

Technologies of Text: Reflections on Teaching, Learning, and Writing with/in Digital Environments

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Four years ago I was invited to develop and teach a course addressing some aspect of literacy and technology within the context of a Master of Educational Technology program. I came to the project with experience in web development and an established research program in digital literacy, but with little first-hand experience of e-learning from an instructor's perspective. In developing my materials for online delivery, I teamed with an exceptional instructional designer, Jeff Miller, and the course was launched in the fall of 2002. Teaching it since in two online offerings and one face-to-face offering has afforded me an interesting perspective on curriculum and pedagogy for digital literacy, as well as on the nature of writing in new media environments. I offer this paper, then, primarily as an instructor's reflection on the value of this journey. The paper consists of three parts: 1) a discussion of the premise of the course, 2) an overview of the context and curriculum, and 3) remarks upon a collaborative community-building assignment that revealed for both the students and myself some interesting features of hypermedia in terms of the ways in which it both promotes and confounds certain notions of writing in online environments.

Toward a broader understanding of technology

The premise of the course in question, entitled "Text technologies: The changing nature of reading and writing," has to do with broadening perceptions

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of technology in the digital age. In educational contexts, for instance, *technology* is often used in a limited sense to refer to computer hardware, applications, and compatible devices. Several ministries of education in Canada have produced K-12 curriculum documents in which *technology* is used interchangeably with *computers*. Consider the British Columbia 6-9 ICT Implementation Guide, which begins as follows:

As a teacher, you know that technology offers powerful new opportunities to enrich student learning. You also know that teachers need much more than hardware and software to build those opportunities into their daily teaching. If teachers are to make technology a dynamic part of their daily work, they need time, resources, training, and most of all, encouragement and support. (Ed. Tech. Branch, 2001, p. 3)

In some respects it is understandable that such interchanging of terms occurs: the computer is the revolutionary machine of the present day and has thus come to embody all things technical. To understand how new technologies may be modifying human experience, however, particularly in relation to the production and reception of text, it is necessary to broaden our understanding by looking at recent technological developments through an historical lens.

In the last fifteen years, phrases such as Educational Technology, Communications Technology, and Information Technology have all come to be associated primarily with computing. The Information Technology (IT) Association of America, for example, observes the following in a statement about the nature of the industry:

With the market in 2001 spending over \$800 billion, Information Technology (IT) is one of America's fastest growing industries, encompassing computers, software, telecommunications products and services, Internet and online services, systems integration, and professional services companies. (ITAA, 2003, n.p.)

Rhetoric around IT is generally couched in the insistent present or optimistic future tenses, while the memory of the industry seems ridiculously short-lived. Computers that were state-of-the-art as recently as fifteen years ago, in an interesting and paradoxical shift in usage, are now termed "archaic," and anxious articles musing about the need to eradicate these artifacts of the recent past abound (e.g., Puzanghera, 2002; Didrickson, 1996). Documents that do detail the history of IT tend to concern themselves with the development of telecommunications systems, originating with the telegraph transmitter and receiver developed by Samuel Morse in 1837. A caption in the Information Age exhibit at the Smithsonian's National Museum of American History reads: "Today's information age began with the telegraph. It was the first instrument to transform information into electrical form and transmit it reliably over long distances" (Smithsonian, 2003, n.p.).

Statements such as this, however, most certainly represent a limited understanding of what constitutes “information technology.” A broader perspective would concede that *writing itself* is the fundamental information and communication technology underpinning any literate culture. As Ong (1982, p. 81) observes, people in early literate cultures thought of writing “as an external, alien technology, as many people today think of the computer.” Plato, for example, deliberated over its benefits and drawbacks in the *Phaedrus* in the 4th Century BCE, just as we now deliberate over how the computer will change education, communications, and so on. Plato casts his reflection on the subject as a dialogue between the inventor of letters, Theuth, and an Egyptian king, Thamus. This interchange is alluded to in many discussions of the development of literacy, as well as of education and information technology (cf. Ong, 1981; Postman, 1991; O’Donnell, 1998; Bolter, 2001); nevertheless, it is worth repeating a portion here. Says the sceptical king to the enthusiastic inventor,

The specific [writing] which you have discovered is an aid not to memory, but to reminiscence, and you give your disciples not truth, but only the semblance of truth; they will be hearers of many things and will have learned nothing; they will appear to be omniscient and will generally know nothing; they will be tiresome company, having the show of wisdom without the reality. (Plato, n.d.)

