What are the implications of technology for classroom literacy instruction in the future?

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ABSTRACT

At the 1997 New York State Reading Association conference, panel members Leu, Myers, and Reinking led a discussion on the future of literacy and classroom instruction with new technologies. This article combines their separate position statements and provides literacy teachers with a philosophical and pedagogical framework for integrating technology tools into classroom experiences. While the three authors highlight different aspects of the adoption of technology tools, they share significant beliefs about the historical and social contexts of new technologies, changes in the nature and consequences of literacy with technology, and the processes of adopting strategic uses of technology in educational practice.

Accurate predictions in the area of technology change and literacy are seldom achieved. Who could have predicted the important role of the Internet five years ago, or the role of CD-ROM software ten years ago, or the role of word processors fifteen years ago? This makes pronouncements about the future consequences for literacy either risky or foolish. For example, historically, many experts have proven to be notoriously poor prognosticators. A recent Newsweek article entitled "Cloudy Days in Tomorrowland" (January 27, 1997) offers a litany of predictions that in hindsight seem foolish. They range from the early twentieth century financier's assessment that horses were here to stay and the automobile was a passing fad, to the president of Digital Corporation's conclusion in 1977 that there is no reason for anyone to have a computer in the home. Predictions aside, as the following quote by Tuman (1992) suggests, the future in a very real sense is here already.

It is as if the terrain we stand on has shifted—with many of us about to look up and discover the playful speculations of computer enthusiasts transformed into pressing questions of public policy. [We must address questions] about reading and writing with computers, not as futurists or theorists, but as teachers, parents, and citizens faced with immediate and difficult educational decisions. (p. 15)

Hardly a day goes by without a new example of digital information replacing printed information. We have moved beyond the threshold separating a typographic and a post-typographic world. The questions that are important are not "when" and "if," but "what does this mean" and "how are we to cope?"

Leu points to fundamental historical change in our culture that drives changing technology and contextualizes what it means in today's world to become literate. We must understand the nature of this historical change as we consider the nature of literacy today and in the future. We have moved from an agrarian, to an industrial, to an information age with intense global competition. It is no longer land, labor, or capital that defines one's life opportunity in the information age in which we live. Instead, problem solving, information access, and communication are essential to success. Literacy is essential to enable individuals, groups, and societies to access the best information in the shortest time to identify and solve the most important problems and communicate this information to others. In our historical era, the race will be won by those who are fastest at using information in the most effective manner. Thus, it should come as no surprise that the Internet has appeared at this time. The Internet is the most efficient way currently to store, access, and communicate large amounts of information to vast numbers of people interested in identifying and solving similar problems and possibilities. The Internet and other networked technologies will be essential if we hope to prepare our students for the futures they deserve.
Reinking highlights an additional context of personal literacy history—what might be called the “old fogey factor,” which is relevant to those of us whose formative years were prior to the advent of the microcomputer in the early 1980s. That is, though many of us do not consider ourselves old chronologically, we may find ourselves longing for the good old days when the book was unchallenged as the dominant text-delivery device—a time when the joys of literacy were associated with the touch, the smell, the ambiance of reading printed pages. We will be more likely to address seriously and realistically the literacy needs of our children if we can overcome any biases we harbor against the computer screen, available today in an increasing array of shapes, sizes, and situations. If we are to be truly honest with ourselves, we will find it difficult to defend an argument that the computer screen is inherently inferior to the printed page despite the current, and likely temporary, fact that the hardware that comes with it is bulky and the software that drives it cumbersome, unreliable, and often downright aggravating.

