Chapter 14

Rethinking Instructional Metaphors for Web-Based Writing Environments

Mike Palmquist

Since the early 1980s, writing theorists and instructional designers have envisioned digital “writing environments” that would support writing processes. This work has informed the development of word-processing tools now used routinely by writers. Conspicuously missing from the design of these environments, however — at least from a teacher’s perspective — is attention to instruction. Their designers seem to have assumed that writers would bring sufficient knowledge and experience to the composing process to write their documents. In this essay, I argue that an ideal writing environment would provide student writers with immediate access during composing to relevant instructional materials and feedback tools. I review the design of earlier digital writing environments, develop a theoretical framework that supports the integration of instruction into writing environments, describe Colorado State University’s Web-based instructional writing environment, discuss current and planned research on the environment, and consider implications for future development of such environments.

1 Introduction

Since the 1980s, instructional software for writers has been shaped strongly by what might be termed a “common-denominator approach.” Faced with the variety of pedagogical theories informing instruction in writing classrooms — among them current traditional (Berlin, 1987; Young, 1978), expressivist (Elbow, 1973; MacCrorie, 1970; Murray, 1972), cognitivist (Bereiter & Scardamalia, 1987; Flower & Hayes, 1980, 1981; Hayes, 1996), social constructionist (Berlin, 1987; Bizzell, 1982; Bruffee, 1984, 1986; Faigley, 1986), postmodern (Gale, 1996; Faigley, 1992; Fairclough, 1992; Schilb, 1991), cultural studies (Berlin, 1996; Sidler & Morris, 1998), and post-process theories (Kent, 1999; Trimbur, 1994) —
developers of instructional software for writers have tended to focus on practices common
to the majority of these classrooms. The result has been software that supports practices
such as brief lectures, class discussion, collaborative idea generation, student–teacher con-
ferencing, peer and teacher feedback on writing, textbook-based assignments, and out-of-
class writing assignments.

In this chapter, I suggest that a primary focus on supporting dominant instructional
practices has worked against the development of innovative instructional software for writ-
ers. By choosing to focus our development efforts on feature sets that support widely used
instructional practices, we have, for the most part, perpetuated the instructional status quo.
More important, we have not fully considered how advances in information technologies
might inform our instructional practices.

Below, I report on efforts to use an alternative instructional approach — a studio
approach — as a basis for the development of instructional software for writers. Developed
as a result of our studies of technology-supported writing classrooms (Palmquist, Kiefer,
Hartvigsen, & Godlew, 1998; Kiefer & Palmquist, 1996a,b), our studio approach views the
writing classroom as a place where writing is not only discussed, but carried out, an
approach that contrasts with the more traditional treatment of the writing classroom as a
place where writing is treated primarily as an object of discussion and analysis. This
instructional approach carries with it a number of implications about classroom practice
and, by extension, about the design of instructional software for writers. In the following,
I review the development of instructional software for writers since the 1980s, consider
work on digital environments for writers, trace the development of Web-based resources
for writers, and report on efforts to develop a Web-based writing environment for student
writers. I conclude by considering the implications of work on this environment for writ-
ers, teachers, and developers of similar environments.

2 Instructional Writing Environments

In the early 1980s, as personal computers began to infiltrate writing centers and writing
classrooms, scholars began to consider how they might extend word processing and com-
puter-aided instruction (CAI) software to create a more supportive environment for writers
and writing students. This work was made possible by the visionary contributions of earlier
scholars, such as Vannevar Bush (1945, 1967), whose Memex is widely viewed as the inspi-
ration for work on hypertext systems; Douglas Engelbart (Engelbart & English, 1968),
whose work on hypertext, windowing systems, pointing devices, and ARPANET led to cur-
rent computer operating systems and the Internet; and Theodore Nelson (1965, 1974), a
hypertext pioneer who is credited with coining the term “hypertext.” It was also made pos-
sible by early work in CAI for writing instruction by scholars including Hugh Burns, (1980,
1984), Burns, Culp, and George, (1980), Friedman, Von Blum, Cohen, Gerard, and Rand,
Selfe and Billie Wahlstrom (Selfe, 1984; Selfe & Wahlstrom, 1979, 1983), and Wresch
Initial attempts to create instructional writing environments focused largely on integrating existing word-processing technologies with CAI software. WANDAH (Writers Aid and Author’s Helper; Friedman et al., 1982; Von Blum & Cohen, 1984) was a notable example of an early writing environment, as was DRAFT (Neuwirth, 1984). DRAFT, which integrated “conventional text editing facilities with tools to help writers with invention, arrangement, and style” (p. 191), came closest to current conceptions of an instructionally oriented writing environment, but it was not widely adopted. WANDAH, which was marketed commercially as HBJ WRITER, was characterized by McDaniel (1986) as “a rare early development that supported … integration, surrounding an easy-to-use word processor with prewriting, planning, proofreading, and revision aids.” McDaniel pointed as well to ACCESS and WRITER’S HELPER as examples of integrated writing environments:

ACCESS, a writing “environment” developed at the University of Minnesota, supports the integration of writing-aid programs with WORDSTAR and also offers utilities that a teacher can use to construct writing exercises and assignments and communicate with students about their writing. WRITER’S HELPER is also one of these integrated packages that works with BANK STREET WRITER and some other word processors.