In considering Plato’s remarks, Ong observes that in terms of its influence on human culture, writing is the most radical of any communication technology:

Because we have by today so deeply interiorised writing, made it so much a part of ourselves, as Plato’s age had not yet made it fully a part of itself . . . we find it difficult to consider writing to be a technology as we commonly assume printing and the computer to be. Yet writing (and especially alphabetic writing) is a technology, calling for the use of tools and other equipment: styli or brushes or pens, carefully prepared surfaces such as paper, animal skins, strips of wood, as well as inks or paints, and much more . . . Writing is in a way the most drastic of the three technologies. It initiated what print and computers only continue, the reduction of dynamic sound to quiescent space, the separation of the word from the living present, where alone spoken words can exist. (Ong, 1982, p. 81–82)

This understanding of writing (text) as technology is reinforced through etymological exploration. For example, considering the origins of the term *text* reveals some interesting connections. Scholes (1992) observes that the word finds its roots in Greek. To summarize,

- Tik or tikos is a medication used in childbirth
- Teckt_ denotes the act of engendering or bringing into the world
- A tekt_n is a craftsman, especially one who works in wood
- Techn_ is an art or skill, cunning (of hand or of intelligence), or a treatise (on grammar or rhetoric)

All of these terms, Scholes remarks, share a common theme—that of creation; and this is fitting, for anyone who has spent much time writing will understand how the process might be conceptualized as a form of germination or birthing, carrying with it all the joys and sorrows of the same. Further, if we consider the last two of the words listed here, we find that *technology* is closely related to *text*: the *tekt_n* (craftsman) is one who is well-versed in a technique (art or skill), while *techn_* carries both the root and the sense of the word technology, being of or relating to an art or craft. In an interesting slippage of language, *text is technology*.

Working forward from this fundamental notion, it is worth considering the secondary process to which Ong refers in the passage I cited earlier: that of the “continuation,” or evolution, of text technologies through the last several centuries. Our writing tools—whether chisel and stone, reed pen and papyrus roll, press and vellum, typewriter and paper, or keyboard and computer screen—necessarily influence the way we compose and respond to text (Snyder, 1996). As Snyder observes, “the space created by each writing technology permits certain kinds of thinking and discourages others” (p. 5). By way of example, she suggests that blackboards invite repeated modification, causal thinking and spontaneity, while pen and paper invite care, tidiness, and controlled thinking (p. 5). Whether or not we concede her point, the question inherent in her claim is intensely interesting: how have different technologies of text influenced human beliefs about, and approaches to, writing and reading, and what might we come to learn about the nature of recent tools for writing by viewing them through an historical lens?

Course content and context

The question posed above is taken up in a number of publications, including *Avatars of the Word* (O'Donnell, 1998) and *Writing Space* (Bolter, 2001), both of which approach the topic from a humanities perspective (O'Donnell is a classicist and Bolter is Professor of Language, Communication and Culture). In an effort to bring the ideas raised by such computing humanists into the educational technology forum, I proposed and developed “Text technologies: The changing spaces of reading and writing” (ETEC 540) as an elective in the online Master of Educational Technology program (MET) offered jointly through the University of British Columbia and Tec de Monterrey, Mexico (see <http://www.met.ubc.ca/>).

ETEC 540 is something of an outlier in the MET curriculum, situated, as it is, alongside a number of courses in the design, planning, management, and business of e-learning, as well as courses in integrating computers in the classroom, learning theories, and so on. In fact, when I first reviewed applications to the program submitted by designers, corporate trainers,

administrators and educators around the globe, I feared I might have misjudged my audience—that my proposed amble through the history of technologies for writing would be deemed of little relevance to professionals whose concerns tended toward software development and systems management. Apparently these fears were unfounded: the course has been well received in all offerings; conversations in online discussions have been animated and of high calibre; and innovation in the context of individual and collective project work has been abundantly evident.