Myers believes that technology has probably remained fairly neutral, being shaped by the cultural uses involving literacy. Historically, the hierarchical forms of authority of the Roman Catholic Church may have seen a demise through the mass-printing of the Bible and the ensuing Reformation and democratic revolutions, yet seen a rise in the paper work which defines the lives of people in the bureaucratic state. In schools, most all literacy activities and learning are framed by an evaluative context that narrowly defines literacy as acts of written communication that are judged in terms of form and content by an authority. Technology, in making it so easy to use multiple media to represent the world and communicate ideas, has supported the broadening of our definition of literacy to include many acceptable forms for demonstrating knowledge in schools. In fact, as literacy comes to include all forms of representing meaning through art, dance, music, video, and gesture, we begin to understand how meanings constructed with print have always relied on our life experiences with all forms of representation.

However, as Reinking points out, the idea of retooling our teaching practice in light of technological change is not always a pleasant thought. We create routines and adopt comfortable perspectives in all aspects of our personal and professional lives to simplify and manage complexity. Entertaining the possibility that we need to substantially re-conceptualize literacy and our teaching of it threatens whatever security we have been able to carve out of that complexity. As Myers cautions, technology may be adapted to accomplish the same principal end as current school instruction in which the teacher transfers knowledge to the student whose identity and social relationships are constructed within the classroom evaluative context. Or, Myers asks, can we find ways for the newer technologies (spilling into school often through the students themselves) to reshape human interactions involving the construction and sharing of knowledge to support more equitable, collaborative relationships and a valuing of difference and community belonging?

**CHANGES IN THE NATURE OF LITERACY WITH TECHNOLOGY**

The new electronic contexts for literacy, because they are powerful, complex, and continually changing, will be even more dependent upon social learning strategies than traditional literacy contexts. No one person knows everything there is to know about the Internet; each of us has useful information that can help others. One person may know something about how to search for information but another may know a really good location for students who want to publish their work. By sharing our information, we can help one another learn about these rich information resources. Literacy learning on the Internet, Leu asserts, is best accomplished through social interactions with others, perhaps even more naturally and frequently than in traditional print environments.

From the perspective of literacy as a situated practice, Myers argues that electronic communication involves different consequences for authors, readers/viewers, and “texts.” First, the idea of a “text” is broadened to include all media forms which represent ideas and experience; thus, film, music, dance, gesture, and even clothing become “texts” which are intentional and can be interpreted. Being able to represent knowledge in these multiple media with electronic imaging and communication tools creates the sensation of first-hand experience of the world that is much more powerful than reading a second-hand description in written words. The constructed nature of printed and multimedia texts becomes more obvious as we author and publish using electronic tools. The ability to produce electronic representations has consequences for our sense of audience as now the world can access our ideas published on the Internet, also giving us a new sense of voice and power. Through these electronic communications we also are brought more often and more quickly into contact with the world’s great diversity—we can find connections and build community with minds all over the globe that show up on our very own computer screen. We can develop a
greater value for sharing ideas with others at the same time that we can feel greater control over our expressions by effortlessly changing our words and images with electronic editing tools. This sense of impermanence supports our openness to revise personal and group ideas through the on-line negotiation of meaning. Electronic literacy exposes the function of image and word to create social belonging, going beyond the emphasis of print to simply shuttle ideas between separate minds.

Reinking believes that the unique characteristics of digital reading and writing are becoming increasingly clear (Reinking, 1995). With the aid of a computer, reading and writing are literally (a) interactive processes; (b) they entail a wider range of media; (c) they allow for a broader range of freedom and control in accessing information; (d) they invite the use of alternative ways to structure texts; and (e) they create new modes of written communication such as E-mail, which require the knowledge and use of particular conventions.

1. Interactive: There are many examples that could be cited to demonstrate that unlike printed texts, which are inert, electronic texts are dynamic and more naturally encourage, even demand, the active engagement of readers. In short, readers are faced with choices, and counseling them about making wise choices and finding useful information in electronic forms are critical issues.

2. Multimedia: Electronic texts may incorporate sound effects, speech, animations, movie clips, and so forth. To insist today that students compose with the conventional symbolic elements of printed texts alone, is increasingly becoming an anachronism. Many authors recently have pointed out that we need to broaden our conceptions of literacy beyond the alphabetic code so central in the typographic.