Despite their promise, these programs were not widely adopted. In 1987, Frase argued for the creation of more robust environments that would take advantage of writing tools — “online dictionaries, thesauruses, and encyclopedias” (p. 220) — and computer networks. “We have the technologies to address the needs of writing teachers, students, administrators, testers, and researchers,” he wrote. “But all these resources have scarcely touched education in America, and they will continue to pass the classroom by until educational environments are structured to coordinate and integrate these resources” (p. 220). Similarly, in 1990, Carlson expressed her surprise that, despite the potential flexibility in the design of writing tools based on computer technologies, “most computer-aided writing (CAW) software available today is based on a model derived from writing with traditional tools” (p. 95).

Throughout the early and mid-1980s, software supporting writing instruction focused largely on helping teachers, who typically made decisions about software adoptions, pursue their curricular goals. As such, the software served largely to replicate, in an online environment, teaching methods used for many years in writing classrooms. Most CAI software, for example, extended the worksheets used in many writing classrooms for purposes ranging from reviewing grammar and mechanics to generating ideas to revising essays, while most style checking software, such as WRITER’S WORKBENCH (Kiefer & Smith, 1983, 1984; Kiefer, Reid, & Smith, 1989), was used to supplement (or even to replace) face-to-face tutoring or handbook review.

By the late 1980s and early 1990s, spurred by the success of hypertext programs such as Apple’s HYPERCARD and Eastgate Systems’ STORYSPACE, scholars began to consider the role such tools might play in instructional writing software. Programs developed for student writers that incorporated hypertext tools included Learning Tool (Kozma & Van Rockel, 1986; Kozma, 1987) and TEXTVISION (Kommers & De Vries, 1992). Reflecting
on his work with this type of tool, Kozma (1991a) argued for the need to go beyond word processing:

Certainly word-processing programs help writing by automating some of the more burdensome aspects of text production and revision. Features such as inserting, deleting, and moving blocks of text are likely to account for the findings that students who use word-processing programs write longer compositions, have fewer errors, and make more revisions (Hawisher, 1988, 1989). However, these features have little to do with the formulation of plans, the retrieval and organization of knowledge, or the evaluation of the emerging text: those cognitive processes least prevalent among novice writers.

Kozma argued that student writers were likely to benefit from tools that corresponded “more directly to cognitive components of the composing process,” such as idea organizing, style and grammar checkers, planning and revising prompts embedded within the writing software, communication packages that support peer review, chat, and email, and “artificially intelligent writing environments” that support composing processes and facilitate the analysis of drafts. To test this argument, Kozma (1991b) studied student writers as they composed using computer-based outlining tools, spatial organizers, and rhetorical/topical prompting. He found that students did more planning when using idea organizing tools (as opposed to using a word processor alone) and even more when prompts were built into the tools.

Despite the strong theoretical support mustered for the use of hypertext-based writing tools for students, these tools would not have a significant impact on the composing processes of most student writers. In contrast, the growing use of network communication tools and the development of large file sharing networks would lead to significant changes in the way students composed. Two early projects, one that did not move beyond the proposal stage and another that had a relatively brief run, offer insights into the theoretical motivations of early developers of network-based instructional software for writers.

In 1987, Richard E. Young and Christine Neuwirth, members of the rhetoric faculty at Carnegie Mellon University, proposed the development of an instructional writing environment informed by an alternative pedagogical metaphor (Neuwirth, 1989; Young & Neuwirth, 1987). Their proposal to the Buhl Foundation, submitted in 1987 and resubmitted in 1988, called for the creation of a network-based environment based on a distributed instructional metaphor. The proposal laid out an ambitious alternative to the then-current approaches to writing instruction, calling for an environment that would provide real-time connections between writers seeking assistance and other writers who were logged onto the network, delayed feedback on drafts through electronic mail and commenting programs, and access to instructional software that could have been used independently of course curricula. Although the Buhl Foundation chose not to fund the proposal, it provided a theoretical framework for network-based writing support that mirrors the framework adopted by many Web-based OWLs (online writing labs).

In 1989, at Colorado State University, a similar initiative was undertaken by Dawn Rodrigues and Kate Kiefer. The Electronic Writing Service (Rodrigues & Kiefer, 1993),
like the environment proposed by Young and Neuwirth, called for a distributed approach to instruction in which students could request interaction with writers and tutors, request instructional materials via electronic mail, and submit drafts for style and grammar analyses from the WRITER’S WORKBENCH program housed on a UNIX server. Rodrigues and Kiefer described the Electronic Writing Service as “a ‘virtual reality,’ a place where students can ‘talk’ in writing to one another or to a tutor, a place where they will also be able to locate appropriate writing software to help them with a writing assignment in any of their courses” (p. 223).

This shift to a focus on network computing was also reflected in software developed in the mid-1980s to support collaboration. Early commenting programs included COMMENTS (Neuwirth, Kaufner, Keim, & Gillespie, 1988) and PROSE (Kaplan, Davis, & Martin, 1987). COMMENTS was integrated into the network system used at Carnegie Mellon University, where it was developed, while PROSE relied on file sharing (often literally the exchange of diskettes). The first version of the DAEDALUS INTEGRATED WRITING ENVIRONMENT (Butler, Carter, Kemp, & Taylor, 1988) was also developed at this time. Running on a local area network (LAN), the program provided access to CAI, a limited word processor, a spell checker, and real-time chat. Programs such as these would lead, by the mid-1990s, to a set of sophisticated LAN-based groupware programs that supported document sharing and communication among writers and teachers. These included ASPECTS, which supported concurrent editing of documents and real-time chat (Amdahl, 1992); COMMONSPACE, a program based on the PREP EDITOR developed at Carnegie Mellon University (Neuwirth, Kaufner, Chaddock, & Morris, 1990), which supported commenting and real-time chat (Tucker, 1996); Norton CONNECT.NET, which integrated Microsoft Word and its commenting tools into an environment that supported public and private chat, paper submission, and limited class management tools (Woodlief, 1997); and DAEDALUS INTEGRATED WRITING ENVIRONMENT, which provided features comparable to Norton CONNECT.NET (Sands, 1997).