To give a sense of content, students in ETEC 540 progress through a series of four modules: 1) Introductions and defining terms; 2) From orality to literacy; 3) Discovering modern literacy; 4) Literacy and the new media. The introductory module sets the premise of the course in accordance with the notions raised earlier and introduces, among other things, the community writing space that features in the last section of the paper. The second module, drawing on the work of Ong (1982), concerns itself with an examination of the shift from orality to literacy among certain cultures, and with early technologies for writing. In this module, students consider how the invention of writing may have modified human thought processes, and what effects particular early developments in technologies for writing—for example, the shift from iconic to symbolic writing—had on the rise and nature of literacy. I should note here that students are also invited to critique the technological determinist argument that is evident in the writings of scholars such as Ong (1982) and Eisenstein (1979); that is to say, we consider as a class not only how new technologies modify human ways of knowing and being, but how human ways of knowing and being bring about changes in technology. We are, after all, both agents and subjects of change.

In the third module students examine technologies for writing before the invention of the computer (i.e., scroll, codex manuscript, print), considering the socio-political milieu that gave rise to such developments, as well as how these technologies modified reading and writing practices, literacy instruction, and so on. In terms of the reception of text, students consider questions that put a different spin on contemporary concerns about navigation in hypermedia. For example, sometime after the second century of the Common Era, the Egyptian scroll underwent a significant modification that would have had no small effect on reading practices. Clement (1997) observes, “in about 220 [CE] lawyers began to concern themselves with the definitions for various kinds of books” (§ 3). Among the new forms mentioned at this time is the *codex*, or paged book. There has been much discussion about why the change from scroll to codex transpired, although no definitive theory has emerged (see, for example, Roberts & Skeat, 1983; Clement, 1997; O’Donnell, 1998). Nevertheless, this much is clear: the invention of this form radically altered the aesthetics of written documents and revolutionized reading prac-

tices by breaking up the continuity of the text. Understandably, such a change substantially altered the physical act of reading, which shifted from the practice of literally “unravelling” a text, to the practice of “delving” into it through a process of peeling away layers. Moreover, the codex form would have modified cognitive processing by enabling non-sequential access to information: having the freedom to shift quickly from the back to the front of an early codex without page numbers, for instance, is likely to have been as disorienting a process for new users of that medium as is clicking about a website for neophyte computer users today. As the codex form evolved, moreover, the development of margination and other forms of paratext and intertext would have further complicated reading processes.

To give a second example, in this module we examine as a class the effects on reading practices provoked by the mechanization of writing. Contemporary concern about the way in which reading off a computer inhibits engagement with the text, for instance, is paralleled in early response to printed books by a readership that felt the form literally *lacked life*—in the sense that no living hand had given care to the crafting of the letters and no scribe had breathed life into the words by vocalizing them in the process of setting them to page (Manguel, 1996). Further, as Bolter (2001) observes, the physical layout of the printed book is highly organized and standardized, and its dominant features (in comparison with manuscript) are linearity, replicability, and fixity. In short, the medium would likely have seemed as remote and sterile to late fifteenth and sixteenth century readers as the cool glare of the computer screen may seem to bibliophiles now.

This being said, Bolter (2001) also observes that as new technologies for writing emerge they tend to either replace or supplement established technologies. He calls the process of shifting from one medium to another, which involves both competition and integration, “remediation.” Each new technology, he remarks, claims to be better than the one it sets out to remediate in at least one—if not several—senses (p. 26). Gutenberg, for example, might have claimed that the printing press was a better method of producing books because it was faster, cheaper, and more accurate. But in developing the press, he also integrated the existing economy of writing by striving to make his product look as much like the medium it was replacing as possible through the use of cursive fonts, which imitate handwriting, and so on. Building on this notion, students in ETEC 540 examine the numerous ways in which computers remediate previous technologies. For instance, even the scroll, almost two thousand years after its demise, has been resurrected and has taken up residence in the new economy of writing (as the presence of the “scroll bar” in numerous applications attests). Ultimately, modern day educators are in the interesting position of considering the ways in which a medium that seems to have absorbed all other media may be modifying literacy practices.

