In an age when children are learning to point and click with a mouse at the same time that they are learning how to hold a pencil to write the alphabet, it is clear that literacy today involves more than the three R's. Young children are also learning more and more from hypermedia and multimedia forms of instruction, and these influences on children's early education will have a profound effect on their abilities to read and write and on their very conception of what it means to read and write. Although multimedia communication is revolutionizing concepts of literacy and the composing process, it requires a new way of thinking about producing information, so that we can understand and teach the process of multimedia composition. Using a semiotic approach, this article presents a rhetorical model of multimedia communication and its elements and an analysis of the multimedia composition process and its rhetorical features.

In the midst of the multimedia computer revolution, educators and practitioners alike are currently faced with finding new ways for helping students and professionals learn how to communicate with the new medium. Unlike the word processor, which, as its name implies, provided an electronic means for producing words in print, multimedia computing provides a way of producing and integrating a variety of media in electronic form, either online, on computer disks, or on CD-ROM. Although word processors and desktop publishing programs made for significant advances in the format and design of documents in the print medium, those changes still occurred primarily in the world of hard copy according to the standards of linear, print-based text.

With multimedia, however, there is no such stable point of discursive reference; thus, making the transition from writing linear documents to composing multimedia environments presents significant challenges. As a still relatively new electronic medium, multimedia is experiencing the growing pains that every new communication technology goes through in grappling with issues of genre, content, structure, and style in the process of evolving and defining itself. In addition to new technologies and new literacies for communication, multimedia provides new forms and genres for communication. However, in the present state of multimedia development, the means and the genres of multimedia communication are not fixed—we are almost making them up as we go along, and new ones are appearing before we become familiar with the current ones.
In addition to creating new discursive genres, creating multimedia documents requires a new repertoire of technical skills, including familiarity with authoring tools, scanners, and graphic, video, and audio capture and rendering tools. More importantly, producing multimedia also requires a significant reorientation to the composing process. Thus, while students need to learn how to use the new technologies, they also need to learn how to compose and integrate print, video, and audio information into a usable multimedia product—that is, they need to become multimedia literate, capable of producing and reproducing information in online environments.

As such, it is an enormous challenge to help students who have learned linear writing how to learn nonlinear, multimedia composing. Although many dimensions of multimedia are already familiar to us, especially what we have learned from research in hypertext and hypermedia, the complexity of the technology, coupled with the need to redefine the composing process in relation to the technology, may still be difficult to adjust to for many teachers of writing. In order to provide a theoretical tool for educators to understand the rhetoric of multimedia communication and how to create information in this medium, what follows is an explanation of the foundations of HyperRhetoric.

**TECHNOLOGY, LITERACY, AND MULTIMEDIA**

As Edward Barrett (1992) noted in “Sociomedia: An Introduction,” when we produce a new communication medium, we are also “hardwiring” our brains to produce and process information in this medium (p. 1). Historically, this process occurs with the appearance of any new communication technology: Consider the technologies of speech, gestures, facial expressions, writing, radio, telephone, film, television, audio recordings, video, and computer-based communication—each communication technology provides a systematized set of codes, or literacy, that establishes the rules, genres, contexts, and discursive acts that make it possible for people to communicate with one another.

The cognitive hardwiring that multimedia requires operates on the level of a basic literacy; it, too, functions as a systematized set of codes through which all members of a culture can produce and share information in appropriate contexts. From this perspective, multimedia is simply one more in a long chain of technologies that allow us to create, exchange, and interpret language. But as each new communication technology appears, it transforms and appropriates not only those that preceded it but also the literacies required to read and interpret the earlier technologies in a process of “repurposing” information, that is, using certain features of older communication technologies in new ones. For example, in *Being Digital*, Nicholas Negroponte (1995) indicated that when movies became popular, plays were repurposed into film, and movies were repurposed for television (p. 63). Multimedia communication, however, enables mass repurposing of all available technologies of communication—speech, gesture, writing, video, audio, and film within a single communication environment—and mass repurposing of all communicative literacies, as well.

The technological and social effects of repurposing in multimedia have profound implications for composition instruction, in both present and future tenses. As Joshua Meyrowitz (1985) explained,

> new media have an effect of being different from older media and by changing those aspects of society that depended on earlier means of communicating...the potency of a new medium
emanates not only from its own uses and inherent characteristics, but also from the ways in which it offsets or bypasses the uses and characteristics of earlier media. (p. 69)

Primarily, multimedia bypasses earlier media by blurring the boundaries among print, video, photography, audio recording, animation, and film by allowing us to combine and integrate varied and disparate media into one discursive space. By allowing us ways to sample, assemble, and reassemble fragments of various cultural media, multimedia literacy is a kind of meta-literacy, produced by a meta-technology, which provides a new electronic meta-context for discourse as well—an exclusively online communication environment.

However, as teachers of writing, our orientation to communication is, traditionally, most often centered in a concept of the written word and its power to shape social experience. For example, the Aristotelian model of rhetoric, as it has been adapted to written communication (Figure 1), dominates the conceptual foreground in most writing instruction courses, and with good reason. For the purpose of teaching writing, this model has helped people be conscious of the rhetorical dynamic of writing and to orient and organize their written communications for specific audiences. However, writing is primarily a visual medium, whereas, as Larry Friedlander (1995) indicated, multimedia, “permits users to learn...through seeing, hearing, reading, doing, and simulating” (p. 164); writing and multimedia occupy markedly different discursive spaces—the space of pages and the space of screens, speakers, keyboards, mice, and headsets, respectively. Thus, the argument presented here is that traditional models and approaches to written communication are inadequate for explaining the rhetorical phenomenon of multimedia and for preparing students to become multimedia literate because these models do not adequately describe the rhetorical space of electronic documents. Although rhetorical models of written communication help us to teach students how to produce coherent pages of discourse, they are not well suited to helping us teach our students how to produce linked screens of virtual discourse. The recent emphasis on visual communication, mapping, navigation, chunking, and linking information in technical communication courses, for example, is a

Figure 1. Model of written communication.
good step toward helping students develop multimedia literacy, but there is no reason why these same emphases and skills should not extend to all kinds of computer-based composition courses. In short, to prepare for the future of composition, we all need to become users and designers of sound, moving pictures, text, and animation and to learn ways of integrating all of these elements into an electronic discourse.