3. Freedom and Control: Electronic texts broaden the boundaries of freedom and control in accessing information. For example, electronic texts allow beginning readers more freedom to read independently. An electronic text can provide immediate access to the pronunciation or meaning of a difficult word, or a more advanced reader can easily access needed information on the Internet. Likewise, electronic texts can limit a reader’s access to some aspect of a text until an appropriate time.

4. Alternative structures: The technology of print has naturally led us to think of texts as linear and hierarchical, thus the utility of the conventional outline. Electronic texts, however, encourage a non-linear approach to reading and writing, which raises some entirely new literacy issues. Hypertexts which create links between independent or semi-independent nodes of text are the prime example. These alternative structures also blur the distinction between readers and writers (e.g., creating one’s own pathway through a text is akin to writing) and subvert the view of texts as distinct entities and the finality of published documents.

5. New Modes and Conventions: We need to begin to understand with our students the dynamics and conventions of new modes of written communication such as E-mail. Determining the ethics of forwarding a message without permission, how to respond to a “flame” (term for insult), the use of emoticons (such as a smiley face), and typography, and so forth are quickly becoming literacy skills of the highest order of practicality. To omit such topics from instruction in schools seems increasingly short-sighted.

**Processes of Adopting Technology Tools in Educational Practice**

Myers believes that technology can be used to accomplish the same ends as traditional literacy instruction—the efficient transfer of knowledge to a passive learner. Or, pedagogy can frame the use of technology to support classroom activities in which meaning is negotiated or examined for the purpose of constructing shared meanings in a democratic community for which the classroom is our youth’s primary introduction to socially organized life and public institutions. Such activities would construct a critical literacy, supporting more equitable decision making, more thoughtful consuming, or more embracing of difference through the use of multimedia literacies to negotiate experience, represent ideas, and create a sense of belonging. Three forms of electronic activity illustrate this possibility: (a) E-mail communicating, (b) world wide web publishing, and (c) hypermedia authoring. First, in E-mail and netnews networks, participants share personal experiences, offer alternative points of view, ask questions and question answers. Meanings are negotiated across cultures and the webs of meaning and belonging across the world are drawn tighter together. Second, the world wide web gives power to “ordinary” citizens to publish ideas in multimedia format and to link those ideas to any others in the world. (We must deal with the issue of access and cost and the unequal distribution of capital nationally and world wide, for computing remains a middle class revolution to date. However, the cost of knowledge production and distribution will be far less in the electronic space of the future than in the bookstore of the present.) Again, people are able to negotiate ideas and create physical traces between ideas for others to negotiate shared meanings. Garner and Gillingham (1997) describe how six teachers incorporated
Internet activities in their classrooms to support the development of several literacy abilities. One case study illustrates how students can become highly motivated to use literacy when they control the topic, audience, and purpose in their net communications. Such electronic messages demonstrate logical thinking and improved language forms over more traditional class writing assignments. In another case study, through e-mail communications students change the study of history from the memorization of facts to the exploration of topics by making connections between the associated ideas in the many hyperlinks from one web page to the next. And, in a third case study, Internet communication provided young adults in high school with the opportunity to establish their own membership in the adult world.

