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Wedding the Technologies of Writing Portfolios and Computers

The Challenges of Electronic Classrooms

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WRITING PORTFOLIOS AND COMPUTERS COMPRISE TWO OF THE MORE recent teaching technologies introduced into late twentieth century English classes. In a relatively short time, these two technologies have spread to English classes at all levels and appear increasingly in the field's professional discussions. Not surprisingly, discussions of both technologies—in journals and other professional publications—are usually upbeat, heralding the innovations as revolutionary with the promise to improve dramatically students' learning and writing. Not surprisingly, each technology is seen also as a positive influence that will promote a social construction of knowledge in which teachers and students are all learners-in-progress, collaborating together to form new communities of learning.

But what *is* surprising are the striking similarities in the language used to extol each technology. Of computer networks we read that their "real strength [is] a shift in the way students think about their own writing shown by a greater ENGAGEMENT in writing tasks" (Batson 1988, 55, emphasis in the original) and that "[t]he computer-based collaborative approach attempts to re-empower text by emphasizing the student text itself instead of the instructor's evaluation" (Barker and Kemp 1990, 24). Correspondingly, of portfolios we learn that "[t]he experience [of using portfolios] changed the way we see our students as writers and

as people. Because of our work with portfolios, we have altered the way we teach writing as well as the ways in which we talk to each other as members of an English department" (Bergamini 1993, 145). In an article entitled "Portfolios as a Vehicle for Student Empowerment and Teacher Change," we learn too that with the use of portfolios the teacher "was no longer center stage. [She] facilitated, answered questions, and joined reading and writing groups . . . the class had grabbed hold of the reins" (Weinbaum 1991, 213). Thus both technologies, we are told, are potentially transformative for English classes. Teachers who use these technologies—many educational experts maintain—are capable of changing classrooms into exciting intellectual spaces where students and their texts are privileged. Such instructional innovations, moreover, are extraordinary in that they help teachers reshape the social contexts of classrooms and departments, and subtly restructure the relationships among students, instructors, and the tasks at hand.

These comments—for both computers and portfolios—are hopeful and optimistic, capturing, we believe, what is best about the profession of English teaching: its strong commitment to positive educational change and a characteristic optimism about achieving instructional goals. Yet this same positive thinking can also be dangerous if its members want to think critically about portfolios and computers. As we have argued elsewhere exclusively of computers, the reliance on such laudatory language can serve to obscure problems that continue to characterize our classes despite our best intentions (Hawisher and Selfe 1991b). Computers, for example, at times sustain teaching approaches that contribute neither to good teaching nor learning in much the same way that portfolios can support perfunctory paper-collection procedures and evaluation systems that serve to reproduce existing class-based and race-based inequities within our educational system. We are thinking, for instance, of classrooms where computers serve the function primarily of grading and evaluating papers (Marling 1984; Jobst 1984), providing drill and practice grammar tutorials (Holdstein 1983; Falk 1985), and, in general, of reinforcing a back-to-basics mentality that supports traditional authority structures within educational settings (LeBlanc 1990). There are also English classes that employ writing portfolios as record-keeping devices that emphasize the number of assignments submitted and the kinds of errors students must avoid if they are to receive a good grade for their collective writing. Currently, some school districts and state educational systems (e.g., Vermont, Kentucky, and Indiana) are exploring options to use portfolios in efforts to set standards (that may

ignore local constraints and goals) and in exit-examination systems (that may reflect district inequities without addressing their causes). The New Standards project, with its commitment to work with partner states on developing portfolios with performance-based standards for assessment, is yet another example of the use of portfolios for wide-scale assessment. It is possible, then, to introduce both these technologies into English classes with little changed except the method by which writing assignments are written and submitted.