MULTIMEDIA LITERACY AND DIGITAL ARCHITECTURES

Critics of hypertext and multimedia presentation of information, such as David Dobrin (1994), argue that new technologies do not require new literacy: “A print text and hypertext are texts. That’s all there is to it” (p. 310). On one level, this is true. A book or a hypertext is simply a recognizable container for information that people can read and use. On another level, however, because of radical changes in the nature and forms of hypermedia and multimedia information, literacy cannot be thought of as centered in any one medium. Each medium has its own literacy, and when existing media are combined in new ways, this creates something else entirely—a multiple-medium literacy. Language, in the form of digitized bits of text, images, and sounds, is now dispersed in small information fragments across all available media, and accessing information becomes much more like channel surfing than reading. For example, Ben Davis (1995) likened the fragmentary experience of multimedia to a game of “Wheel of Fortune” where contestants “spin a roulette wheel that allows them to buy letters and solve hidden messages seen only in part” (p. 251). Because language is dispersed in this way, multimedia literacy occurs among the ruptures and intersections created in the multisensory presentation of interactive, multimedia information. As such, multimedia is a technology of resistance to the dominant paradigms of media technology and to all their genres and means of production. Unlike the pleasurable, coherent experience of reading hypertext that Landow described as desirable, the experience of multimedia is more chaotic and, perhaps, appeals more to a rhetoric of exploration where the boundaries and destinations of the discourse are not always clear. Because of this discursive characteristic, HyperRhetoric is a form of communication that continually invents and reinvents itself through an ongoing negotiation among users, developers, electronic content, and its presentation in a multimedia environment.

Although language is dispersed through multiple media, the media are also reintegrated within a communication environment. Certain conventions are repurposed from older literacies and media (from print, TV, film, video, and animation, for example); but a new, multimedia literacy requires a way of integrating existing media into new genres, operating by a process of analogy, which creates unique, hybrid genres—multimedia works like a VCR when video is being used; a CD player when audio is used; a book or magazine when text is presented; and a computer, which allows us to access information through the programming and interface. Paul Taylor (1992) described the phenomenon of computer discourse “not as a single genre, but a collection of related genres” (p. 145). As a result, the whole of a multimedia presentation is made of many microstructures—the structure of text in a computer window or dialog box; the structure of a film clip; the structure of an audio bite; the structure of an interface; the structure of graphics and animation—all of which must be integrated to work together and complement one another. Within this multimedia environment, literacy is a floating, ambient phenomenon, as users “read” a bit
HyperRhetoric

of text here, a bit of video or audio clip there, a navigational icon, and so on—specific literacies come into play as needed and recede when others are required. Certain combinations of literacies can also work simultaneously, or in sequence, as when a user views a drawing or photo along with a caption in a textbox, or uses the buttons signaling the available navigational options, which, as George P. Landow (1991) noted, "stimulates and encourages habits of relational thinking in the reader" (p. 83) rather than strictly linear habits of reading or thinking.

The phenomenon of multimedia literacy is the basis of HyperRhetoric, the social act of transmitting and receiving multiple-media information through, and with an interactive, electronic, communication environment—that is, HyperRhetoric occurs only online. The distinction between rhetorical, printed "texts" and HyperRhetorical multimedia "environments" is important conceptually because a text is a static, physical object, whereas an environment is a fluid, electronic place, composed of numerous objects, thus each represents a different discursive form and context.

Although various menus or information maps orient the user to the general arrangement of the content of World Wide Web pages or CD-ROMs, most users of CD-ROM documents or Web sites never experience the "document" in the same way twice because they follow different paths or vectors each time it is used. Thus, the environment's form is ephemeral and transitory because it only occurs online and only for a certain period of time. This is especially true of Web sites where information is updated weekly, daily, hourly, or in real time in some cases. What may have been on a site two weeks ago may not be there today, and that may explain part of the allure of the Internet you can never be sure about what you will find there. Here, in fact, users expect the physical environment and contents of sites to change regularly—those that don't are referred to, disdainfully, as cobweb sites. In CD-ROM environments as well, because of the shifting structure of the content, the user is continually in the process of rediscovering the content with each repeated use or "reading." As Jay David Bolter (1991) noted:

"electronic text is the first text in which the elements of meaning, of structure, and of visual display are fundamentally unstable...the computer does not require that any aspect of writing be determined in advance for the whole life of a text." (p. 116)

The lack of perceived, permanent structure has led to many problems for hypertext or hypermedia users. For example, the difficulties of navigating hypertext and hypermedia are well documented by Landow (1991) in what he described as a rhetoric of linking (p. 81), characterized by a discourse of arrival and departure (p. 82). Without adequate information for determining where to enter or exit a link in a document, the user feels "confused and resentful" (p. 83) due to a lack of a perceived structure to the document. As Johndan Johnson-Eilola (1994) noted, this apparent lack of structure can make a user feel lost and decentered (p. 210).

As a result, much discussion of hypertext navigation has centered around differences between linear and nonlinear texts, and these distinctions have been helpful in differentiating various ways of reading hypertext. For example, Landow (1991) described how the use of full text searches, folders, links, web views, and menus can act as primary overviews to effectively orient users and guide them through the space of an electronic document (p. 83). Landow (1991) further noted how the addition of graphic concept maps (p. 90), flow charts, timelines, outlines (p. 91), and text overviews (p. 93) can help users
further refine their abilities to search and locate information in hypermedia documents through a variety of navigational schema or strategies.

Although these methods of hypermedia navigation provide alternatives to the linear reading of text, the composition of hypertext and multimedia environments is more paradoxical. As Marie Redmond and Niall Sweeney (1995) argued,

> the experience of viewing a multimedia presentation is a linear event; however the information contained in the presentation is not written or stored in a linear manner. The main challenge in multimedia production is how to write and develop information in a nonlinear form for linear viewing. (p. 90)

The paradox of hypertext and multimedia is that however associatively a user may access information in the environment, it can be experienced only linearly, as an event through time; thus, to some extent, our navigational choices and experiences in the environment are conditioned, or framed, by a temporal sequence of events. When Landow (1991) acknowledged that hypertext "still depends on many of the same organizing principles that make page-bound discourse coherent and even pleasurable to read" (p. 81), he was referring to conventions that also made the book an object that can be used through time. The need to repurpose print conventions to make hypermedia readable underscores the fact that, in its early stages of evolution, hypermedia and multimedia do not yet have their own clearly defined genres for structuring and using the data in a way that is as universally tacit and comfortable as using a book, at least for most people born before 1980.

Thus, the structure of multimedia environments is essentially a metaphor—both associative and linear features are present. Neither is mutually exclusive, but each offers alternative paths through the information environment. One can follow a map, take an off-road, or pursue a combination of the two. Nor is the ability to alternately arrange texts exclusive to multimedia—one can scan or skim through a book and achieve the same kind of effect by reordering the experience of reading. However, rather than thinking about hypermedia in terms of nonlinear or linear discursive space, it may be more helpful to consider Bolter's (1991) idea that "the electronic writing space is very malleable" (p. 108). Because multimedia documents possess both linear and nonlinear features and are structured and read in both linear and nonlinear ways, the condition of malleability more accurately describes the range of linear/hierarchical and nonlinear/associative options a user has in navigating and experiencing the ambient structure of an electronic environment.