A third set of classroom activities utilizes the power of desktop software to create student-authored multimedia, videos, hypertext, presentations, or desktop publications. Color printing is now common and low-cost giving the power of commercial printing to class newspapers and magazines. Scanners allow students to add photographs and drawings to their stories. Hypermedia software such as StorySpace, HyperStudio, and Digital Chisel help students bring texts of all media together and create multiple pathways through various display windows, and invite readers to add new windows of information or create even more links between ideas. Video production software like Adobe Premiere and Avid Video Shop give students professional studios in which they can use video footage to create quicktime movies, set to their own audio tracks and voice recordings. Students can create documentaries on topics they research, autobiographies, or critical commentaries on traditional texts and cultural media. Students can also create and manipulate their own advertising images in programs like Adobe Photoshop, taking the "consumer" further inside the ideological construction of visual representations that predominate our mass media culture. These activities greatly expand the traditional written essay that has dominated student expression for decades of school literacy practice, yet they require a great deal of writing to organize, negotiate, and prepare thoughts and "texts" for an effective hypermedia representation of ideas. Myers, Hammett, and McKillop (1998) demonstrate how hyper-media technology offers teachers a way to frame classroom activities to promote critical literacy.

Reinking recommends that teachers start by introducing students to a single simple technological activity that has the following characteristics. It should relate to conventional print-based literacy in meaningful ways helping to bridge the familiar and the new. Working with a multimedia encyclopedia is a good example. It is related to a familiar reference and incorporates many of the characteristics of electronic texts. The activity should involve authentic communication and meaningful tasks; worksheets and drills on computer software are not the route to the new awarenesses and skills we are after. It should engage students and teachers in higher levels of thinking about both printed and electronic texts. A class discussion on the advantages and disadvantages of multimedia and conventional printed encyclopedias would be an example. This might involve some exploration of how sources of information are validated. Finally the activity should allow students to develop functional strategies for reading and writing. Such a consequence would emerge from the multimedia encyclopedia as students engage in "data-base thinking" essential to locating useful information electronically.

Given the social nature of electronic literacy, Leu believes instruction should be grounded in practices that take advantage of social learning opportunities. Workshop experiences and cooperative learning activities may be especially useful with the Internet since they allow groups of students to share experiences and learn from one another. In addition, the Internet is also developing its own form of socially mediated learning, many of which appear to be very promising for classroom instruction; these include listserves, IRC chat sessions, collaborative Internet projects, and teleconferencing with CUSeeMe and other video technologies. Leu provides some helpful beginning Internet sites which are listed at the end of this article.

As we consider changes in how we teach, we need to keep in mind an important paradox: While technology is becoming increasingly available to classrooms, it is not always systematically integrated into a central location within classroom lessons (U.S. Congress, 1995; Kinzer & Leu, 1997; Leu, Hillinger, Loseby, Balcom, Dinkin, Eckels, Johnson, & Raegler, in press). When teachers with Internet connections are asked why they haven't fully exploited its potential, the answer is often, "I just don't have the time to learn about it." While many stories of exciting learning experiences with the Internet exist, many teachers are also struggling with Internet integration (U.S. Congress, 1995).

One staff development model Leu and Leu (1998) have found effective contains four instructional strategies that are sequenced to enable teachers new to the Internet to move from simple to more complex classroom integration: Internet Activities, Internet Projects, Internet Inquiry, and Internet Workshop. The order also moves teachers from a more traditional classroom model of learning centered around the teacher's dispensing of knowledge, to a classroom model...
centered around the students and their learning needs as knowledge is collaboratively constructed to accomplish valued purposes. Central to each of the first three strategies is the use of Internet Workshop, a strategy for learning collaboratively in the classroom about Internet use and for sharing the results of group and individual learning projects. In a typical workshop, students share how they completed Internet activities, helping to build community literacy skills together with placing a value on the ideas constructed by students within the interactive activity.

Technology tools facilitate the production of words and images. And, electronic publishing brings these words and images and their authors closer together in time and space. This has fundamental consequences on the nature of knowledge and the forms of literacy by which knowledge is socially constructed. Classroom technology experienced within social collaboration involving the negotiation of experience, the multimedia representation of ideas, and the linking of representations to build and evaluate knowledge, promises to support the critical literacies required for community belonging in a multicultural world, whether those literacies be electronic, paper, or chalk. Students already have, or quickly learn, many of the skills needed to work the machines; as educators we must provide a vision of the democratic and human purposes that can be served in our uses of the machines.