Despite the promise of these programs, only DAEDALUS INTEGRATED WRITING ENVIRONMENT continues to be distributed and developed. The growing sophistication of word-processing tools and the availability of key features within Web-based classroom management systems, such as WebCT and BlackBoard, appear to have reduced the attractiveness of this type of commercial software. The development and assessment of these programs, nonetheless, contributed in important ways to our understanding of how to provide digital support for writing students, including strategies for integrating instructional content into composing tools; requesting, providing, and working with comments; using network communication tools to support writing instruction; and integrating spelling, style, and grammar checking tools into word processing programs.

3 Writing Environments for Professionals

A second strand of software development relevant to instructional writing environments focuses on the development of tools for professional writers and writing teams. Unlike the classroom-based metaphors that influenced the development of instructional writing environments in the 1980s and 1990s, the metaphors that shaped the development of these
digital writing environments tended to be of writers, individually and in groups, facing specific composing tasks. Most often, the developers of digital writing environments turned to cognitive models of writing, such as the theoretical models that emerged from the work of Hayes and Flower (1980, 1981), Hayes (1996), and Bereiter and Scardamalia (1987), to conceptualize those tasks. John Smith (1994), for example, observes in his introduction to *Collective Intelligence in Computer-Based Collaboration*:

> From the beginning, we believed that if we could understand more clearly the cognitive process of writing, then we should be able to build computer systems consistent with that process. That is, if we could identify key-mental activities that comprise expository writing, then we should be able to build corresponding features into our computer systems to support and, we hoped, enhance those same activities (p. ix).

Work on digital writing environments for professionals focused on two primary questions: How can writers work with information? How can writers work together? The first question was informed by work in hypertext, network file systems, and emerging tools for working with multimedia content, such as images, audio, video, and animation. The second question was informed by work on communication tools and emerging database models that supported locking and versioning of documents. While the instructional writing environments developed for writing students tended to focus primarily on CAI, word processing, chat, spelling, grammar, and style checking tools, the writing environments targeted at professional writers (and writers working in professional settings) focused more heavily on storing, managing, and working with information, and on supporting communication and document sharing among writers who might be collaborating on a project.

One of the first digital writing environments for professional writers, the aptly named *Writing Environment* (WE), was developed by Smith and his colleagues at the University of North Carolina. WE reflects a strong focus on information management. Influenced strongly by early work in hypertext, it had four modes: network mode, which supported exploration using nodes and links; tree mode, which supported hierarchical structuring of ideas and information; edit mode, which allowed editing of nodes; and text mode, which provided a linear view of nodes and supported editing for coherence (see Figure 1). Development on WE began in the mid-1980s (Smith, 1987; Smith et al., 1987) and continued into the early 1990s (Lansman, Smith, & Weber, 1993; Smith & Lansman, 1989, 1992).

Another early digital writing environment, Brown University’s *INTERMEDIA* (Garrett, Smith, & Meyrowitz, 1986), reflects a similar focus on information management. Built largely as a hypertext editor, it was used primarily to support the development of complex hypertext documents. Initially, *INTERMEDIA* provided a text processor, graphics editor, timeline editor, image viewer, and 3-D model viewer. By the time it reached the end of its development phase, *INTERMEDIA* offered tools for working with audio, video, and animation and provided access to an online dictionary. It also provided limited support for collaborative writing through its implementation on a shared file system network and an annotation tool.

In the 1990s, the focus on hypertext shifted to a focus on hypermedia. Denley, Whitefield, and May (1993) describe a database-driven collaborative writing environment that supports
the development of multimedia documents and allows browsing of text, graphics, audio, and audiovisual objects stored in the system’s database. SEPIA (Structured Elicitation and Processing of Ideas for Authoring); (Streitz, Hannemann, & Thuring, 1989), offered support for the creation of argumentative hypertexts, allowing writers to work in activity spaces dedicated to content, planning, argument, and rhetorical considerations. Collaborative tools allowed writers to simultaneously view and edit files consisting of text, images, audio, and video. Annotation of files was accomplished by linking to a new file containing a comment.

The influence of hypertext technologies on the development of digital writing environments is also seen in several programs designed to support work with notes, among them NOTES (Neuwirth, Kaufer, Chimera, & Gillespie, 1987), NOTECARDS (Trigg & Irish, 1988), INTERNOTE (Catlin, Bush, & Yankelovich, 1989), AQUANET (Marshall & Rogers, 1992) and MILO (Jones, 1993). Notes, developed at Carnegie Mellon University, provided both a general tool for working with notes and three task-specific tools for summarizing and synthesizing: Summary Graph, Synthesis Grid, and Synthesis Tree. Although it was available on the university network, NOTES did not see widespread use by writers. Instead, it was developed largely to test the efficacy of task specific tools for writers as opposed to the more general tools found in environments such as WE (Neuwirth & Kaufer, 1989). MILO, developed around 1990, provided collaborative support for notes-based writing projects. MILO allowed writers to create notes containing both text and graphics, link notes, and view notes as a graphical tree, as a linear indented outline, or in their order of creation. MILO also provides a search tool and a spell checker.