Although electronic texts tend to be malleable and shifting, it is possible to identify two broadly defined categories of electronic environments, the most general being closed and open environments. A closed multimedia environment indicates definite and permanent discursive boundaries. Such an environment is self-contained, and users can access any of the information within it, but it doesn't link to other environments outside itself. Nintendo GameBoys, informational kiosks, and some earlier reference CD-ROMs are good examples of closed environments. Open multimedia environments, on the other hand, have no definite discursive boundaries and can be linked to or by other documents outside themselves, such as a Web page or some of the newer interactive encyclopedias on CD-ROM that allow users to access online services for additional information. Closed multimedia environments are rapidly becoming the most recent relics of the information age, as users are demanding more malleable and changing online environments, or what Edward Brown
HyperRhetoric and Mark Chignell (1995) described as free-form multimedia, "a style of multimedia in which information structure can be realized through the shared intentions of author and reader" (p. 192). Brown and Chignell (1995) further explained that the 

users of free-form multimedia function as application developers, authors, and readers all at once. Therefore, the structures of discourse and information organization usually provided by different software applications, are instead created by the users in the course of their work. (p. 194)

The primary difference between these two environments is the result not so much of the content and how it is structured but of their digital architectures. The term digital architecture refers to the complex system of electronic coding that underlies the creation and distribution of all online documents. As Bolter (1991) observed, in the discursive space of online environments, information exists as both a visual surface and as a data structure in a computer (p. 106).

We use data structures, the long strings of 0s and 1s that make our computers work, all the time, but, until recently, we didn't have to code them ourselves—programmers did that for us. For example, most word-processing programs contain designations such as normal, heading, bold, list, and so on for text; all these designations are equivalent to electronic "tags" that mark the data as a certain type of textual entity so that the program knows how to save, store, and print the information. With one person working at one terminal, this tacit tagging of text by the word-processing program presents no problem—however, when information needs to be transferred to another terminal, perhaps to a different computer platform, the electronic markup of texts becomes more significant rhetorically.

Unlike word processors, Standard Generalized Markup Language (SGML) and Hyper-text Markup Language (HTML) provide electronic codes that "tag" the document so that it can be read and understood electronically by other computers regardless of the platform or program. As Larry Aronson (1994) wrote, research into markup languages began in the late 1960s at IBM as a way to help solve problems they experienced transferring data from one computer system to another (p. 2). A generalized markup language focuses on specifying document types and their text elements with markup tags like <para>, <list>, and <header> to indicate a paragraph, a list, and a header. By generalizing markup languages, tags can be read across computer platforms and programs, making information easy to digitize and to transfer electronically.

The sum of all the tagged document elements results in a Document Type Definition (DTD), an electronic template that delineates the digital architecture of a document in a flowchart, much like a blueprint outlines the physical structure of a building. Thus, DTDs function like document specifications—they are hierarchical and exact and must be up to code, in a manner of speaking. Aronson (1994, p. 2) identified three parts to SGML documents:

1. The character set, which distinguishes between the characters that indicate text and those that indicate the markup tags;
2. The document type definition, which indicates whether a document is a letter, a memo, an article, or a brochure, for example, and also indicates which markup tags are "legal" for that document, like a document template; and
3. The document instance, which contains the document's text and markup tags.
Once tagged, electronic "parsers" read SGML DTDs and match the document's code against the rules for that type of document. As Elizabeth Gilmore (1993) cautioned, if the markup tags do not reflect the rules for that document template, the parsing program will send an error message so that the wayward tag can be recoded (p. 214).

In contrast to SGML, HTML is an application of SGML that is used exclusively on the World Wide Web. HTML follows the same principles of SGML, that is, the declaration of document types and their appropriate tags, but is significantly different in that it allows for text anchors or links to other electronic documents. Another difference is that, according to Aronson (1994), HTML browsers do the SGML character-set and document-type declarations tagging automatically (p. 2), leaving the composer free to focus more on the content and arrangement of the environment. As a rhetorical activity, however, tagging text is mechanical and mind numbing, more like putting price tags on canned goods than like composition. As a result, markup language technology is evolving toward the devel-

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**Resources for Multimedia Development**

*A Multidisciplinary Guide for Educators and Trainers*

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*About the Guide

*Organization of the Guide

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1. Introductory Resources
2. Multimedia Communication Theory
3. Education
4. Business and Training
5. Multimedia Development
6. Authoring Guides and Tutorials
7. Periodicals and On-line Resources

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*Figure 2. On-screen presentation of Web page content.*
opment of “drag and drop” programs that convert raw text, graphics, audio, and links into SGML or HTML code. But in either case, the existence of markup languages requires an additional level of rhetorical awareness and choice that is necessary for online communication—the tagging and checking of electronic information.

To illustrate the relationship between on-screen text and markup languages, Figure 2 shows how a Web page appears on the screen, and Figure 3 shows the text tagged with HTML.

Note that the markup code in Figure 3 gives no indication of the font or size as it appears on-screen in Figure 2. Because users can alter the default viewing font at their individual terminals, there is no need to include this information in the code. Although the examples show only text, both SGML and HTML include tags for graphics and sound, and Virtual Reality Markup Language (VRML) includes tags for 3-D animated graphics, like the kind on the Netscape home page.

These markup languages provide the invisible, but all important digital architecture upon which electronic documents are hung. There is no room for interpretation with markup languages—if the DTD is not what it claims to be, the information will be unintelligible to another computer. For example, in the case of Figure 3, the conversion program I used could not read the graphic code for the horizontal bars I placed between the text elements, as seen in Figure 2—they did not compute. To solve the problem, the program eliminated the boxes and generated code for only the text in the file; I will need to add tags for the boxes later in my HTML editor.

```
<html><head>
</head><body><b><b>/body><p>
<b>/b>Resources for Multimedia Development </b><p>
<b>/b><i>A Multidisciplinary Guide for </i><b>/i></b><p>
<b>/b><i>Educators and Trainers</i></b><p>
<b>/b></b><p>
<b>/b>*About the Guide</b><p>
<b>/b>*Organization of the Guide</b><p>
<b>/b></b><p>
<b>/b> 1. Introductory Resources </b><p>
<b>/b> 2. Multimedia Communication Theory</b><p>
<b>/b> 3. Education </b><p>
<b>/b> 4. Business and Training</b><p>
<b>/b> 5. Multimedia Development</b><p>
<b>/b> 6. Authoring Guides and Tutorials </b><p>
<b>/b> 7. Periodicals and On-line Resources </b><p>
<b>/b></b><p>
<p>
</p></body></html>
```

*Figure 3. HTML code of Web page content.*
Thus, in order for digital architectures to work, the electronic structure and the information structure of the environment must be in sync. As seen in Figure 4, the digital architecture is composed of three integrated elements: a macrostructure, signified by an SGML DTD; a microstructure, signified by an HTML application; and another microstructure, signified by an information architecture.