The final module of the course is focussed entirely on computer-based technologies for writing. We examine in particular “non-linear” or “multi-directional” forms such as hypertext or hypermedia and consider what implications such forms have for the future of literature, literacy, and teaching methodologies. In fact, as indicated in the preceding sections, the investigation of this topic occurs throughout the course as students explore the ways in which understandings of the evolution of technologies and literacy practices prior to the digital revolution inform their understanding of, for example, computer-based instruction, e-learning, multimedia design, and so on. Further, students are involved from the outset in the development of a collaborative writing space, the “ETEC 540 Community Web,” which makes use primarily of html, but into which we have more recently integrated the use of “weblogs,” “wikis,” and so on. This project has offered insights into the nature of online writing spaces that have proved rather interesting.

The ETEC 540 Community Web

The Community Web was introduced in the context of this course for two reasons: first, as a way to foster community in a learning environment that can be isolating for students and instructors, and second, as a way to allow students to explore the possibilities of the new medium as a space for innovation and collaboration around the creation and diffusion of knowledge.¹ The ETEC 540 Community Web is based primarily on the notion of “constructive” hypertext proposed by Joyce (1995), who distinguishes between two forms of hypertext: “constructive” and “exploratory.” Simply, the first is the sort of writing space that reader/writers construct as they go along, while the second is a writing space that allows for exploration, but not modification, of the existing materials. By way of example, the Internet, which is changing on an ongoing basis as pages are added and deleted, might be deemed a large-scale constructive hypertext, while many “read-only” commercial CD-ROMs such as electronic encyclopaedias fall into the latter category.

Although the idea of having students develop a website on a particular topic is not unusual, the way in which this project is organized has made for some interesting observations. Students are asked in the first instance to consider how hypertext revolutionizes writing by demanding that we rethink the way we structure written information. Here we consider, among other things, questions of sequence and closure. According to conventions established in print culture, book authors generally determine a best sequence, giving much thought to ensuring that ideas flow in a logical manner. Paragraphs and sections in conventional print documents are typically linked by transitional cues that are embedded in the text itself; readers may choose to peruse such material out of order, but a privileged sequence nev-

ertheless exists, and this tempers the tone of the whole. (There are, of course, exceptions to this scenario, such as avant-garde literature and encyclopaedic forms, but the bulk of writing in print follows this pattern.) Clearly highly networked hypertext environments—particularly innovative spaces in which information is structured according to associative rather than hierarchical models—challenge traditional text structures. For example, in a networked environment, persuasive argumentation that builds in a logical fashion toward a conclusion is replaced by rhetorical ploys such as juxtaposition. Readers are presented with options respecting sequence, and a formal point of closure may not be apparent.² Such indeterminacy has a profound effect on how readers engage with the subject matter, and hypertext theorists accordingly made some grand claims for the medium in the first wave of hypertext criticism (see, for example, Moulthrop, 1994; Landow, 1997; Johnson-Eilola, 1993, Douglas, 1992). The gist of their position was that this new technology for writing would liberate readers from rule-bound (literally, ruled and bound) nature of print.

Although some of these early claims about hypertext have been seriously critiqued (e.g., Aarnseth, 1997 and Miall, 1999), there are several interesting ideas in this literature on hypertext that are worth exploring. One of these is the notion of collaborative writing environments wherein all contributors have access to one another's creations, and wherein links, additions, and deletions might be made at will to the point that authorship ceases to be of importance. At the outset of the first iteration of the course, this is how I conceived of the Community Web; and, with this vision in mind, I gave students access to server space with a community password and no existing file structure. As a class, we explored Joyce's notions mentioned above and characterized the space as "a structure for what does not yet exist" (Joyce, 1995, p. 42). We then considered how we might engage the space. If exploratory hypertexts are designed for audiences, I observed in the context of this deliberation, constructive hypertexts are designed for *actors* (calling the root of the word, to act, or to perform an action): "More than with exploratory hypertext, constructive hypertexts require a capability to act: to create, change, and recover particular encounters within the developing body of knowledge" (Joyce, 1995, p. 42).