![Figure 1: Writing Environment (WE). Clockwise from upper-left corner: network mode, text mode, edit mode, and tree mode.](image-url)
A key concern informing the development of these systems was how best to represent information, and in particular the emerging text of documents, on screen. Even when working with comparatively larger screen sizes and resolutions, computer monitors fell far short of the flexible workspace offered by a large desk or an office floor. This posed problems with what has been described by Severinson Eklundh, Fatton, and Romberger (1996) as a “local perspective.” Some developers, such as Streitz and his colleagues (1992) and Marshall and Rogers (1992), addressed this problem by allowing representations of notes or nodes to extend beyond the available screen view. Severinson Eklundh and her colleagues experimented with a program they called PAPER, which provided a view of a document as a set of pages. Their purpose was “to provide a writing environment that both gives a sufficient global view of a document and supports the writer’s spatial memory” (pp. 138–139). In a manner similar to many notes-type programs, PAPER allowed writers to stack pages on top of each other and to reposition pages by dragging them across the screen.

To address the second key question informing work on writing environments for professional writers — how can writers work together? — designers turned to network communication tools, such as chat, email, and video conferencing, and database technologies that allowed advanced control of documents. Key issues faced by these designers included choice and implementation of communication tools, negotiation (or imposition) of roles among members of a collaborative team, representation of annotations, document control and versioning, revision tracking, and document merging.

Chat, shared views of documents, and, less frequently, audio or video conferencing were used to support communication among authors in many collaborative systems. SEPIA (Streitz et al., 1992) was among the more ambitious collaborative writing environments, employing shared browsers, notification of users currently working on a shared project, voice conferencing, and video conferencing. SASSE (Baecker, Nastos, Posner, & Mawby, 1993) allowed collaborators to work concurrently on shared documents in a What You See Is What I See (WYSIWIS) editor, determine who was actively involved in an editing session and which parts of the document they were editing, and create text and voice annotations.

The roles adopted by — or assigned to — members of a collaborative writing group were a key issue explored by designers of collaborative writing environments (Miles, McCarthy, Dix, Harison, & Monk, 1993). Ultimately, the debate focused on whether to assign roles through software, through social interaction, or through some combination of the two. In a report on their work with the PREP EDITOR, Neuwirth, Kaufer, Chandook, and Morris (1994) observed that factors affecting writers’ roles involved “activities such as agreeing to enter into communication and negotiating its form, allocating access to resources, and agreeing on commitments” (p. 148). As they reflected on challenges facing them and the work they would pursue, they noted:

We see our work as split between increasing the technological potential of group interaction and harnessing this potential to satisfactory communication outcomes. Down this second branch, we expect to find some technological solutions, but many social ones as well. Cultures define hundreds of regulatory devices in face-to-face interaction to monitor social behavior.
We are still in the earliest stages of establishing cultures for group exchange over networks (p. 151).

Writing a year earlier in his introduction to *Computer Supported Collaborative Writing*, Sharples (1993) characterized the challenges facing designers as a mix of technological issues and social realities:

Those of us who wish to design software for the support of collaborative writing must tread very warily. If we rush in proffering out shared editors, coordination tools and negotiation support systems then we are, at best, likely to be ignored or, at worst, seen as a Trojan Horse of new technology intruding into the writer’s world of formal agreements and structures, and informal alliances, unacknowledged collaboration and tacit social support (pp. 4–5).

Although role assignment was explored in a number of early environments (e.g., Garrett, Smith, & Meyrowitz, 1986), the consensus that emerged among developers was to rely most heavily on social negotiation of roles. In part, this consensus resulted from the recognition that roles within a collaborative group can change quickly. For example, a reviewer might be asked, in a real-time exchange, to begin editing a document. If the software restricted that person from editing the document and none of the collaborators currently working on the document were able to change the restrictions, time would be lost.

Designers of collaborative writing environments also addressed issues related to document annotation. Questions focused on how best to display annotations (e.g., as links, as marginal comments, as the equivalent of footnotes) and differences in annotation modality (e.g., voice versus text). Wojahn, Neuwirth, & Bullock (1998) studied alternative representations of comments, finding that annotation interfaces affected “the number and types of problems about which collaborators communicate” (p. 456). Neuwirth et al. (1994) investigated the effects on writers of written and spoken annotations, finding that writers found the “greater expressivity of the voice modality” useful for all but low-level editing issues (p. 51).

The growing sophistication of databases allowed designers of collaborative writing environments to coordinate the changes made by multiple authors to shared documents, providing a solution to a long-standing problem, articulated in 1986 by Garrett et al.:

If a hypermedia system is to be useful for cooperative work it must provide ways for multiple authors to read, link to and from, and even edit the same set of documents, while also allowing authors to protect their work from unauthorized access or changes. At its simplest this functionality could be implemented in a system where authors have sequential access to documents. However, it would be more useful for cooperative work within a fully networked environment where multiple authors would have simultaneous access to documents (p. 171).

Systems such as SEPIA and Sasse used databases to control a range of actions by writers, among them synchronizing changes to a shared document (Olson, Olson, Mack, &
Wellner, 1990), saving versions of the document (Miles, McCarthy, Dix, Harison, & Monk, 1993), and locking all or parts of the document (Baecker, Nastos, Posner, & Mawby, 1993; Streitz et al., 1992). Databases also supported flexible display of documents, such as hierarchical outlines and webbed representations of linked documents in hypertext and notes-based systems and alternative views of annotations. By using databases to associate information, rather than to save documents as single files, designers were able to provide flexible displays of the document and save multiple document states. When needed, these states could be compared, inadvertent changes could be discarded, and information could be recovered from earlier versions of the document.