As Gary Heba (1996) indicated, the concept of architecture is especially apt for describing the relationship between electronic and information structures in online environments. For example, the macrostructure of a building, like a multilevel office facility, consists of its foundation, gridwork, electrical and telephone wiring, plumbing, and basic finishing work. At the macrostructure level, all that exists is a big, empty building with floors, rooms, and stairs and elevators to get from floor to floor. Some of the rooms may be larger or smaller than others, but because they are empty, they have no apparent use or function except to provide a place to put objects (p. 214).

At the macrostructural level, the SGML DTD provides this same kind of digital architecture for an online document, a framework of containers for information identification and placement. The DTD indicates what type of document architecture one will find—just as a blueprint will illustrate the difference between a skyscraper and a bungalow.

As Heba (1996) noted, at the first microstructural level, HTML applications and their content are equivalent to the office equipment, workstations, and other objects that fill all the empty rooms in the DTD macrostructure. Like SGML, HTML tags information so that it can be searched and retrieved easily, like putting “living room” or “kitchen” labels on boxes when moving (p. 214). As Aronson (1994) wrote, HTML can tag information as “text,” “graphic,” “video,” “photograph,” “link,” or “interactive field” (p. 2). Through these tags, HTML assures that objects will appear within the appropriate rooms of the macrostructure, so that when the document goes online, graphics don’t appear in textboxes, text isn’t cut off in the textbox, or all the other technical glitches that might happen when macrostructures and microstructures collide.

The next microstructural level, the information architecture, involves the purpose of the document, the context in which people will use its information, and the arrangement of the environment’s content. It is possible to design a solid, integrated digital architecture, but without people to use and bring the information there to life, all that exists is a vacant building. No matter how well designed a building may be, it is the interaction of people in
that environment, the available information, and the information access paths that give the structure discursive life.

Increasingly, however, on the Web, digital architectures are designed to allow interaction and exchange with other architectures through linking. As Heba (1996) observed, with closed multimedia environments, such as those found on CD-ROM, links can establish relationships between like kinds of data, like designating a group of rooms in the building described earlier as a “suite,” or a floor as a “department” or “division,” providing another level of organization within the self-contained macrostructure (p. 214). In open multimedia environments, the same inter-structural links are possible; however, intra-structural links can also be made to other rooms in different macrostructures. As a result, online environments have no discursive or temporal center aside from what developers decide will be appropriate, useful, interesting, or entertaining for certain users in certain contexts; but even then, developers have no control over what will be linked to their CD-ROMs or sites from outside. From the point of view of single authorship publication, laissez-faire linking constitutes a rhetoric of invasion, but in the collaborative spirit of global linking that the Web signifies for many, free linking embodies a rhetoric of invitation. With the ability to link beyond one document to another, the idea of a complete document, such as a book, really does not apply anymore, because through linking, the user is really accessing many parts of numerous environments. at different times, continually repurposing and reorganizing the vast beehive of information we know as the World Wide Web, the collective product of electronic co-authoring on a mass scale. This effect of linking one document to another document marks perhaps the most significant paradigm shift in the concept of document structure and the ways texts are produced and reproduced.

**HYPERRHETORIC—A SEMIOTIC MODEL OF MULTIMEDIA DISCOURSE**

Because HyperRhetoric involves more than textual communication, a broader definition of language is necessary to explain the phenomenon of multimedia communication, and semiotics provides a base. Robert Hodge and Gunther Kress (1988) defined semiotics as the study of “the processes and effects of the production and reproduction, reception and circulation of meanings in all forms, used by all agents of communication” (p. 261). Meaning is produced through a sign, which is the result of the interaction between a signifier and a signified. For example, Arthur Asa Berger (1989) explained that a picture of a tree (signifier) represents the concept or idea of a tree (signified) (p. 30). Whether in language, images, or sounds, the signifier-signified relationship provides the basis of all types of communication—the ability to recognize and use signs. The basic premises underlying the study of semiotics are that language is a system of signs and that individual signs become parts of larger codes or conventions that govern the way people communicate in a given culture. For example, from a semiotic perspective, words, images, sounds, textures, smells, tastes, and data markup code in the case of SGML and HTML, are all capable of producing meaningful information. This idea of multisensory communication, the attendant literacies that accompany them, and the technology required to produce and transmit information combine to form the basic condition of HyperRhetoric.
Matthew Hodges and Russell Sasnett (1993) described multimedia communication as nonliterate because it is based in television, radio, film, and the telephone—media that are all based in nonwritten communication (p. 6); however, as argued earlier, all media communicate through intricate systems of formal codes that are equivalent to literacies. In order to provide a semiotic framework for understanding HyperRhetoric and multi-

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**Figure 5.** Model of multimedia communication.
media communication, the model in Figure 5 is an attempt to account for the comprehensive, rhetorical integration of multiple media and technology within an electronic environment. As Heba (1994) indicated, multimedia communication is possible because of the rhetorical relationship between developer, user, context and purpose of the product, and communication environment (p. 130). Central to this relationship is the context and purpose of the discourse; without a clearly defined purpose or use, the navigational and structural difficulties discussed before only become compounded and render the discourse unusable. The model depicts the elements of multimedia communication and the ways in which the various elements are related. As Figure 5 illustrates, HyperRhetoric is a complex of intersections among many components, rhetorical levels, and dimensions—a complexity that requires the ability to focus on and integrate many media at the same time. The following discussions of the individual elements of the model explain how they are related rhetorically.