We should note too that the enthusiastic discourse we have identified here is not limited to portfolios or computers. Similar claims over the years have been made for pedagogies using "process approaches," "peer groups," "journals," and "collaboration"—other instructional technologies that English teachers have turned to in the last twenty years in an attempt to improve the teaching and learning of literacy. We have all also heard comparable language extolling the National Writing Project and the Writing Across the Curriculum movement. In fact the optimistic discourse noted here has close connections with what Mike Rose has called the "myth of transience," that is, the belief that if, as English teachers, "we can just do *x* or *y*, the [literacy] problem will be solved—in five years, ten years, or a generation. . . . " (Rose 1985, 355). According to this argument, if the educational establishment would just institute a particularly promising innovation, the literacy crisis as defined by the public would begin to disappear and students would be able to read and write in ways prized by society. But, as Rose has noted, and he aims his criticism primarily at universities, this kind of thinking is also dangerous: the myth of transience usually prevents us from seeing multiple possibilities for reform and "serves to keep certain fundamental recognitions and thus certain fundamental changes at bay" (Rose 1985, 356). Thus the broad-based kinds of change that can and should be made in educational systems are often obscured by the introduction of new technologies, and the innovations themselves—because of our limited perspectives and uncritical acceptance—ultimately fail to bring about the necessary systemic-level changes in the values that undergird these same educational institutions and programs (Hawisher and Selfe 1993).

One site for change that such enthusiastic discourse serves poorly is teacher education programs, and we include here programs that educate college level teaching assistants as well as high school teachers. Many teacher education programs, in discussing the use of both portfolios and computers, provide teachers with the practical strategies for implementing such tech-

nologies without encouraging them to think through the educational issues and implications that accompany their effective integration. Using either portfolios or computers to support productive—if limited and local—educational reforms requires deep-seated changes that cannot be brought about by merely introducing teachers to innovative teaching technologies (Hawisher and Selfe 1993).

In this chapter, then, we would like to step back from an uncritical acceptance of promising educational innovations and offer a more tempered view of what we can and cannot expect from writing portfolios and computers, stressing the theoretical grounding and experiences teachers need if they are to succeed with the two technologies. We first define "electronic portfolios" and present an example of how one teacher uses them in a writing class. Following our discussion, we turn to the education of teachers and present three challenges to teacher training programs. Throughout the discussion, we caution that despite the potential for meaningful educational change often associated with portfolios and computers, the bringing together of the two does not necessarily double the benefits—in fact the combination may well double the liabilities.

Teaching Practices and Electronic Portfolios

We begin by uniting the two technologies in the term "electronic portfolio," which we define as an online collection of student work that will ultimately be evaluated by an audience of some type—either the student authors themselves; peer readers; teachers; parents; administrators; evaluation experts; or mixed audiences representing more than one of these groups. The kind of portfolio envisioned here reflects what Kathleen Yancey describes as "a working portfolio," that is, "an archive of work, collected over time, all of which counts for learning, but not all of which counts for assessment" (Yancey 1993b). We see the working portfolio, however, as finally resulting in what Yancey terms "a presentational portfolio," a collection that culls from the working portfolio exhibits pulled together for a specific purpose, in this case, the completion of a course. The electronic portfolio differs from its paper cousin primarily in that the portfolio materials are created and stored in a digitized form (e.g., on a floppy disk, on a compact disk, on a computer network), with students often collaborating electronically on projects and sharing their work with other students and the instructor during the course of a semester. That is not to say that the work in electronic portfolios is never printed out as hard copy but only to note that

it is created, stored, and shared with others in a computer-based medium. Although, in most cases, the computer-based distribution will be local and probably limited to the student's teacher and classmates (e.g., the exchange of floppy disks and the exchange of files over a local-area network or LAN), it is also possible to set up such a system over a WAN (wide-area network) or the Internet (a collection of networks that spans the globe). With the Internet, other classes and teachers—as close as next door or as far away as another country—can also view and comment on the electronic portfolios.

To find out how teachers across the country use electronic portfolios, we queried an electronic discussion group, WAC-L, the Writing Across the Curriculum List, and in a very short time received several responses. Interestingly, the responses were from teachers with Appletalk and Macintosh technology. Portfolios seem to work transparently in Macintosh environments since the "folder" metaphor, which provides a ready-to-hand synonym for "portfolio," is already in place. By this, we do not mean to suggest electronic portfolios cannot be used with other computer systems; students can keep portfolios on individual disks using any kind of computer. The teachers who responded to our query, however, used computers for more than the creation and storage of documents; they also used the network to enable students to share their projects online. Macintosh environments make this easy, but other systems allow for the electronic sharing of texts as well.