Work on digital writing environments for professionals has had a significant impact on the “environment” used most frequently by student writers, the modern word processor. Leading word processors routinely include spelling and style checking, drawing tools, revision tracking and commenting tools, and linking tools. Some word processors also employ limited forms of versioning. In addition, most are integrated into network environments, supporting email and Web browsing, among other communication tools. Specific writing environments, such as the PREP EDITOR, which is the foundation for COMMONSPACE, have been marketed as instructional writing environments. Other instructional writing environments, such as ASPECTS, drew heavily on the shared editor and synchronous communication tools that emerged from this body of work.

Despite these contributions, however, work in this area has had limited impact on the education of most writing students. In part, this reflects the experimental nature of many early writing environments, most of which served primarily to explore possibilities or to prove a concept. In part, it reflects the decision to develop many writing environments on high-end Unix systems rather than on the operating systems more commonly used on personal computers. And, in part, it reflects a reluctance on the part of many writing teachers to accept the theoretical foundations shaping the development of early writing environments. Kemp (1992), for example, argued that the cognitive models underlying these environments have worked against their widespread adoption for instructional purposes.

It might also be that the metaphor underlying these environments — that of the professional writer, working alone or collaboratively, often on hypertextual documents — is inconsistent with the metaphors informing most writing courses: a novice asked to learn about writing concepts and processes through discussion and then sent out of the classroom to apply those concepts and processes to the creation of essays. If so, the most important contributions of these environments to the development of instructional writing environments may lie in what designers have learned as they have considered such issues as how to support information management, co-authoring, and document review.

4 Web-Based Support for Writing Instruction

The Web has emerged as an important source of instructional support for writers and writing teachers. Since Purdue University’s OWL (online writing lab) moved from its home on Gopher to the World Wide Web in 1994 (OWL Fact Sheet, 2005), a large number of writing centers, writing-across-the-curriculum programs, and composition programs have established presences on the Web. For a more detailed history of this movement, see
Palmquist (2003). The majority of OWLs have used the Web to provide access to instructional materials, to schedule online or face-to-face meetings between writers and writing center tutors, to support online review of drafts, and to publicize services offered by writing centers and writing programs.

By 1996, more than 100 OWLs had established a Web presence. Lasarenko’s (1996) review of 93 OWLs indicated that they ranged from OWLs that served primarily to announce the services available from campus writing centers to those offering handouts and links to other online resources to “Full-Fledged” OWLs, which offered “a complete set of online services, including online manuscript submission and feedback.” Johnson (1996) observed that these OWLs also offered “a local publishing environment for student writers of electronic texts” and made “a pointed philosophical mission of redefining traditional notions of academic literacy.”

Despite the rapid movement of OWLs to the Web, a number of scholars, among them those most involved in spurring that movement, urged caution. Harris and Pemberton (1995), for example, warned that offering online tutorials offered significant challenges to the designers of OWLs:

> Attempting only to replicate familiar face-to-face tutorial settings in an electronic, text-oriented environment can lead to frustration and to defeat as OWL planners find themselves unable to simulate all characteristics of effective tutorials. Instead, it is important to recognize that OWLs can have a number of very different configurations — configurations that take advantage of the strengths of online environments and that work with, not against, both local conditions and writing center theory (p. 145).

Hobson (1998) cautioned that some of the online instructional practices associated with OWLs were inconsistent with the pedagogical principles and philosophies informing most writing centers. Hobson called attention in particular to a reliance on worksheets, drills, and guides to form, as well as what he saw as tacit encouragement of writers to work in isolation. Crump (2000), similarly, observed that the online support offered at that time by most OWLs, whether in the form of instructional materials or online interaction with writers, was “still very limited in terms of scope and shape” (p. 225).

Since Crump’s observation, a number of OWLs have provided more sophisticated instructional support for writers and writing teachers. The Purdue OWL (http://owl.english.purdue.edu) offers resources on a range of writing topics and is considering a move toward a database-driven content management system. The Wiki-based OWL at Texas A&M University Corpus Christi (http://falcon.tamucc.edu/wiki) supports writing and writing-intensive courses and offers significant resources for collaboration among teachers and students. The largest OWL, at Colorado State University (http://writing.colostate.edu), offers more than 27,000 pages of content for writers and writing teachers, ranging from instructional guides to annotated links to database-supported tutorials.

In addition to OWLs, important Web-based support for writers includes the development of online textbooks, such as Paradigm Online Writing Assistant (http://www.powa.org/), the Writer’s Handbook at the University of Wisconsin Madison’s OWL (http://www.wisc.edu/writing/Handbook/index.html), and College Writing Online,
by Joe Moxley (2003), which is available by subscription from Longman. In addition, Web-based resources such as the University of Antwerp’s CALLIOPE (Computer Aided Language Learning in an Interactive Online Pedagogical Environment) (http://www.calliope.be) offer suggestions for new directions in support for writers (Jacobs, Opdenacker, & Van Waes, 2005). CALLIOPE, which is implemented using a content-management system, is based on a problem-based approach and segments instructional materials into theory, practice, and case.