**Developer**

There is no single author of a multimedia publication. Instead, David Rosen (1994) observed that multimedia projects are undertaken by a group most closely resembling that of a movie production team (p. 11). Developers of a multimedia product include:

<table>
<thead>
<tr>
<th>Developers</th>
<th>Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investors</td>
<td>Producers</td>
</tr>
<tr>
<td>Animators</td>
<td>Sales and Marketing Group</td>
</tr>
<tr>
<td>Video Specialists</td>
<td>Technology Lawyers</td>
</tr>
<tr>
<td>Writers</td>
<td>Audio Technicians</td>
</tr>
<tr>
<td></td>
<td>Programmers</td>
</tr>
</tbody>
</table>

The negotiations that take place among these groups could be called a rhetoric of inter-media, because that is essentially what happens. Members of a multimedia project team must be able to communicate across media, almost like international translators communicating across cultures. Communication in a particular medium is much like a culture with its own literacies, conventions, and codes; thus learning how to integrate various media into a coherent electronic document also requires a collaborative literacy. To approach inter-media collaboratively, writers must learn more of what the graphic designers do; graphic designers need to learn more about what sound designers do; and sound designers must learn more of what the writers do. In short, the members of the team need to learn what other members are doing and how they do it in order to reduce the number of content and design conflicts that inevitably arise. Ultimately, they need to know what the user needs at each stage of content development. It is useful to have as many members of the team present in the planning stages as possible to help them understand what other team members are doing, plan for integrating media, and avoid possible production conflicts due to lack of communication among team members.

Along with the ability to be inter-media literate, developers also have the responsibility of being multi-technology literate in order to produce a seamless, usable electronic environment. As such, along with dimensions of ethos that relate to the credibility of the information the developers are presenting, there is technological ethos—that is, credibility in terms of the ability to produce a document that works seamlessly and transparently online.
In multimedia environments, the users are those who "read" and interpret text, images, audio, video, film, and animation. Users can also "read" the navigational interface (or be instructed how to do so online) in ways that allow them to manipulate media and to travel comfortably in the communication environment—that is, to interact effectively. Because of the cost of producing a major CD-ROM publication, developers try to reach a wide, multilevel audience, that is, users with a variety of backgrounds, abilities, and literacies; resulting in documents that contain a wide range of general information on a large variety of topics. Smaller training programs can be tailored more to specific audiences and distribution and can also, through multiple links, yield the kind of informational "depth" we traditionally associate with printed documents.

Because multimedia content is not written or produced sequentially, the dynamic between the information the developers design and the ways users employ content resembles a "start-stop-jump" model of dialogue, or conversation. Users initiate a dialogue by booting up, and they sustain it by starting new conversation strings, stopping them, and jumping to new strings; they can also loop the strings to return to a previous conversation. Because multimedia documents are malleable, they are not structured in a single narrative; instead, they contain multiple structures and narratives. As a result, Ann Rockley (1994) suggested that multimedia scripts should be drafted in interlinked modular units (p. 660).

This type of electronic dialogue resembles the dynamic of everyday conversation; however, as Hans-Jorg Bullinger (1988) observed, it also resembles, to some extent, the flowchart or diagnostic dialogue design used by hardware and software programmers, which is the ergonomic basis for human-machine design (p. 14). Although structured hierarchically, the use of the flowchart in multimedia merely indicates how the content is structured in the DTD, not how users will interact with the content. Although the electronic form of the document is arranged hierarchically, the user's experience of the document's form is not; thus one level of rhetorical awareness in SGML involves only the electronic structure and storage of information, while another level focuses on what the structure contains and how it will be used.

Within electronic dialogues, users engage the information environment in micro-conversations—the idioms of HyperRhetoric—involving task- or interest-based discursive acts such as seek-and-find tasks, matching tasks in educational programs, simulation tasks in training programs, and so on. In this dynamic, the user's role is to initiate and sustain the electronic dialogue, and developers must create a sufficiently large number of informational links and nodes to keep the user engaged in the dialogue over multiple uses. Users experience "conversations" in multimedia not as readers, per se, but as fragmented semiotic subjects moving among objects in the environment, just as one would in a museum or a theme park.

**Context and Purpose**

The context and purpose of communication are the primary elements in the model presented here because these are the forces that drive all communication—something to say and a place and time to say it. Context, in semiotic terms, as defined by Hodge and Kress (1988), results when "the form of signs is conditioned...by the social organization of participants and...by the immediate conditions of their interaction" (p. 37). In multime-
dia environments, context is a function of both the purpose of the discourse and the technology required to produce and reproduce that discourse. The social organization of the participants may be individual users at home, work, or school, or networked users in an office or classroom in which the context initiates the discourse.

Communication Environment

The most radical difference from models of print-based communication is the concept of the communication environment. As discussed above, the environment is structured and developed on two levels: an electronic architecture and an information architecture. Essentially, the multimedia environment consists of a computer monitor, or other means of data access like headsets and data gloves, and all available media that can be presented in that environment (text, audio tracks, visuals, movies, and animation), thus discourse in the environment depends on all the parts of the environment working together.

The key to mastering the communication environment becomes a matter of deciding whether a piece of text, a visual, or an audio track is the best rhetorical option for a particular user, or if a combination is the best approach, so that the user has a variety of media to use for gaining information. For example, A. W. Bates (1980) indicated that the best learning takes place when a combination of media are used (p. 399). The more senses stimulated, the greater the receptivity to and retention of information. Thus, the most effective multimedia environments include as many media as possible to ensure the greatest discursive range and value. The key elements of the communication environment include SGML and HTML, platform and interface, and presentation environment. These and associated elements (see Figure 5) are described next.

SGML and HTML

As described before, SGML and HTML add another layer of rhetorical concerns to the composition process, including:

- **Repurposing of Information.** Once information has been tagged in SGML or HTML, it can be reused in other DTDs, providing efficient electronic recycling or repurposing for various purposes. As William Coggin (1996) noted, in SGML and HTML "information is independent of the document to which it belongs, to which it is a part, and becomes a part of whatever document we wish to create" (p. 211). For example, in a multimedia database, a picture of a dinosaur that appears under the category of Plants and Animals can be reused as part of a visual collage in a multimedia timeline showing images of flora and fauna from the Mesozoic Age. An image of a tattoo on the Web turns up in a student’s POWERPOINT presentation on the cultural significance of tattoos. This ability to repurpose information across media and contexts allows for a "cut and paste" style of composition that, like a collage, creates meaning by assembling bits and pieces of previously constructed discourse and arranging them in new contexts and combinations.

- **Digital Architectures and Electronic Rhetoric.** The presence of SGML and HTML in the rhetorical environment creates a new level of technological knowledge associated with multimedia literacy. With all computer-mediated discourse, literacy involves knowing not only what to say but how to say it electronically, whether it be through knowledge of function keys and macros or through markup tags and DTDs. Because
of the structural fluidity of open communication environments, electronic markup languages are likely to have the single most important impact upon the rhetorical shape, content, and development of interactive online genres.