USEFUL SITES FOR INTEGRATING THE INTERNET INTO YOUR CLASSROOM

Connecting with Other Teachers
- http://www.readinonline.org/ — International Reading Association Online Journal
- http://www.classroom.net/classroom/edulinks.html — Classroom Connect Jump Station
- http://www.liszt.com — Liszt Select
- http://www.pacificnet.net/~mandel/ — Teachers Helping Teachers
- http://www.schoolnet.ca/adm/staff/ — The Staff Room of Canada’s School Net

Cross-Cultural Learning Experiences
- http://www.stolaf.edu/network/iecc — Intercultural E-mail Classroom Connections
- http://web66.coled.umn.edu/schools.html — International WWW Schools Registry
- http://www.africaonline.com/AfricaOnline/coverkids.html — Africa Online: Kids only
- http://indy4.fdl.cc.mn.us/~isk/mainmenu.html — Native American Indian Resources

Writing Opportunities
- http://www.pitsco.com/p/keypals.html — Piitsco’s Launch to Keypals
- http://www.quill.net — The Quill Society
- http://i-site.on.ca/booknook.html — The Book Nook
- http://www.realkids.com.club.htm#top — Young Writers Clubhouse
- http://nimbus.temple.edu/~cforrest/Lit/Right.htm — Publish your work online
- http://www.ipl.org/teen/aplus/ — Guide to writing research paper and internet research
- http://syndicate.com/ — Vocabulary site with puzzles and games

Literature Opportunities
- http://www.peg.apc.org/~balson/story/jump.html — Stories from Australia
- http://www1.psu.edu/ChapterOne/Children/index.html — ALA Newbery Award Winners
- http://www.ipl.org/youth/AskAuthor/ — Ask the Author
- http://pubpages.unh.edu/youth/AskAuthor/ — Ask the Author
- http://the-tech.mit.edu/Shakespeare/works.html — Complete Works of Shakespeare
- http://www.georgetown.edu:80/tamlit/tamlit-home.html — American Literature Archive
- http://mgfx.com/kidlit/ — Kidlit site to get kids involved in literature

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Opportunities for Exceptional Students
http://www.hood.edu/seri/serihome.htm — Special Education Resources on Internet
http://www.interactive.net/-wader/sped.htm — Resources for Special Educators
http://www.cec.sped.org/home.htm — The Council for Exceptional Children

Central Sites — Great to Locate Internet Activities and to Begin Internet Inquiry
http://www.excepec.com/-dboals/boals.html — Social Studies Web Site for K-12 Teachers
http://www.enc.org:80/index.htm — Eisenhower National Center for Math & Science
http://forum.swarthmore.edu/ — Math Forum
http://www.wmht.org/trail/explor02.htm — Walk a Mile in My Shoes- Multicultural

Internet Projects
http://www.gsn.org/gsn/proj/index.html — Global SchoolNet’s Internet Project Registry
http://www.kidlink.org:80/KIDPROJ/ — Kidproject list
http://www.classroom.net/contact/ — Classroom Connect’s Teacher Contact Database
gopher://ericir.syr.edu:70/Listserve/KIDSHERE-List — Archives of Kidsphere
http://www.otan.dni.us/webfarm/emailproject/email.htm — E-mail projects
http://schoolnet2.carleton.ca/english/ext/aboriginal/lessons/index.html — Sample projects

Child Safety Locations
http://www.cyberpatrol.com/ — Cyber Patrol
http://www.netnanny.com/netnanny/home.html — Net Nanny
http://www.surfwatch.com/ — SurfWatch
http://www.gsn.org/web/tutorial/issues/index.htm#begin — Guidelines and Policies for Protecting Students
ftp://ftp.classroom.net/wentworth/Classroom-Connect/aup-faq.txt — Classroom Connect’s Acceptable Use Policy FTP Site

REFERENCES


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