The Web has also provided a foundation for several instructional writing environments, including La Console d’écriture, TC3, and ScienceWRITE. La Console d’écriture (Bisaillon, Clerc, & Ladouceur, 1999), targeted at French secondary students, focused on poetry, informative texts, and adventure stories. It operated in a learning and a writing mode and provided pedagogical scenarios for student writers. The learning mode provided a “detailed description of the writing process” (p. 200) and offered access to five cognitive activities as well as explanations, examples, and practice. The writing mode provided a word processor, spell checkers, and idea generators, as well as a terminological extractor and document management software. TC3 (Text Composer, Computer supported & Collaborative) was developed to support argumentative writing among Dutch secondary school students (Erkens, Kanselaar, Prangsma, & Jaspers, 2003). A groupware program which provided access to Internet resources, it was based on an earlier instructional writing environment, Collaborative Text Production, developed in the mid-1990s (Andriessen, Erkens, Overeem, & Jaspers, 1996). The system provides four windows (two private, two shared): Information, Notes, Chat, and Shared Text. It also provides two planning tools, one for diagramming and the other for outlining, as well as a help function. Science WRITE (Greene et al., 1998) is a Web-based instructional environment that builds on Bereiter and Scardamalia’s cognitive model of composing (1987), as well as on their procedural facilitation model (1982), combining explicit textual instruction with example texts and exercises that build on each other. Students can work interactively through the modules, which focus their attention on both content and rhetorical situation.

The Web is also the home to larger, institutional efforts to support writing instruction. Web-based course management systems that have been developed for use in writing courses include SyllaBase (http://english.usu.edu/Document/index.asp?Parent = 6451), which is being developed at Utah State University by a group of writing teachers (Buchanan, 2000), Critical Tools (http://www.albany.edu/~critical), which was developed through the Computer Writing and Research Lab at the University of Texas at Austin, the Speakeasy Studio & Cafe (http://speakeasy.wsu.edustudio/), which is being developed at Washington State University, and TOPIC (http://ttopic.english.ttu.edu/), which is being developed at Texas Tech University. SyllaBase should be of particular interest to writing teachers. Unlike course management systems such as WebCT and BlackBoard, which attempt to emulate a class taught on the lecture model, SyllaBase emulates instruction that typically takes place in writing classrooms. The instructional metaphor informing it, as a result, is more closely aligned with that of the writing teachers who might use it. TOPIC (Texas Tech Online-Print Integrated Curriculum), in contrast, represents a significant departure from most writing curricula. The system supports an instructional approach in which one group of teachers provides classroom instruction while another evaluates and responds to student writing (Kemp, 1999). A database-driven Web application, TOPIC
manages the submission and review of essays written by students enrolled in Texas Tech writing courses (see Figure 2). TOPIC also provides course management tools for students and teachers, descriptions of writing assignment, and related instructional materials, including online textbook materials.

The majority of Web-based instructional resources developed for writers and writing instruction have been informed by the dominant metaphors that inform most writing courses. Systems such as Science WRITE, CALLIOPE, and TOPIC, however, are based on instructional metaphors that differ, in degrees ranging respectively from moderate to extreme, from those dominant metaphors. In the next section, I discuss a Web-based writing environment, the Writing Studio, that is also based on an alternative instructional metaphor, that of a “writing studio.”

5 A Database-Driven Digital Writing Environment with an Instructional Focus

In August 2005, Colorado State University announced a major upgrade to its OWL, Writing@CSU (http://writing.colostate.edu). The updated site allowed writers to create password-protected accounts in which they could save work created through the site. The site provided access to composing tools, commenting and document exchange tools, communication tools (including chat, blogs, and discussion forums), a course management
system, and instructional resources including writing guides and interactive activities. The revision marked the site’s transition from a standard OWL, which provided access to information about writing and the teaching of writing, to a Web-based instructional writing environment shaped by the metaphor of the student writer at work.

5.1 Development

The Writing@CSU project began in 1991, when faculty at Colorado State University began planning a campus-wide writing environment to replace the earlier Electronic Writing Services (Rodrigues & Kiefer, 1993). In 1993, using the name, “Online Writing Center,” it was released as a hypermedia application available through the University’s wide area network. In 1996, the Online Writing Center moved to the Web. By May 2005, the site, which had been renamed in 2001 to Writing@CSU, had more than 60,000 static pages and additional dynamic pages and had received more than 2.4 million visits in the previous year.

In 1999, faculty associated with development of the Writing@CSU Web site had recognized that, although it was providing a significant set of resources to writers and writing teachers, the nature of those resources was similar to those that had long been used in writing classrooms. The hypertext writing guides available through the site, some with more than 500 pages of content, could be characterized as enhanced textbooks. The interactive tutorials were similar in form and content to worksheets that had long been assigned in writing courses. Similarly, resources such as curricular materials, guides for teachers, and annotated model texts had clear analogues in the print world. Essentially, the site was providing a rich set of resources that served largely to support the instructional status quo in the University’s writing and writing-intensive courses. Indeed, despite significant investments in technology-based writing instruction in our department over the past two decades, the overall approach used in our courses reflected classroom-based practices that would be recognizable to a writing teacher from the 1970s or 1980s.

Work on a previous project had convinced us, however, that technology-supported writing instruction would be more successful if it were based on an instructional metaphor that focused on the student writer in the act of composing. That metaphor emerged from the Transitions study (Palmquist et al., 1998), an exploration of computer-supported and traditional writing classrooms in which we found that the presence of networked computers in a writing classroom was correlated with strikingly different attitudes among students and teachers toward the use of writing during class meetings. Briefly, we found that students in traditional writing classrooms resisted writing during class and their exchanges with classmates were more likely than not to be off topic. In contrast, we found that students in the computer-supported classrooms were more receptive to writing during class, more likely to talk about their writing with teachers and classmates, and more confident in their writing skills at the end of the term. Most important, we found that student writers seemed to learn best when they could ask a teacher or classmate for advice and feedback as they composed.