**Platform and Interface**
The interface is an electronic extension of our abilities to speak and write—if one cannot use the interface, there is no electronic dialogue. Multimedia interfaces require two major components: the discursive interface (the technology that enables the user to engage in dialogue, such as a mouse, a keyboard, a touch screen, a joystick, or a combination of one or more of these) and the navigational interface (the icons or buttons that help a user move through the discursive electronic environment).

**Presentation Environment**
The presentation environment refers to the form in which information is presented to the user. The type of multimedia presentation discussed here ordinarily uses a computer monitor (including a screen and an audio output) at a terminal or kiosk as the presentation environment. The technological and presentational limits of the various features of the environment described later present a new spectrum of rhetorical considerations and choices when composing for multimedia.

The most important design feature of the presentation environment is an information map. The information map acts like a master menu or table of contents; it directs users' attention and guides them through the full range of information available and how to get to it. Its function is to orient users to the product, so they can use it as easily and efficiently as possible. For example, Randy Brooks (1993) indicated that information maps work best when designed for simplicity and functionality (p. 428) and that they should convey the range of information that can be accessed, such as icon-driven menus that identify subject/task options and navigation cues that help the user move freely in the multimedia environment.

Once an information map has been established, the environment depicted on the monitor is made up of three important elements: screens (the total information on one computer screen), boxes (windows or frames of information, such as text, graphics, and movie or video clips, as well as music, narration, and dialogue), and buttons (information to help the user navigate).

**Screens**
Screens are the elementary building blocks of any multimedia presentation. Screens can contain text, photos or drawings, film or videotape, or animation. Several scrolled pages of text do not make for a well-designed screen unless that information is essential for a particular context and purpose, such as a complex training program. Instead, screens should be modular, or self-contained, so that they can stand on their own. Two ways to approach screen design that are familiar from other media are storyboarding and scripting. Individual screens, or a group of screens under a subject topic, can be story boarded or scripted one screen at a time. However, unlike storyboarding and scripting for television and film, there is no overall linear story to tell—there is just a range of information on a variety of topics from various media and a context and purpose for each screen, although
certain training demands may require an overall structure or several linearly structured modules.

**Boxes**
Boxes are the frames or windows on the computer screen in which the information appears. Important rhetorical considerations in box design are size, number, and placement. The size of a box is important because a user must be able to see and use the information presented. If a film is shown in a 1-inch by 2-inch box on the screen, much of the visual information contained will not be accessible to the user; an accompanying audio track may become foregrounded as a result. On the other hand, because of the current limits of graphic and video compression, videos on screen-sized boxes are overpixelated and resemble cubist paintings in motion.

The number and placement of boxes is also an important rhetorical concern. Unlike the windows environment on computers, where numerous windows can overlap each other, each box in a multimedia environment must be an autonomous entity and must not be interrupted or obscured by another frame. Designers should consider no more than three or four boxes per screen unless multiple comparisons to an object or developmental stages in a process need to be shown. Boxes should be placed toward center screen or in another consistent location in order to best orient the user to a repeated element in the environment. Overall, as William Horton (1994) noted, it is important to design the environment so that various media are reinforcing one another rather than competing for the user’s attention (p. 781).

**Buttons and Links**
The navigation cues in multimedia programs are provided by various types of buttons. Buttons can be two- or three-dimensional and can be activated by a keyboard, mouse, or touch screen. Rhetorically, buttons can be used for orientation purposes, such as providing an information map of the kind and range of information in a presentation, like a menu. They can also provide navigational cues to get the user from one point to another, like the “go to the next screen” or “go to the next topic” buttons seen on information kiosks. Buttons function like hosts on television talk shows—they may not have anything interesting to say themselves, but they keep the conversation going.

As discussed earlier, the ability to link users with other documents and thus other users is the most significant rhetorical function of buttons, enabling us to instantly expand the rhetorical context of audience through both time and space. Links can take users to other places within a single, closed multimedia document or to other open documents, as on the Internet. Generally, links appear as highlighted words that function as buttons, but they also may be icons, such as a camera for a photo or a film frame for a video.

**Print Information**
Written words can be presented by scanning text from newspapers, magazines, journals, and so on, by using a word processor and converting the document, or by downloading an online file. The function of print in multimedia environments is primarily twofold: to provide directions and to provide written content. If a large amount of print material is
Visual Information
Visual information works on two levels. First, the screen itself, a large part of the communication environment, is a visual display. Second, the information contained in the screen is also visually displayed. A gestalt approach to visual design in multimedia environments can be used to integrate both levels of visuals into one coherent, overall design. Typically, multimedia visuals will be still or moving images such as illustrations, animation, photographs, videos, or film. Words are also a kind of visual information. Reproducing visual information can be costly, making it necessary to plan and budget for visuals carefully; thus the use of visuals is also a rhetorical concern requiring designers to decide which graphics best meet the user’s need for information and how to provide those graphics technologically.

Tactile Information
Tactile information refers to three-dimensional design of on-screen buttons and boxes and to background designs. Adding a third dimension, for example by making a button look like something one can press, helps users to respond to objects on the screen. This kind of three-dimensionality can better help users orient themselves to the different features of an on-screen environment. Textured backgrounds can also make for more appealing presentation of information, but they can also make text difficult to read, especially if the background contains both light and dark areas. For example, light text will show well against a dark background and vice versa, but a chunk of text that fills a background screen grading from light to dark cannot be a consistent color because dark letters won’t be visible in the dark part of the background and light letters won’t be visible in light part of the background. Rhetorically, a designer must decide how much text will fit in a box, where to put the box, and how to make it readable.

Audio Information
Audio information can include narration, dialogue, and voice-over as well as music, sound effects, and natural sounds, but one must consider the rhetorical impact of the audio information on the purpose of the communication. Music can be extremely distracting when it does not directly support the purpose of on-screen information, so music and sound effects are best used sparingly, perhaps as introductions to and transitions between screens. Spoken words can be presented as narration, with an on-screen narrator or as a voice-over, especially to reinforce large amounts of text. It is important to consider the recording volume of sounds when integrating them with other media. Too loud a sound can distract from information in other media present at the same time. Too soft a sound can have the same effect. When using music, one should remember that a song or musical style that

needed for an application, however, multimedia presentation is probably not the best environment to use unless the text can be chunked and linked.

Although many may feel that the status of writing in multimedia discourse has been reduced to mere headings, captions, and sound bites, it is fair to say that without words, most multimedia would not work. Print literacy plays the major role in the planning, development, scripting, testing, indexing, documentation, and ultimate use of multimedia discourse.
works today may sound dated in a short time. The cost of using copyrighted musical mate-
rial is also a factor in developing the audio budget.