Here we present one teacher's experience to demonstrate more clearly the positive ways electronic portfolios can function in English classes. Becky Howard's description of her use of electronic portfolios at Colgate University is particularly noteworthy, we believe, in that it is fairly simple to implement yet makes extensive use of computer technology. At Colgate, each writing instructor and student has an Appletalk local network "account," a folder in which they can store their work. These folders are secure in that they can be accessed only by the folder owner, his or her instructor, and the network administrator. Howard relies heavily on the network for her class on "Writing with Word Processing," which focuses primarily on revising. (Note that in focusing on revision, Howard uses the portfolios in yet another way. Portfolios become part of a pedagogy that emphasizes and showcases revision strategies.)

In describing her use of portfolios, she writes:

> students use their electronic folders as portfolios where they store their work—the assignments [she gives] them, their responses to each other's papers, and the

> papers they are writing for other classes. All of this constitutes work-in-progress; they revise work at their own discretion throughout the semester, regardless of whether it has already been submitted for a grade. This includes work submitted in other classes; in [her] Comp class they use papers assigned in other classes as laboratory opportunities for applying principles learned in [her class]. As they revise papers, the students keep old copies in their folders. At the end of the semester, they select what they consider their best work, not their best final products, but their best work as writers, the work that best demonstrates them as analysts, rethinkers, and revisers of their own writing and that of their classmates. They can select from work assigned in [her] class, work assigned for other classes, [as well as] their responses to classmates' papers. Having selected their best work, in all its drafts, they submit it to [her]—electronically, of course. Accompanying it is a road map explaining what each piece represents and why they chose it. This then constitutes 60-90 percent of their grade for the course, depending upon the vagaries of syllabus design from one semester to another. (email correspondence, 2-14-94, 8:19 A.M.)

For Becky Howard, the advantage of the electronic portfolio is that it allows her to have greater interaction with the students. As these students work, they can put drafts in a special electronic homework folder, which Howard checks daily. Because her students tend to work late at night, and she tends to work early in the morning, they leave material for her that she responds to, sometimes long after they go to bed. Then, when the students get up in the morning, Howard's response is waiting for them. Her use of electronic portfolios is in keeping with Yancey's definition of a "working portfolio" in which the portfolio's contents are always in a state of flux and under revision; finally, however, the students ready their portfolio for presentation and end-of-semester evaluation, choosing what they regard as their most successful efforts.

So what do teachers need to know about electronic portfolios that they cannot learn from other teachers' experiences such as Becky Howard's? What do they need to know that they have not already learned from their use of computers or portfolios as separate technologies? Quite a bit we think. Teachers who have used computer-based systems know that moving texts from hard copy to electronic form—essentially moving written communication from one medium to another—can result in major differences in the texts that students produce (Markel 1994), the processes they use to write (Heilker 1992), the structure of collaborative group tasks and the nature of collaboration itself (Forman 1992; Sirc and Reynolds 1990), and the style and tenor of written exchanges (Kremers 1988; Romano 1993; Regan 1994).

Given these observations, we also suspect that the change in medium can make a significant difference in the nature of electronic portfolio writing and, perhaps, in the way teachers use portfolios in their classes. For example, although Howard has been able to incorporate electronic portfolios seamlessly into her writing class, it is worth noting that the ease of communication via the network—her increased level of access to students and theirs to her, the elimination of some time and distance issues that can limit teaching in conventional classes, and the speed of electronic communication—may affect in subtle, and not so subtle ways, her approaches to teaching writing. Such a context could encourage both an emphasis on responding to students and an emphasis on discursive exchanges: students write, Howard responds, and students exchange drafts with each other. Such a context could make a qualitative change in her interactions with students and their interactions with one another.