Although I wished to impose as few restrictions as possible, our Web project was not entirely without focus: to begin the process we set principles of participation and, among other things, agreed that all submissions should relate in some way to our key terms: text and technology. To this end, I set up a simple index page bearing these terms along with a number of iconic placeholders that would ultimately serve as links to various student submissions (see Figure 1).³ I emphasized that I did not wish to establish a hierarchical entry point to the web, and therefore links bore no distinguishing

features indicating where they might lead. We began with a simple introductory exercise designed in part to allow those new to Web development to test the waters: I asked students to submit two pages to the site, one in some way representative of “text,” and the other representative of “technology.” Submissions could take any form—from a literary quotation to a more complex multimedia endeavour. The exercise was not assessed formally.

In short order the project ballooned into a fascinating, but chaotic, collection of text in the broadest sense of the word: students submitted commentaries, quotations, poems, anecdotes, images, animations, and video. Some submissions consisted of one simple html file while others were multimedia compilations complete with animations video, sound, and so on. Although I had been involved in Web development for years, this was the moment at which I first considered the fundamental paradox of the medium. In my dual role as audience member and “Web Minder” (the designation students gave those who managed the site), I, perhaps more than any other member of our learning community at the time, looked at our

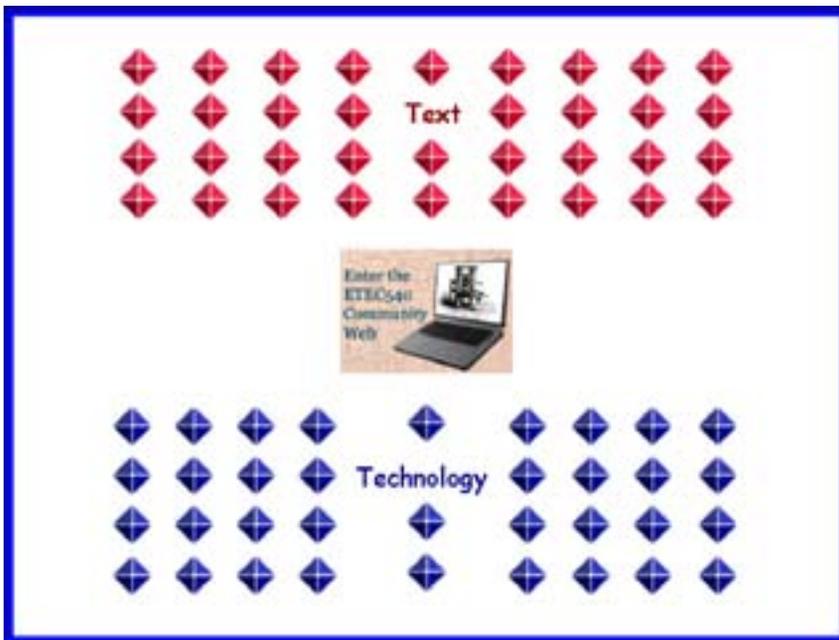


Figure 1. The original navigational structure for the ETEC 540 “Community Web” page. To begin the process of building the collaborative Web structure, students were asked to publish two simple Web pages, one on the topic of “text” and another on the topic of “technology.” Individual diamonds were then linked to student submissions. The navigational structure was intentionally ambiguous.

Community Web on two levels. As a reader / participant, I clicked about the space enjoying the juxtaposition of playfulness and seriousness, alphabet and icon, stillness and motion; I observed the ways in which certain additions informed my own; I engaged in conversation about how the linking mechanism confounded navigation; and I considered the advantages and disadvantages of this arrangement. Conversely, as Web Minder I observed and interacted with the space on an entirely different level: it was not an interweaving of various media linked in multiple and innovative ways, but rather, a series of files in a folder entitled "communityweb." And from this perspective it was an utter mess. While I had set in place a protocol for naming documents such that students would not overwrite each other's work, I had, as mentioned earlier, not wanted to impose a file structure on their space. Assigning student folders and individual files in the usual fashion would have reinforced ideas of ownership, authorship, and hierarchy that I had hoped to challenge in undertaking this exercise. But the resulting lack of structure also challenged my own training with respect to how to organize files so as to facilitate maintenance of a large website.