Some multimedia documents feature audible navigation cues such as clicking noises or
musical arpeggios when a button is pushed. Although they fall primarily in the “bells and
whistles” category, these audio signals fill up the lag time between pushing the button and
accessing the desired information on slower CD-ROM drives or very large multimedia
documents, and they serve to reassure users that the document is actually working while
they are waiting, like Muzak on the telephone while you wait for the next available
customer service representative.

Cultural Information
This category refers to cultural and historical codes present in all media. In addition to
presenting information accurately and effectively in the presentation environment, design-
ers also need to be aware of making multimedia communication culturally sensitive and
appropriate for the intended user. This is an important consideration in international multi-
media design. An image or color chosen by an unknowing designer may be highly offen-
sive in certain contexts to users in the overseas market; thus, it is necessary to view and
hear cultural habits and popular media from other countries to learn about offensive and
acceptable visual and audio representations. For example, the common hand gesture that
signifies okay in the United States has a derogatory sexual connotation in some Latin
American countries.

RETHINKING WRITING: MULTIMEDIA AND COMPOSITION
The model of HyperRhetoric discussed above focuses on the complex intersections of
literacies, technologies, and information design and presentation in multimedia environ-
ments. As such, it represents a revisioning not only of literacy and multimedia communi-
cation but of the ways we think about composing and presenting information, and, at a
fundamental level, the ways we think about the nature of information. Rethinking writing
courses to reflect multimedia theory and process presents a daunting, difficult, but neces-
sary challenge to teachers of writing if we are to be prepared to meet the electronic
composition needs of our students.

But where to begin? Few of us have the technical background to simply leap into multi-
media authoring; further, to enter into this discursive space, we need, as Cynthia Selfe
(1992) suggested, to become lifelong learners in technological environments (p. 25) and to
become architects of computer-supported and virtual learning spaces (p. 35). To do this,
we must reorient ourselves to the concepts and process of multimedia composition as well
as the skills necessary to create it.

On a conceptual level, it is especially important to help our students and ourselves
understand the differences between associative, categorical structures and hierarchical
ones, that is, the differences between writing for complete units and complete documents,
and how those differences change traditional rhetorical strategies and processes associated
with linear forms of writing. To help illustrate these differences, it is also helpful to under-
stand the multimedia composing process in terms of familiar rhetorical categories: inven-
tion, arrangement, and style.
Invention as Search and Vector

Just as the experience of a multimedia environment unfolds moment by moment, so, too does the process of its invention and composition. Naturally, when we teach writing, much of our initial emphasis is on helping students arrive at thesis statements that are developed and supported throughout the essays. With multimedia, however, there is usually no explicit thesis statement per se; instead, the thesis is driven by problems, questions, or curiosities that users bring to the discourse. As a result of these differences in a document's purpose and use, the main tasks of multimedia invention, as described by Redmond and Sweeney (1995) are to specify the range of information in the presentation, to detail the navigation paths, and to develop the user interface (p. 93).

In contrast to traditional writing, where we expect essays to be focused and coherent and to lead to a definite closure, users of online multimedia bring a new set of expectations to the composition product. Users want online environments to provide something new with each visit. They want variety, difference, multiple perspectives, and a lack of definite closure. Thus, these two types of writing require different processes of invention. Gregory Ulmer (1989) distinguished between heuristics, tools for inventing the content of linear, printed discourse, and euritics, tools for inventing the discursive space of video and other audiovisual media (p. 71). The use of euritics, for example, can help students focus their compositions to emphasize sound and visuals rather than text or even to experiment without words to express an idea or feeling. As a group project, students could compile varying impressions and expressions of a single event, like a day at home, at school, or at the circus, with one group using only words, one only pictures, one only sounds, and one a combination to observe and learn the discursive conventions and effects that different media have on the representation of information.

Although multimedia composition is not driven by the same kind of thesis and focus as writing, neither is it generally driven by anti-thesis—as composers of multimedia environments, we are creating documents that are much more like magazines or catalogues with articles, sections, and features than essays. To orient users to this type of environment, we can provide a broad orientation or wide angle focus to the content, such as that found in information maps or main menus. We can also provide a "How to Use This Document" section that may lead users to navigate the environment as suggested, but beyond this point, it is up to the user to "invent" the development and arrangement of the discourse. The epic style of invention that drives the creation of coherent, written discourse does not work well in multimedia environments; here, invention is incremental or episodic. Thus, the emphasis in multimedia invention shifts from a focus on the document as a whole to a focus on individual screens of information and the methods by which they are integrated and linked to other units of information. Invention from this perspective involves a recursive two-way search—developers must search for available information that is topical, accessible, and interesting, and users must search documents and reassemble the text into meaningful, useful patterns.

Thus, perhaps the major question that drives multimedia invention, according to Ricki Goldman-Segall (1995), is "how do we take existing streams of linear media, chunk them up into pieces, and then put them back together again?" (p. 29). Many invention exercises for traditional writing courses involve brainstorming, chunking, and mapping, where students are encouraged to generate bits and pieces of their essays in any form and then
reassemble them into linear, written discourse. With multimedia invention, the same techniques are effective for generating information, but with a difference—students produce bits and pieces of discourse, but it remains bits and pieces. This process is characterized most by the lack of transitions that, in traditional writing, help us develop ideas by means of the linear stream of connections between sentences and paragraphs. Multimedia invention, with no transitional stream as such, has instead the vector, or the ability to develop concepts by moving from one discursive topic to another in a number of directions. Goldman-Segall (1995) suggested a number of directions vectors might take for developing ideas through a process of layering: “Building groupings that are similar (clustering, stacking); thickening the description with annotations; linking across attributes: slicing though the layers; and adding perspectives and ‘points of viewing’: triangulation” (p. 44). The last two in the series, slicing through the layers and points of viewing, by allowing unique and even surprising ways to link material, offer the most intriguing ways to develop content in a way that has potential to open multimedia as a technology of discovery.

From this perspective, the vector is a kind of cognitive transition point or detour in the navigation environment indicating direction but not necessarily a relationship with information preceding or following it. As in physics, discursive vectors have direction and velocity that allow users to change direction in the environment at their own speed as they invent the discourse. To supply ample development by this means, the principle of vectoring in multimedia invention dictates that objects in the environment can be linked to as many other objects as possible in the environment, with or without causal, purposeful connection. In open multimedia environments, development can also be achieved by linking to other environments. Although this principle is in opposition to Landow’s (1991) observation that the “existence of links in hypermedia conditions the reader to expect purposeful, important relationships between linked materials” (p. 83), the danger of conditioning the user this way diminishes multimedia’s potential both as a vehicle of discovery and as a medium that enables users to make connections between concepts or objects, pictures or words, that seem to have no direct relationship, as in the creation of metaphor. Thus, as teachers of writing, perhaps the most difficult obstacle to overcome in multimedia composition is the instinct to somehow tie it all together.