But we suspect that for evaluation purposes—and for various pedagogical approaches as well—electronic portfolios also have some potential for making assessment *too easy*. With online networked portfolios, teachers can virtually inspect and monitor student writing without the student's knowledge; and, with some software, they can electronically copy papers to display to the rest of the class without the student's permission. Without thinking through the theoretical consequences, teachers can use electronic portfolios and the computer systems that support them to "keep tabs" on student work, to practice "surveillance" on individual writers and collaborative groups, and to create an oppressive setting that is not conducive to accomplished learning. Although we realize that such practices also come into play in traditional class settings, the supposed "efficiency" of computers in record keeping and surveillance tasks (Zuboff 1988; Marx and Sherizen 1989) can lead teachers to practices that they might otherwise eschew. Electronic versions of portfolios may encourage teachers unwittingly to collapse critical distinctions between learning and assessment. Because texts are easy to post and share in electronic environments, there is the temptation for teachers to *collect* at the expense of students' selecting and reflecting on their writing and learning.

Grant Wiggins, an assessment specialist, suggests, for example, that technology can support assessment efforts by providing the means of maintaining an ongoing data base of student performance. He writes, "We can use technology more efficiently. We can keep video and audio records and evaluate [students' progress] by sampling . . . efforts that have been stored electronically" (Wiggins 1991, 10). We would, however, hope that

the profession thinks carefully about devising and developing such systems. To require students to keep a computer disk that follows them through all their years in school or to keep centralized computer records of students' work is fraught with problems that have not been considered carefully. Are students to carry with them every success and failure, especially their failures, from childhood to adolescence to adulthood? Will a disk or "computer file" become a prerequisite for admission to various academic programs? Perhaps our reaction waxes extreme, but decisions about who reads, who writes, and who can delete information in these "lifetime" portfolios are critical issues, and they have yet to be addressed. Instead the profession often exhibits a kind of thoughtlessness about technology or a kind of naive faith in it, both of which are problematic. It is our belief that electronic portfolios offer both opportunities and liabilities that hard copy formats do not. A major project for English teachers will be to develop a responsible professional vision—a vision grounded in sound composition theory and practice, and tempered by critical, informed, and humanistic perspectives on technology and teaching.

Challenges to Teachers and Those Who Would Teach Them

Although we have complicated the initial concept of electronic portfolios and their uses to some extent, we have not yet offered a realistic outline of what it will take to develop a responsible, professional vision of electronic portfolios. Several important and complex challenges suggest themselves immediately and we have listed three of them here. All of these comments are aimed at helping the profession reconsider its goals and approaches—rethinking what it means to teach and learn while developing critical perspectives on the new technologies. The challenges we identify are far from exhaustive, but they may help guide the profession's thinking about the education of teachers over the next five years, especially in relation to the use of electronic portfolios.

Challenge #1: The new technologies never stand still. They are constantly changing and as such require continuous learning on the part of teachers and those who would prepare English teaching professionals.

Electronic portfolios provide an excellent example of the remarkable changes that have occurred in software and hardware over the past couple of years. We have already mentioned, for example, how portfolios can be kept over a network for sharing and distributing various documents to

teachers and other students. In addition, the portfolio documents can be more than just "papers"; they can, in fact, be comprised of artifacts created with graphics programs, hypertext software, and even animation and 3-D rendering programs. The students might well construct their portfolios in such a way that they combine text, visuals, and sound, ultimately creating multimedia portfolios. Moreover, students can use "conferencing" software to consult with other students and teachers as they work on their projects, eventually transforming their "working" online folders into presentational portfolios. These presentational portfolios, in turn, can be posted on the World Wide Web and linked in a global hypertext.

At the University of Illinois, Urbana-Champaign, the Center for Writing Studies has dedicated a capacious hard drive (3.2 gigabytes) to experiments with a combined Unix and Macintosh environment that will allow storing and accessing portfolios across the Internet. PacerForum software will also be used in conjunction with two other programs, *Replica* and *Acrobat*, which allows instructors to collect documents produced with different software programs and stores them in one file; in other words, as we mentioned, students can produce documents with graphics, word processing, even a spreadsheet, and arrange and store them in one file for presentation.

Figures 1 through 5 illustrate how students and teachers can create and exchange ideas through this electronic portfolio system. In Figure 1, there is the PacerForum interface with classes and groups over several parts of campus, along with a sample class, English 381 and Friends.