Ultimately, while the Community Web was largely a success in terms of its ability to prompt discussion about digital literacy and encourage experimentation with form and genre, my goal of creating an unfettered writing space in which students might challenge conventional, "rule-bound" structures failed on certain levels. Most notably, I found myself introducing a hierarchical file structure complete with individual student folders in an effort to manage the space, and this undermined the notions of communal ownership I was attempting to promote elsewhere. Not surprisingly, when I later asked students to propose alternate navigational structures for the growing Web of materials they were generating in the context of the class, they responded by developing in the first instance an "author index," which appeared as a list of class participants in alphabetical order—a mirror image of the file structure I had imposed on the space. Following discussion of the way in which this interface privileged individual over community values, they turned to the notion of organizing the site content by assignment: 1) commentaries, 2) research projects, and 3) final projects. These lists were again organized alphabetically, but by title with no author name provided. While this organization was more effective in presenting the site as a community effort, it reflected yet another set of institutional values: those associated with formal education and assessment. Again, I invited students to consider alternate modes of information architecture and to interrogate the assumptions implicit in those modes. Eventually, they settled on a concept-based, network interface, while still providing users the option of accessing the more hierarchical author and assignment indexes within the context of a sleek, corporate design (see Figure 2).⁴



Figure 2. The ETEC 540 “Docuverse,” a concept-based navigational structure for the Community Web. The term “docuverse” derives from Nelson (1981). It is a compound of “universal” and “document” meant to describe the potential for online writing spaces as limitless, interconnected writing spaces.

The paradox of the Web

The notion of the paradoxical nature of the Internet raised above—whereby underlying hierarchical file structures belie the openness of more experimental networked forms and the seamlessness of the user interface—is one that is worth considering further. Manovich (2001) observes that digital media have enabled a new technique in the development of aesthetic objects: *compositing*. First defined by Porter and Duff (1984), the term refers to “the process of combining a number of moving image sequences, and possibly stills, into a single sequence with the help of special compositing software” (Manovich, 2001, p. 137). Manovich cites an example from the film *Wag the Dog* (Rosenthal, De Niro & Levinson, 1997), wherein a shot of a girl running through a destroyed village with a cat is achieved through compositing three elements: a videotape of the child actor running, and stock footage of a cat and a destroyed village. Such “modular media,” observes Manovich, is much easier to work with: if a particular aspect of the composite shot is problematic, technicians can modify the one element rather than shooting the whole scene again. Most Web pages are similarly

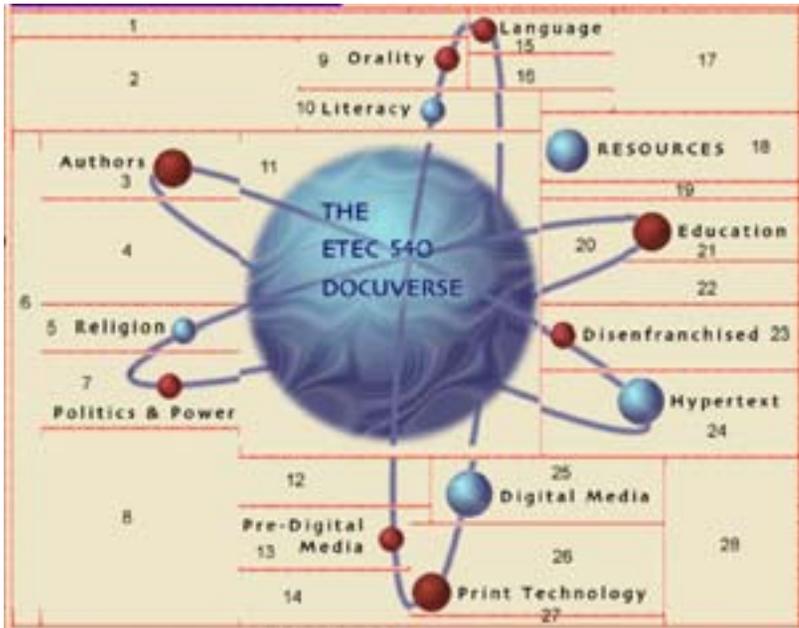


Figure 3. The ETEC 540 “Docuverse” shown in Mosaic’s edit mode reveals that the image is a product of digital compositing, whereby several modules—in this case separate image files—are displayed together to produce a seamless visual effect. I have numbered the images for the purpose of this figure. See Figure 2 to view the image as it appears online.