We characterized the instructional interactions we observed in the computer-supported writing classrooms as a “studio approach” to writing instruction because the behaviors we observed seem more similar to classes held in an art studio, where teachers and students discuss work in progress, than to a typical writing class, where writing is discussed and
then out-of-class work is assigned. Our conception of the writing classroom as a studio is consistent with visions of writing classrooms articulated by several scholars, many of whom predate the widespread use of computer and network technologies (Grego & Thompson, 1996; Phelps, 1992; Platt, 1991). As such, we are making no claims about the novelty of our instructional approach. We suggest, however, that this approach can be used not only in face-to-face instructional settings, but also in electronic settings — and, perhaps more important, that it can provide a powerful metaphor to guide development of instructional writing environments.

In 2001, we developed a prototype Web site that attempted to use a studio approach to support the teaching and learning of writing (Fogelson, 2002, May; Kiefer & Barnes, 2002; Palmquist, 2002, March, May). The Writing Studio, which was designed to be part of the larger Writing@CSU site, allowed writers to access instructional resources, communicate with and receive feedback on writing from teachers and other writers, access tools that supported elements of the writing process, and save their work for later access. The Writing Studio was initially designed as a collection of “rooms,” each of which could focus on a particular genre, discipline, or course. Our first room, based on instructional materials developed by Mackenzie Fogelson (2002) as part of her master’s project and implemented using Macromedia ColdFusion, Microsoft IIS, and Microsoft SQL Server, supported secondary students working on informative writing assignments. The Writing Studio provided a password-protected environment in which student writers could learn about, compose, ask questions about, share drafts of, and save their informative writing assignments (see Figure 3). The room was developed as a single application that allowed navigation among modules that guided students through the process of choosing a topic, planning a writing project, drafting the project, and revising and editing the project. An instructor’s guide was provided.

In summer 2002, we created a second prototype that simplified the user interface, provided multiple navigation options, and implemented an expanded set of instructional materials, communication tools, and composing tools. Key changes included a drop-down menu running across the top of all pages in the Studio; implementation of a discussion forum and chat system; implementation of a writing center draft-submission tool; WYSIWYG drafting, note-taking, and bibliographic citation tools; and the ability to download or email work completed in the Studio. The instructional modules used in the first prototype were enhanced through the use of a WYSIWYG editor, linked tutorials, annotated example texts, and video-based discussions of relevant composing processes by experienced writers and teachers (see Figure 4).

Subsequent enhancements to the Writing Studio during 2003 and 2004 included the addition of commenting tools, a course management system, new composing tools, and a video-based help system. The commenting tools allow writers to request comments from writers, teachers, and writing center tutors and to make comments on work completed by writers who grant them access to their project portfolios. Reviewers can notify writers by email that comments had been made on their work. In addition, “comments” icons in instructional materials and composing tools alert writers that feedback is available, allowing them to view and manage comments as they compose.

The course management system adopted the approach pioneered by the developers of SyllaBase — using the writing classroom, rather than the lecture classroom, as the basis
for the design of course management tools. The course management system allows teachers to create and manage classes and to view and comment on student work. Teachers can display calendars, course syllabi, assignments, course materials, related links, and relevant instructional materials on the Writing@CSU site. The course tools also support communication via electronic mail, discussion forums, chat, blogs, shared file folders, and a grade book. Teachers can manage class rosters, set commenting access rights among students, assign students to groups, keep notes about their course in a teaching notebook, modify the appearance and content of the course page, and manage co-instructors, among other options. Although the overall set of tools is similar to that of course management systems based on a lecture-class metaphor, the assumption that they will be used to support writing classes shaped numerous decisions about which tools to include and how they would be designed. For example, teacher commenting tools are provided while test and quiz tools are not. Similarly, to support journaling, students can “publish” their blogs to a class’s blogs page.

The new composing tools included an ideas tool, an outliner, a “Work at a Glance” tool, and a blogging tool. The ideas tool provides a space for recording ideas and information related to a writing project. “Ideas” can be categorized and linked. The outliner supports the creation of an outline and supports links to source citations, notes, and ideas. The “Work at a Glance” tool allows writers to view all work they have completed on a writing project as they work on a draft. It provides a centralized information management space that supports drafting and revising processes (see Figure 5).

Figure 3: A page from the Informative Writing Room in the first prototype of the Writing Studio, Spring 2001.
Rethinking Instructional Metaphors

Figure 4: A Writing Studio practice guide, ca. 2003.

Figure 5: The “Work at a Glance” tool, ca. 2004.
In summer 2005, following assessments that involved analysis of site traffic, interviews with teachers and students, informal usability testing, and a formal usability study conducted at the University of Twente in the Netherlands (Van Craaikamp, 2005), the site’s developers decided to merge the Writing Studio and the larger Writing@CSU site. The decision reflected the recognition that the login required to access instructional materials was discouraging writers from viewing instructional content housed within the Studio. It also reflected a desire to redesign both Writing@CSU and the Writing Studio to account for the results of the usability tests, which indicated the desirability of a reduced set of navigation tools and the creation of a unified look and feel across the site. The redesign resulted in a smaller Web site (total pages were reduced from roughly 60,000 to roughly 27,000, largely by shifting older pages to another site) with simplified top-level pages (see Figure 6) and a new classification of instructional resources. The “rooms” have been replaced by Writing Collections and the disparate collection of materials previously found in individual rooms have been integrated into the larger set of writing guides, activities, and demonstrations. Writers are now asked to login only when they attempt to access resources that will require them to access customized content (such as a course page) or to save work (such as a composing tool or

Figure 6: Changes to the Writing@CSU site. From top left, clockwise: old home page, new home page, new top-level page, and old top-level page.
an interactive activity). The redesigned site also makes greater use of a database to individualize access to materials on the site and to control the appearance and behavior of pages on a user-by-user basis.