When students double click on the forum English 381 and Friends, they see Figure 2, a representation of the three particular class discussion groups: online portfolios, the violence of literacy, and a chat group. These are all electronic spaces set aside for the students to discuss and share possible portfolio documents. When one of the "tiles" is double-clicked, the tile opens up and there is a space where students can volunteer comments and also insert other documents. In Figure 3, for example, a REPLICA document has been inserted which, when clicked on, results in the illustration shown in Figure 4. (Obviously this is a document one of the authors has written, but the process we demonstrate here represents how students might create, send, discuss, and represent their work over the course of a semester.) As we noted, these electronic portfolios can easily become multimedia projects. In Figure 5, there is a "picture" and "sound" which can be added to students' other documents. Again by clicking on the icon, we can see or hear its contents. For our purposes, the sound might well be students introducing their portfolios by reflecting on how the various online documents represent

Figure 1
PacerForum Interface

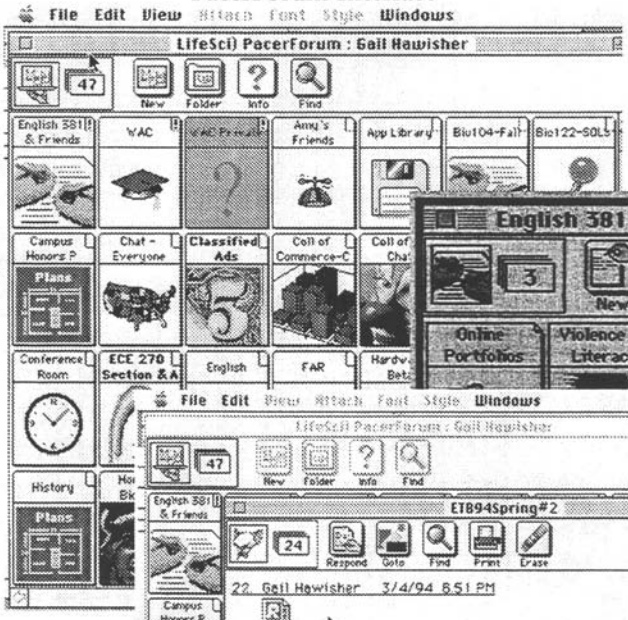

Figure 2
Forums within the Class

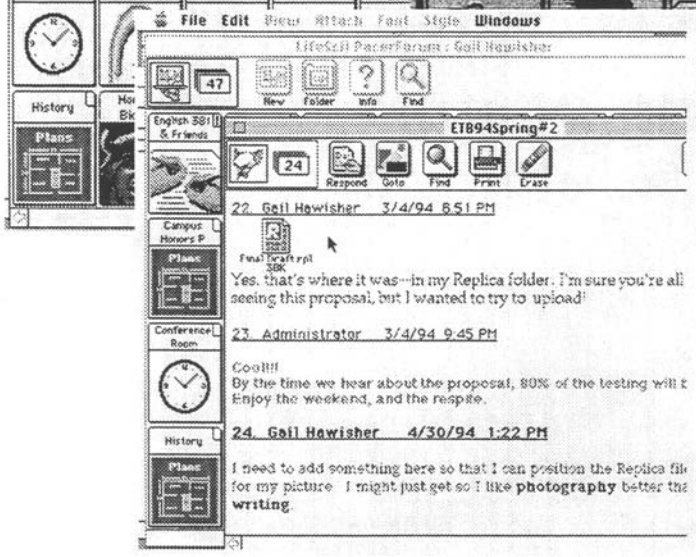

Figure 3
REPLICA Document

their interests and work in the course, what they were thinking about when they created them, and where they might lead in the future.

We think the software here presents one interesting and productive way in which teachers can use portfolios for classroom teaching and evaluation. One consideration, however, is to demonstrate how much preparation and learning is required before the teacher can work with the constellation of software and hardware mentioned here. Not that any of them are