composed: although perceived as a whole (e.g., as a “page”), they are constructed of multiple files that are stored as separate units and displayed by the browser according to an arrangement specified in the page code. For example, the ETEC 540 Concept Map shown above (see Figure 2) appears to display one image along with the various labels, but is in fact a composite of 28 images knit together to appear seamless (see Figure 3).

Drawing on Manovich’s notion of compositing, Walton (2004) considers the significance of the difference between the designer’s and user’s interface with the Web. While users generally encounter Web pages as seamless visual artifacts, she observes, “Designers see the Web in its raw, uncomposed state, and work with separate components which they must construct into a whole. They can see the seams of the design and its component pieces: their view reveals the artifact as constructed and composite” (p. 167). The designer view, she continues, makes apparent “internal logics and encoding schemes,” and begs the question, “what model of the world or the human subject is implied” by such structures (p. 168)? Walton notes that Internet users may catch glimpses of the composed state of the Web

as well. The seams of its construction are often visible, for example, when pages load or when a “plug-in” is required to complete a page design (p. 168). Taking up Walton’s line of thought, Snyder (in press) remarks that although such the underlying structures and conventions of the Web may be “less mesmerizing than the multimedia assemblages on screen, they are no less influential in determining what is communicated” (n.p.). The implications of this scenario, as intimated earlier, are manifested in my own classroom virtually every time I ask a class to approach the question of what sort of interface they might create to allow outside users (hypothetical or otherwise) to engage with materials they post in networked digital environments. Almost without exception, they develop in the first instance an interface that mirrors the file structure.

Some implications for teaching and learning with digital media

Hypermedia, it would seem, is Janus-faced, offering one visage and masking another, and in this way reinforcing the hierarchal structures it proposes to undo in an interesting and in certain respects subversive fashion. To what extent this feature of the medium will influence the sorts of genres and structures that emerge in the coming years is unclear; from the point of view of instructional methodology in digital literacy, however, it is worth being aware of this essential paradox and the ways in which it enables and disables certain approaches to reading and writing. As Walton (2004) observes, while literacy researchers such as the New London Group (2000) have argued that the capacity of new media to encode a variety of modalities begs a new multimodal literacy, they have generally failed to consider the significance of the underlying grammars of these modalities and the ways in which these grammars influence the production and reception of new media forms. Inviting students to engage with the Web as designers provides them with a different and important perspective on digital literacy, as does approaching the question of literacy and technology from an historical perspective, with particular attention to the ways in which digital media both extend and modify preceding technologies of text and literacy practices.

Endnotes

1. Others have troubled the notion of community in cyberspace, considering the legitimacy of online communities, and examining how they operate (e.g., Smith and Kollack, 1999). In question, among other things, is the notion of whether virtual spaces without physical boundaries wherein the identity of members is always in question can form the basis of a legitimate “community.” For the purpose of this exercise, community is construed in accordance with its early and continued usage

in the English language: “appertaining to or being held by all in common; joint or common ownership” (*OED*)—hence, “community of interest.” “Virtual” communities of this nature are not novel, having been evidenced for centuries (for example, in the doctrine of the “Communion of Saints” held by most major Christian churches).

2. For an example of an online essay in hypertext form, see Bernstein, M. (1997). *Chasing our tales*. Retrieved June 14, 2004 from <http://www.eastgate.com/tails/Welcome.html>
3. Ideally, a link to the online materials would be included here; however, changes to the support structures underlying the MET program through the last four years have resulted in changes in the location of the ETEC 540 student server. At the time of publication the student server was offline pending a shift in location. In consequence, screen captures of materials are included.
4. The underpinning of the design in online corporate culture was a point we did not consider as a class at the time, but it would certainly have been worth exploring in the context of a consideration of factors influencing interface design.

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