can facilitate students' reading and writing by providing individualized assistance and by reducing the drudgery associated with some aspects of reading and writing.** Salomon's (1979) theory of instructional media postulates that a critical attribute separating various instructional media is the degree to which a particular medium can supplant processes and skills necessary to acquire information from that medium or to perform a task with that medium. For example, motion pictures have an advantage over photographs because zoom and closeup shots can focus a viewer's attention to important details that might not be noticed by the viewer of a photograph. Using this theoretical position Reinking (1987) argued that printed and electronic texts should be considered different media because electronic texts provide many more opportunities for individual help and guidance during independent reading and writing. The examples of computer applications and research cited in earlier sections of this chapter devoted to the malleability of electronic texts and their capability to expand the boundaries of freedom and control in accessing textual information support this position. However, we provide additional examples here to highlight how these capabilities might figure in classroom instruction.

For example, in our own work (McKenna, 1994) we are investigating the effects of providing beginning readers with pronunciations of unfamiliar words sometimes accompanied by phonetically related words while reading popular children's books presented by a computer. We believe that electronic texts might provide options for innocuous and individualized phonics instruction without detracting from the enjoyment of children's literature. We believe that computer technology offers a variety of new instructional options for assisting students in learning fundamental but often mundane aspects of reading and writing and that such instruction can be accomplished in engaging ways that free teachers to concentrate on less transient aspects of literacy acquisition. We are also interested in related questions such as how far children might choose to read above their instructional level when they have access to supports that reduce the obstacles to successful reading. Our work extends several other rigorous, theory-based studies aimed at providing individualized assistance that reduces the difficulties facing some early readers. For example, Olson and his colleagues (Olson et al., 1986; Olson, & Wise, 1987) have experimented with various types of speech feedback; Reitsma (1988) has investigated how reading with computer-based speech feedback compares to teacher guided reading; and Roth and Beck (1987) have compared the effects of two theory-based computer word games with speech feedback on word recognition and comprehension.

Some of the research investigating the effects of word processing has focused on how it may assist young children overcome the limitations inherent in writing with conventional tools. For example Chang and Osguthorpe (1990) and Green (1984) have investigated how word processing supports emerging writers by providing visual, auditory, and motor help and by removing the often tedious aspects of early
writing such as forming letters with a pencil. Also, Phenix and Hannan (1984) suggest that word processors bolster young children’s efforts to revise, reread, and rewrite narratives because they can focus more on the content of their message and less on penmanship and spelling. In a case study of a kindergarten student, Cochran-Smith et al. (1990) conclude that the effectiveness of word processing activities for children’s writing development is dependent on the writing task, the child’s literacy development, the instructional context, and features of the word processing software.

We believe more research is needed to explore such factors and how they relate to the computer’s ability to individualize assistance and to reduce the need for less engaging aspects of reading and writing processes. Studies are needed to investigate how instructional activities derived from such awarenesses can be implemented in classrooms and what their effects are on teaching and learning. We need to determine what Salomon et al. (1991) have called effects with and of media. That is, what are the immediate consequences of reading or writing a particular text with a computer and what are the long-term effects of the computer on the way students approach reading and writing in general?

ISSUES AND TRENDS: PAST, PRESENT AND FUTURE

Researchers’ interest in computer technology and literacy spans almost 30 years, beginning with Richard Atkinson’s research on a computer-based initial reading program at Stanford University (Atkinson, & Hansen, 1966). However, except for a few large projects such as Atkinson’s at Stanford, which were typically supported by large grants, most of the research involving computers has occurred since microcomputers were introduced in the late 1970s. During the intervening 15 years, the perspectives and questions motivating interest in computers and literacy have evolved as computer technology and knowledge of its use has become more sophisticated, as the availability and use of computers have increased in and out of schools, and as educators and researchers have come to understand more fully the computer’s potential to alter traditional conceptions of schooling and literacy. There has been an increasing, although sometimes reluctant, acceptance of the idea that electronic forms of reading and writing are moving closer to the mainstream of literacy. The early conception of computers as instructional devices that provided novel opportunities for accomplishing the goals of the conventional language arts curriculum has gradually given way to a realization that computers may precipitate fundamental changes in how we read and write. This shift represents a maturing of the technology and our awareness of media. That is, what are the immediate consequences of these changes? The trend away from simple, atheoretical studies comparing the effects of literacy activities with and without a computer, which we noted in an earlier section of this chapter, can be cited here again. Early studies frequently lacked theoretical justification and methodological rigor, and they provided specious answers to wrong questions (e.g., see a critique of the extensive research on IBM’s writing-to-read program by Kreindl, & Williams, 1990). Such studies mirror the unproductive approach used to study a variety of earlier media such as instructional television, and leaving such research behind is a positive development indicating that an interest in computers and literacy is not as transient as it has been the interest in other instructional media. Also, unlike early studies, recent research has focused more on conceptual factors that separate printed and electronic texts such as those we have highlighted in this chapter as opposed to visual factors, such as the optimal amount of text to display on a single screen. Relative minor variations in the visual display of texts on computer screens have not produced robust effects on the most valued aspects of literacy such as reading comprehension (Reinking, 1992; Reinking, & Chanlin, 1994); thus, we see the decreasing interest in such factors as a positive development. We also see a shift from inter- to intramedia comparisons (a distinction first alluded to by Wright, 1987). Early studies focused on comparing electronic and printed texts usually with the tacit assumption that printed texts were the standard against which electronic texts must compare favorably to be of any value. Now we are seeing more studies content to investigate how differences in computer-based reading and writing activities might be improved without comparisons to ostensibly parallel print-based activities. Indeed, as printed and electronic texts continue to diverge, such comparisons make less sense intuitively and practically. For example, why should researchers compare writing with a word processor to writing with conventional materials when no one would seriously propose abandoning word processing? Likewise, most word processors now include means to incorporate video and sound into written documents, which take them beyond the realm of print.