Figure 4
Open REPLICA Document

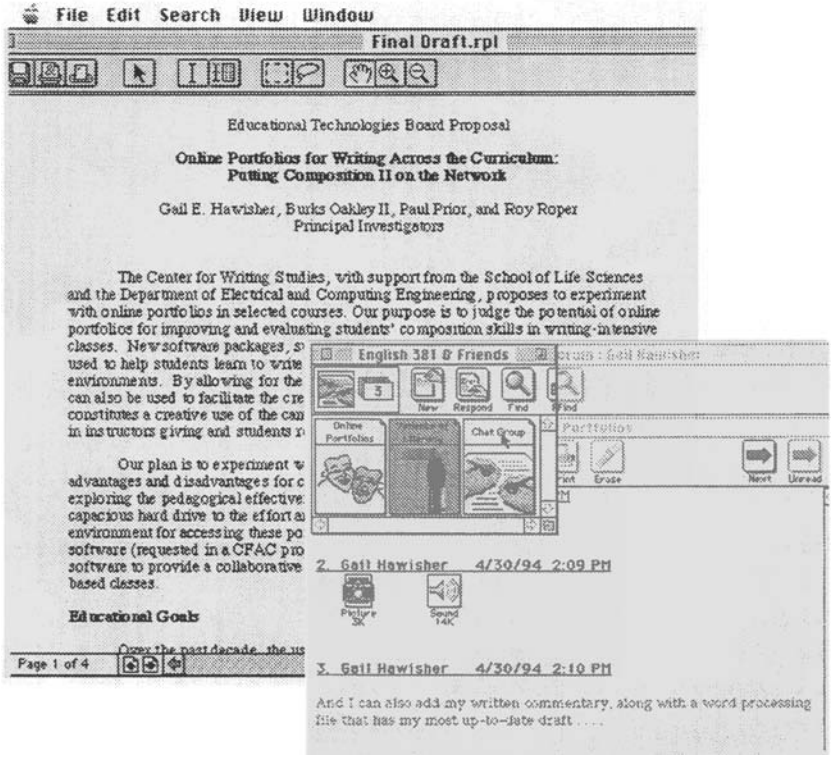

Figure 5
Graphics and Sound

particularly difficult, but any new software requires a great deal of time and preparation on the part of the English teacher. And it's often not until teachers have used the software extensively that they are really able to take advantage of its potential benefits and minimize its shortcomings.

As software changes, so will hardware. Even by 1989, Tom Forester, in *High Tech Society* had estimated that the power of computing technology was doubling for the same cost per unit every eighteen to twenty months. Today, many experts suspect this figure has dropped to fourteen months and is continuing a downward trend. And the change is evident in terms of breadth as well as pace. In the last several years, teachers have learned to deal with stand-alone personal computers, modems, synchronous and asynchronous networks, laptop computers, laser printers and laser disks,

CD-ROMs, video toasters, projection devices, and full-page and double-page displays—many of which are now being used in creating electronic portfolios. And, even more recently, English professionals are learning how to navigate the World Wide Web, an electronic space where students and instructors could construct a home page and introduce an entire class's individual portfolios to other students and classes throughout the world.

Challenge #2: Technology is not evenly distributed across schools and universities or even within given educational settings. The rapid changes contribute to creating among us those with easy access to innovative developments and those for whom access is difficult and sometimes nonexistent.

Unfortunately, the technological changes will not be easy to predict or to follow. Nor will they be distributed evenly among schools and universities across the country. In some schools—most predictably those who serve students who are privileged and white—teachers will already have access to every one of the devices we've mentioned and may even have access to technical training and expertise. In other schools—often those located in low socioeconomic areas with minimal tax bases and heavy populations of nonwhite students and students from non-English language backgrounds—teachers may have access only to the most minimal hardware and software, and they may be asked to master these in their spare time. What is true for teachers is also true for students—access to technology in this country depends to a great extent on socioeconomic status, class, race, and gender (see, for example, Jessup 1991; Gomez 1991a; LeBlanc 1994; Olson 1987; Ohmann 1985; and Pillar 1987).

For preservice teacher education programs, the implications of this rapid and uneven pace of technological development are disturbing indeed. Without a predictable base of technological support to aim at, programs will be hard pressed to prepare teachers to face realistic conditions. Does a preservice program dedicated to excellence, for example, prepare professionals to face a technologically rich learning environment, and thus risk failing to provide them the skills they may need to make effective use of a single computer on a crash cart shared by four teachers, or does it prepare them to face a technologically-impoverished environment, and thus risk failing to help them consider the implications of multimedia portfolios, access to the information superhighway, or hypertext document construction on the World Wide Web?