5.2 Current Status

Access to the Writing@CSU site is unrestricted, allowing its use by writers and writing teachers regardless of their affiliation with Colorado State University. Following the announcement of the availability of the Writing Studio course management tools in December 2004, teachers at more than 30 educational institutions began evaluating its use to support their courses. By December 2005, the number of user accounts on the system exceeded 20,000.

Current plans for expanding the services offered by the site include

- strengthening partnerships with other higher education institutions, both in the United States and abroad;
- developing collections, composing tools, and instructional materials for primary and secondary students;
- increasing instructional resources for writing-intensive courses across the curriculum;
- developing or adapting composing tools that support graphical representation of information and flexible positioning of text passages on a screen;
- developing a portfolio publication tool that will allow writers to present their work to external audiences;
- enhancing the blogging tool to support syndication; and
- developing alternative entry pages for the site and “skins” for the course management system for a range of writers, from young learners to specialized communities of learners.

Long-term plans include integrating leading word processors into the site’s composing tools (or, should that prove impractical, replacing the HTML editor we are currently using with an XML editor that would support greater customization) and enhancing the site’s collaborative tools to support real-time document sharing and group writing projects. Potential projects include exploring the use of artificial intelligence to support collaborative interfaces — software that collaborates with a writer — as Babaian, Grosz, and Shieber (2002) have done with Writer’s Aid, a program that uses writer’s plans and past behaviors to partially automate bibliographic searches.

5.3 Future Research

Current research projects include ongoing, informal usability testing of the site and a classroom study of the use of the Writing@CSU site to support the teaching and learning of writing in computer-supported and traditional classrooms. A fall 2005 study of classes taught by 10 instructors at Colorado State University is currently underway. Student attitudes toward writing, technology, and the use of the Writing@CSU site
(with particular emphasis on the composing tools, course management system, and interactive instructional materials) are being assessed through surveys and interviews. Writing and online behaviors are being assessed through classroom observation, usability testing, analysis of Web site usage, and analysis of writing produced for the course. Instructor behavior and attitudes are being assessed through interviews, classroom observation, and informal usability testing. Instructors in the study represent a range of teaching experience and attitudes toward using technology. We intend to follow the instructors’ use of the Writing@CSU site across two academic terms. We also intend to carefully assess differences in the use of the site in the two classroom contexts.

Future research will involve assessment of the use of Writing@CSU site in primary and secondary classrooms, periodic usability testing (both formal and informal), and continuing analysis of the site’s traffic.

5.4 Limitations

The Writing@CSU Web site is a work in progress. Key limitations include its reliance on a WYSIWIG editor that is not compatible with all browsers, problems with making comments on specific regions of a document, and incomplete implementation of composing tools. The current WYSIWIG editor works with Internet Explorer 6.x and higher, Mozilla 1.4 and higher, and browsers based on the Mozilla core. We have implemented a browser check that alerts users if they enter the Studio with an unsupported browser. The warning is given only at the beginning of each session and can be disabled. The comments tool does not support-linking comments to a specific passage of text. Currently, all comments are made at the level of the document. This is not a significant problem for memos and notes, but it poses challenges for commenting on drafts and other longer documents. Writing@CSU does not currently offer a graphical hypertext linking and display tool, such as those found in earlier writing environments, nor does it offer a drawing tool. In addition, the bibliographic citation tool generates a “working” bibliography that must be checked by writers for accurate formatting of entries.

6 Conclusions

The Writing@CSU Web site offers an example of an instructional writing environment based on a pedagogical metaphor that differs from that commonly used in writing classrooms. The articulation of an ideal learning situation — in this case, that of a student writer who has access to relevant composing and researching tools, relevant instructional materials, and feedback and advice from classmates and a teacher — has informed our development of the site. Working from this metaphor, we have developed an instructional writing environment that provides writers with support for the full range of composing, communication, and information-management processes they face as they engage in a writing task. Work by a wide range of scholars over more than two decades has laid the foundation for such an environment, but shifts in technological capabilities and changes in the kinds of documents writers are asked to create continue to redefine the ideal.
The instructional approach that led to the creation of the Writing Studio and the Writing@CSU Web site has potential for enhancing students’ writing skills. It also has potential advantages for teachers of writing and writing-intensive courses. By providing access to instructional materials and composing tools that support students as they learn to write — whether that writing be general activities such as summaries and reviews of literature or more discipline-specific activities such as engineering design reports, chemistry lab reports, and business letters and memos — we can significantly reduce the effort faculty might otherwise make to develop materials of their own. By developing communication and document management tools that support feedback on student writing, we can support out-of-class peer review and increase teachers’ options for providing response. By creating support materials for faculty — including Web-based guides on integrating writing activities into courses, guides that provide direction on reducing the time needed to provide substantive responses to student work, and model course curricula and materials — we can further reduce the effort disciplinary faculty need to expend to use writing activities and assignments in their courses.

Our observations of instructors working with students in computer-based classrooms suggested an alternative approach to writing instruction, one that departs in significant ways from that used in most writing courses. When student writers compose in isolation, their instructional resources are typically limited to information obtained through a textbook or course notes. When student writers compose in an instructional learning environment such as the Writing@CSU Web site, they have access to a far wider range of instructional materials. In addition, through network communication and commenting tools, they have the possibility of obtaining feedback on their writer in far less time than would be the case if they had to wait for the next class or an instructor’s office hours. The development of instructional writing environments based on pedagogical approaches that differ from the dominant approach of class discussion followed by students writing in isolation offers an intriguing alternative to computer-based instructional materials that maintain the pedagogical status quo.