Another notable trend is that research devoted to investigating the relation between computer technology and literacy has benefited from and contributed to the broader interest in contextualized research in classrooms. Researchers today are conducting investigations consistent with Weir’s (1989) point of view when she states, “The kind of teaching and learning I am concerned with treats the computer as an adjunct to socially mediated learning, as part of a context, a constellation of children with children at the computer, of teachers with children with computers” (p. 61). Such a perspective is consistent with recent trends in educational research that emphasize what Salomon (1991) has called systemic, as opposed to analytic research. That is, researchers are looking more globally at the effects of introducing computer-based literacy activities into classrooms and schools. To do so they are using conventional qualitative approaches such as action research (e.g., Labbo et al. 1995–96). Notably, they are at the vanguard of efforts to develop new approaches to classroom research. For example, in our own work we have extended Newman’s (1990) concept of a formative experiment as a means to
determine how computer-based activities can best accomplish specific literacy goals in classrooms (Baumann et al., 1996; Reinking & Pickle, 1993; Reinking & Watkins, in press). Also, Bruce and Rubin (1993) have introduced an approach to classroom research they call situated evaluation to study the effects of innovative reading and writing activities in classrooms.

Furthering the move toward classroom research is an increasing confidence that computer-based activities are not only likely to remain a part of classroom life but that they are moving steadily toward the mainstream of instruction. This point of view is reflected in calls for systematic instructional responses to the new skills and awarenesses that are necessary for readers and writers in a world where much reading and writing will take place electronically (Reinking, 1994). It is also reflected in the development of pedagogical theories centered in computer technology. For example, The Cognition and Technology Group at Vanderbilt University (1994) has developed a wide range of computer-based instructional activities centered in the concept of anchored instruction. In brief, anchored instruction postulates that students learn more when a variety of instructional activities, typically that include reading and writing, is related to a rich, shared experience presented as multimedia using a computer. More research is also investigating how young readers and writers experience emergent literacy when they have regular opportunities to engage in reading and writing activities involving computers. For example, in our own work (Labbo, 1994, 1995; Labbo, Reinking, & McKenna, 1995) we have examined kindergarten students' and teachers' extensive use of a word processing and drawing program as part of school and home activities. Our ethnographic data suggest that children take a variety of approaches in exploring software tools that allow them to express themselves symbolically. We found that children view the screen as a landscape to be explored, as canvas to be painted, as a page to be written upon, as a playground, and as a stage to narrate dynamic, spontaneous plays. Other mainstream researchers have also begun to conduct research into how computers figure into emergent literacy. For example, Sulzby (1994) has compared how literacy emerges in young children who have or have not had opportunities to use computers.

Another recent trend is the rise of perspectives on literacy that would have been unthinkable only a few years ago. More writers are not only questioning definitions of literacy based solely on print but are also beginning to identify explicitly the limitations of printed materials when compared to electronic forms of communication. The focus of this volume is a case in point. Another example is the topics of two plenary speeches presented at the 1994 meeting of the National Reading Conference (Flood & Lapp, 1995; Reinking, 1995), a leading professional organization for literacy researchers. These talks focused, respectively, on the need to expand definitions of literacy to include visual literacy and on the need for literacy researchers to completely reorient their research agenda in light of the increasing prominence of electronic reading and writing. Also, members of The Cognition and Technology Group at Vanderbilt University (1994) have proposed the term 'representational literacy,' which is the ability to communicate ideas flexibly using multimedia. Other writers are seriously questioning whether our conventional bias for prose over other verbal and nonverbal modes of communication is justified (Bolter, 1991; Edwards, 1991; Landow, 1992; Lanham, 1989, 1993; Lemke, 1994; Tuman, 1992a, 1992b). Tuman (1992a) goes so far as to suggest that teachers of writing must confront the possibility that the sustained, detailed crafting of written language is too difficult a task, too removed from normal, informal, sporadic uses of language, to be the normative impulse driving the truly language arts curriculum... [because in doing so] we doom many students to be labeled as failures. (p. 124)

These broadened perspectives point to a heightened consciousness about aspects of literacy that have been either transparent or foreign when printed materials were the only reasonable standard for reading and writing. These perspectives also highlight the need to examine the changing landscape of literacy by opening up interdisciplinary dialogues among scholars in areas as diverse as sociology, history, communication, literary criticism, and education. We understand that to be a primary goal of this volume and hope that our perspective on current theory and research contributes to the dialogue.
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