This tension at the level of preservice education, in turn, has placed increasing burdens on professional developmental programs that provide

ongoing education responsive to local conditions. Professional developmental programs in public school systems, for example, given shrinking budgets and legislative constraints, are not always able to adapt. Nor are the in-service professional developmental programs at colleges and universities exempt from such pressures. At Michigan Technological University, the Department of Humanities has confronted teacher education issues in terms of staffing, funding, instructional strategies, and technology—all of which need coordination to make computer-supported work effective for portfolio development or any other large-scale literacy project. Although the department has had a sophisticated network to support teachers of writing for at least a decade (a classroom/lab with twenty-five Macintosh and twenty-five IBM computers, computers on every teacher's desk, a Unix-based department network that connects all machines, more than three gigabytes of storage for digital communications, access to the Internet, and a file system that supports electronic portfolio management), the department has only begun to understand how much help teachers need—even experienced and highly effective composition teachers—to make effective use of these facilities. To meet the needs of teachers who use computers to teach writing and other humanities classes, the department has employed a three-quarter time administrator for the Center for Computer-Assisted Language Instruction, a half-time faculty-computing support staff member, a full-time systems administrator, and a volunteer staff of fifty to sixty student consultants. It has, in addition, offered individualized instruction for faculty who want to integrate computers into their classes, provided student help for faculty using the computer-supported writing facilities, and begun weekly meetings of teachers who share strategies for teaching writing with computers, compiling electronic portfolios, and creating multimedia texts, among many other topics.

Even this partial catalogue of concerns suggests the range of issues that confront teachers of English who want to think in innovative ways about online portfolios. Many teachers, we know, after reading Rebecca Howard's description of her use of electronic portfolios and our own accounts of the possibilities at Michigan Tech and the University of Illinois wonder whether their schools or departments can indeed afford to make such investments in the hardware and software systems described and whether they have the resources to invest the time and support for faculty development that we've described here.

Challenge #3: It is too easy to see computers and writing portfolios as "tools." We need instead to view them as the richly embroidered artifacts of a culture,

artifacts which ultimately embody the values and ideological directions of our society.

Viewed in this way, electronic portfolios provide an additional challenge. It is not enough for teachers to work to keep current of the latest software and hardware uses, but they must also develop the necessary theoretical and critical perspectives to accompany their new knowledge. When technology, as an artifact of our culture, is employed by teachers who lack a critical understanding of its nature or a conscious plan for its use, and when these teachers must function within an educational system that is itself an artifact of the political, social, and economic forces shaping our culture, the natural tendency of instruction is to support the status quo. This does not mean that the nature of writing or communications within portfolios will remain the same—we have already suggested how these might change dramatically.

What is likely to remain constant—unless we do a better job of educating teachers—is the social function of electronic portfolios within the overdetermined system of cultural, political, and economic formations that make up our educational system. Unless we develop a habit of thinking in new ways about technology and technologically-based texts, electronic portfolios are as likely to be used by teachers to support those practices we now see as reprehensible in our educational system (e.g., surveillance, competition, outdated assessment methods, and the continued oppression of women and students from underrepresented groups in our culture) as they are by teachers who employ those practices we see as positive (e.g., collaboration, the valuing of individual expression and creativity, and the productive exploration of difference). (See, for example, Cooper and Selfe 1990; Jessup 1991; Takayoshi 1994; Hawisher and Sullivan forthcoming).

In light of this realization, we can understand the importance of rethinking some of the approaches teachers now take to compiling, collecting, and evaluating student texts and coming at electronic portfolios from newly established critical perspectives. Some of the perspectives needed for this task can come from a broadly conceived program of humanistic studies for teachers—from cross-disciplinary approaches to social and cultural studies; science and technology studies; studies of postmodernism, Marxism, and radical democratic politics; of physics; and of feminism, among other perspectives. Each of these fields informs teachers at a general level about the relationships that bind people to one another in cultural groups, the language individuals use to express these relationships of society, and the intellectual tools used to give their language form and substance.