Arrangement as Schema and Loops

The main tool driving multimedia arrangement is not an outline but a flowchart or map that clusters modules around similar topics and branches them to other similarly clustered topics. Examples of these maps abound in the current literature, and all share a nonlinear, spatial orientation to information in the communication environment, which is reflected in the way we interact with the information. Unlike essays, we don’t read online environments; we browse and search them, and environments accessed this way are more like temporary electronic collages than like “documents.” Therefore, multimedia environments rely on the schema of the map to reveal their contents and structure. The purpose of the map, as Denis Wood (1992) argued, is to “link all of this elaborately constructed knowledge with our living” (p. 15). The metaphor of a map is especially appropriate for delimiting virtual space and for enabling users to search rather than to read the environment’s content.
The search process is recursive and follows a process like the one researched by John T. Guthrie and Miriam Jean Dreher (1990). The search process is composed of the following five components:

1. **Goal Formation**, in which users determine what topic and type of information they are seeking;
2. **Category Selection**, which involves the user inspecting appropriate categories of information related to the goal, such as a table or a chart;
3. **Extraction of Information**, where the user selects and compiles information relevant to the initial goal and rejects what is not relevant;
4. **Integration**, in which the user synthesizes the new information with previously obtained data or with the goal; and
5. **Recycling**, where the user repeat the first four parts of the process until the goal is met (p. 70).

As described above, the discursive process of searching enables users to structure their searches and the knowledge they gain in continually narrowing and expanding loops. Loops may be task or goal driven, or they may employ what Wolfgang Iser (1978) referred to as “the wandering viewpoint” (p. 109), in which users vector from focused, task-oriented searches in order to process or synthesize connections with earlier parts of the text or with other texts, or simply to let their minds wander. Users continually restructure their experience of the environment by using multiple searches—some of them planned, some of them not—or by getting sidetracked by an “Other Interesting Sites” link at a site visited along the search.

Because users can become frustrated by retracing the same steps—like walking in discursive circles—it is useful to provide a tracking feature, like the highlighted links on Web pages, to help users retrace their steps and keep track of their various search loops. Some multimedia environments also provide a link to the document’s complete flowchart diagram as a means of tracking users’ paths. In addition to providing a map for users to follow, the flowchart arrangement of multimedia environments can also be used as a planning and production tool for composing the environment, like a kind of graphic checklist for composers to follow as they create individual screens or modules of information. Further, the flowchart provides a clear schema for how information is to be tagged and coded in the digital architecture for online distribution, as well as a way to catalogue information in the environment for future repurposing in other environments.

**Style as Selection and Presentation**

Regardless of the medium in which discourse is created, a document’s style emerges as the qualities related to its narrative form and its presentation, or delivery. Broadly speaking, in multimedia environments we can identify visual styles, audio styles, and textual styles, as well as various combinations of these. As a means of individual expression, especially on the Web, multimedia is perfectly suited to postmodern, pop culture ideas of style that Stuart Ewen (1988) described as “an incongruous cacophony of images, strewn across the social landscape. Style may be borrowed from any source and turn up in a place where it is least expected” (p. 14). The cut-and-paste world of multimedia style, by allow-
Multimedia composition also offers students new opportunities to observe various media styles as related to the purpose of communication. Whether online discourse is informational, educational, promotional, or referential, students can observe a variety of environments to see how sound, images, text, and arrangement work for different rhetorical purposes. For example, promotional sites offer high-end design because they have to grab the user's attention quickly by being bright and shiny. In contrast, many referential sites are low-end in terms of design because the users who visit there are specifically looking for that type of information—they don't have to be sold, only informed. Some important questions students need to consider when analyzing multimedia style are: How does the selection of objects in the environment affect the user? What does the selection say about the developer? How does the selection of objects in a variety of media constitute a multimedia style? How do the selections complement each other? What other selections can be used? What effects would other selections have on the purpose, audience, and style of the environment? By exploring questions like these, and others, students and teachers alike will gain a new perspective on multimedia style as an electronic cultural artifact.

The rhetorical concept of delivery has not been emphasized in composition classes because it relates more to oral than to written forms of discourse. As a result, the delivery or presentation of most essays—paragraphs of various sizes, in various fonts, on white paper—is not highly stimulating, nor should it be, because it would detract from the essay's purpose—to develop and arrange ideas in text. However, multimedia presentation of discourse demands a revival in interest in how information is presented to a user. The overall style or design of a multimedia environment greatly influences how users perceive and interact with information, so it is important to consider what the presentation of information says about author's relation to and perception of the information and how the presentation inspires, enables, or hinders users. Overall, multimedia style establishes the kind of technological ethos mentioned earlier, whereby multimedia composers must establish mastery not only of the content but of the digital architectures by providing sites or environments that work as they are supposed to and by endowing the environments with the appropriate technological style.

CONCLUSION

The model of HyperRhetoric presented here is meant to encourage more of us to participate in the transformation and evolution of composition in response to dramatic, continual developments in communication technologies. Consider that newspapers, magazines, journals, and many other forms of print media can now be found online; e-mail is transforming the art of conversation and making it virtual; the Internet provides access to information resources equal to thousands of telephone books; voice-activated computer technology is advancing so rapidly that speaking to our computers will soon become common; and virtual reality will offer a simulated theater of experience that will revolutionize education and training. Consider that, today, 4- and 5-year-old children can surf the Internet; 10-year-olds have home pages on the World Wide Web (some of them better than many of those produced by their seniors); and multimedia computers are becoming more and more commonplace for teaching literature, biology, math, and many other topics.
in elementary schools—in short, the children of today will not learn to read and write as we did, nor will the social forms of reading and writing required of them resemble what many of us learned in our reading and writing education. When our young children enter college 10 or 15 years from now, will they be writing narrative and argumentative essays? Will we even want them to? Given the growth of the medium, and the increase in the use of multimedia for business and educational applications, understanding and using multimedia, hypermedia, and hypertext are not really options for teachers of composition any longer—they are technologies we all must learn to understand and use effectively as we move into the not-too-distant twenty-first century. As Gail Hawisher (1992) noted, “how we adapt our research and teaching to meet the demands of electronic writing spaces… will largely determine the success with which we are able to serve coming generations of students in the virtual age” (p. 98). There is, to coin a phrase, a brave new world of composition dawning, and the changes that multimedia communication technologies promise are too dramatic and far-reaching for us to leave unaddressed at any level of computer-based composition instruction.

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