One of the complex issues that such perspectives from other fields will help us explore has to do with the security of electronic files and the ways in which these files are increasingly subject to electronic methods of surveillance (Zuboff 1988), certainly a direction we will want to avoid with online portfolios as we have mentioned earlier. Another issue has to do with the ways in which computer interfaces serve to reproduce the value our culture places on racism, sexism, capitalism, and monoculturalism (Kramarae 1988; Selfe and Selfe 1994; Winner 1986; Turkle 1995; Hawisher and Sullivan forthcoming) especially in educational settings—simply by the structure of the computer interfaces that students are forced to use. These interfaces, for example, now privilege an English-only, or English-by-default approach to education that many of us would not want to support in general terms. Even the PacerForum interface we present here is not without its biases. When we put together the figures accompanying this article, no clip art was readily available that featured women or other underrepresented groups working and collaborating together. Although most of the graphics *seem* innocuous enough, notice that a man in a business suit announces the "computer news" and also that a male clown introduces another forum. With the exception of the forum "Amy's Friends," ostensibly women and girls look as though they had little "say" in establishing the forums. The closest we could come to featuring women was in selecting the "sets of hands," safely androgynous we think although they are also very white. Our experience is a small example of how it is all too easy to reinforce social structures already in place in our society despite our best intentions. Unless the profession develops the necessary critical perspectives along with the requisite technical knowledge, we fear that teachers will continue to be hampered in their efforts to use technology equitably.

Conclusion

Finally, we think it important to note that these three major challenges mask a great many smaller complications—as many complications, indeed, as there are problems in our educational system at all levels. And we recognize that change connected to computer-supported literacy programs is often addressed with a special degree of conservatism. Not only are we asking colleagues to change their perspectives on teaching and learning with portfolios, but we are also asking that they inform their thinking with the promise of computers, yet another technology. Resistance and sometimes resentment to such dramatic calls for change in the culture of the classroom

and schools should not be unexpected. But we consider it promising that the perspective we gain from exploring the unfamiliar landscape of these two technologies—computers and portfolios—also provides us with new ways to think about teaching.

In this context, we can offer a final, and important, suggestion for the profession to think about: teachers must continue to read, to experiment with technology but, more than anything perhaps, they need to speak up and talk with one another. This suggestion may sound like an easy task on the surface, but there are, as we all know, many factors in our educational system that serve to isolate teachers from one another. The cumulative effect of these factors—economic, political, and social—is to keep many teachers in their own classrooms and on their own campuses away from individuals in their discipline and in other disciplines; to bury some of our colleagues under mountains of paper work and extracurricular duties that shift attention away from pedagogy; to distract them from the consideration of theories that productively inform educational practices; and to eliminate, for many teachers, the option of attending conferences and exchanging ideas with other professionals.

Given the lack of experience and knowledge about electronic portfolios and their uses in English classrooms, teachers need to make—and be given—time to share their observations with other teachers, either locally or regionally through workshops, seminars, or campus and district newsletters, or on a wider basis through professional journals and national conferences. Until the profession begins to share the results we find, widely and systematically, we cannot begin productive comparisons, replications, or the large-scale collection and analysis of our experiments with electronic portfolios.

As Rose has argued, the problems with our educational system are not such that they will disappear magically with the enactment of a particular reform or, as we have claimed, with a particular innovative use of technology. We do know, however, that traditional portfolio projects encourage students to reflect on their learning, thereby giving them an opportunity to enhance their performance through evaluative feedback and review. Electronic portfolios have the added advantage of permitting students to share their work instantly with their instructors and other students over the network at any time of day or night, to "conference" asynchronously with other writers at will, and to revise assignments online as they progress through the semester. In small ways, then, the wedding of portfolios and computers can, in the hands of reflective and critically-minded teachers, begin to change

the culture of our schools. We conclude with a statement from Kathleen Yancey which we have modified slightly. She writes:

> All of this discussion about . . . [computers] and portfolios is not to say that . . . [either of the two, combined or apart] can answer every need, or that they are "the answer." Rather, it is to say that [electronic] portfolios can help us as we seek to understand, describe, evaluate, and improve what we do. (Yancey 1993b)

Perhaps, for now, this request is all we can make of either electronic portfolios or ourselves.