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Source: *College Composition and Communication*, Vol. 45, No. 4 (Dec., 1994), pp. 480-504

Published by: National Council of Teachers of English

Stable URL: <https://www.jstor.org/stable/358761>

Accessed: 29-04-2020 15:19 UTC

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## **The Politics of the Interface: Power and Its Exercise in Electronic Contact Zones**

Over a casual lunch at a recent professional conference, Trent Batson, a professor at Gallaudet University, told us a story that made us think about borders and their effects. He had been visiting Mexico on a short day trip in the company of an academic colleague who taught at Mt. Holyoke but had been born in India. On the way back into the United States, these colleagues entered two separate lines at the stations marking the official re-entry point to this country. Border guards, observing the darker skin of the one colleague stopped him—as they did all people who, in Batson's words, "looked vaguely Mexican." The Indian colleague, having lived and worked in this country for a number of years, had made the mistake of thinking that this border, this country, was an open one. He carried only a photocopy of the green card that identified him as a "resident alien," rather than the card itself, as required by United States law.

Given these relatively unexceptional circumstances, what followed seemed significant to us—the Indian-born colleague was detained by officials and eventually fined—even though he carried additional materials identifying him as a professor at Holyoke. Batson was not stopped or questioned. He was also not allowed to accompany his friend, who was taken to an office by the border guards where he was detained for half an hour. Batson was allowed to watch the proceedings through a window, to gaze on the administration and application of American law.

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On the surface of the story, no real harm was done: the detainment was short term, the fine minimal, the laws for resident aliens clear. But for us, as citizens of the United States, the telling of this story had a chilling effect. We were ashamed not only about the assumptions that the border guards seem to have made but also of the cultural values that the story revealed. As Midwesterners who live relatively far from the border in question, we were taken aback by the story—by the guards' reactions, by the feelings these reactions suggest about Mexican nationals, and by the treatment that people of color receive every day in our own country. We should not, of course, have been surprised at all. It is at the geopolitical borders of countries that the formations of social power, normally hidden, are laid embarrassingly bare—where power in its rawest form is exercised.

If at the time of this story's original telling we didn't like what it made us think about our country, it was not until we had reflected more closely on the incident that we began to unpack the various ways in which it seemed meaningful and bothersome to us—in general, for our own professional lives as teachers and, in specific, for the more specialized instructional work that we do in computer-supported writing and learning environments. The longer we thought about it, the more we realized that the borders represented in this story, the values built into them and constituted continually by them, were—and are—present in our own classrooms as well. These borders are represented and reproduced in so many commonplace ways, at so many levels, that they frequently remain invisible to us. One place in which such borders remain quite visible, we realized, is in the computers that we, and many other teachers of English, use within classrooms. When re-considering this story in light of our own experiences, we began to see how teachers of English who use computers are often involved in establishing and maintaining borders themselves—whether or not they acknowledge or support such a project—and, thus, in contributing to a larger cultural system of differential power that has resulted in the systematic domination and marginalization of certain groups of students, including among them: women, non-whites, and individuals who speak languages other than English.

This article represents our further thinking about these realizations. In it, we begin the task of describing some of the political and ideological boundary lands associated with computer interfaces that we—and many other teachers of composition—now use in our classrooms. We also talk about the ways in which these borders are least at partly constructed along ideological axes that represent dominant tendencies in our culture, about the ways in which the borders evident in computer interfaces can be mapped as complex political landscapes, about the ways in which the borders can serve to prevent the circulation of individuals for political

purposes, and about the ways in which teachers and students can learn to see and alter such borders in productive ways. At the end of the paper, we talk about tactics that teachers can use to enact a radical pedagogy of electronic borders and borderlands.

As a way into this examination, we look at computer interfaces as linguistic contact zones, in Mary Louise Pratt's words, "social spaces where cultures meet, clash, and grapple with each other, often in contexts of highly asymmetrical relations of power, such as colonialism, slavery, or their aftermaths as they are lived out in many parts of the world today" (34). Within this context, we talk about computer interfaces as maps that enact—among other things—the gestures and deeds of colonialism, continuously and with a great deal of success. This is not to claim, of course, that the *only* educational effects computers have is one of re-producing oppression or colonial mentalities. Indeed, from the work of computers and composition specialists, it is clear that computers, like other complex technologies, are articulated in many ways with a range of existing cultural forces and with a variety of projects in our educational system, projects that run the gamut from liberatory to oppressive. However, because recent scholarship on computers has tended to focus in overoptimistic ways on the positive contributions that technology can make to English composition classrooms, our goal in this piece is to sketch the outlines of an alternative vision for teachers, one that might encourage them to adopt a more critical and reflective approach to their use of computers.<sup>1</sup> Such a picture provides a necessary balance, we believe. An overly optimistic vision of technology is not only reductive, and, thus, inaccurate, it is also dangerous in that it renders less visible the negative contributions of technology that may work potently and effectively against critically reflective habits efforts of good teachers and students. Our goal is to help teachers identify some of the effects of domination and colonialism associated with computer use so that they can establish a new discursive territory within which to understand the relationships between technology and education.

### Computers as Learning Environments: History and Motivation

For the last decade, English composition teachers have been using computers in classrooms to create electronic forums—on local-area networks (LANs) and wide-area networks (WANs)—within which writers and readers can create, exchange, and comment on texts. These spaces, it has been noted, have the potential for supporting student-centered learning and discursive practices that can be different from, and—some claim—more

engaging and democratic than those occurring within traditional classroom settings.<sup>2</sup> Such a vision is all the more tantalizing given our recognition that the education taking place in traditional classrooms—despite our best intentions—contributes, in part, to a continuing cultural tendency to marginalize and oppress groups of people due to their race, gender, or ethnic background. Gomez, for example, citing Wheelock and Dorman, compares the 12% dropout rate for white students to the 17% rate for African American students, 18% for Hispanic students, and 29.2% for Native American students (319–20). Giroux notes that “in many urban cities the dropout rate for nonwhite children exceeds 60% (with New York City at 70%)” (111). As teachers of English, we recognize, in other words, that we work in an educational system that instructs students about oppression and inequity, by example, even as we strive to erase such lessons from the official curriculum. This situation and these figures, as June Jordan notes, are all the more dramatic in light of the fact that only 15% of the entrants into the American workforce will be white males by the year 2000 and that some states like California will have 61% non-white students in their populations by the year 2010 (22). And as Mary Louise Gomez further reminds us, most schools can expect 30–40% of their student population to come from a non-English language background by the end of this decade (319).

This continuing pattern has encouraged many teachers of English to turn to—among other things—computer-supported writing environments as places within which they and students can try to enact educational practices that are more democratic and less systematically oppressive: for example, student-centered, on-line discussion groups in which individuals discover their own motivations for using language; on-line conferences in which students’ race, gender, age, and sexual preference may not figure in the same ways that they do in more conventional face-to-face settings; collaborative groups in which students learn to negotiate discursive power. To create and maintain these communities—to defend their use and value—we have often used what Hawisher and Selfe have identified as an overly positive “rhetoric of technology” (55) that portrays computer-supported forums—among ourselves, to administrators, to students—as democratic spaces, what Mary Louise Pratt might call “linguistic utopias” (48) within which cues of gender, race, and socioeconomic status are minimized; students speak without interruption; and marginalized individuals can acquire more central voices. And if this rhetoric is helpful in that it describes what we *want* to happen—and sometimes, to some extent, *does* happen—in our classrooms, it is also dangerous. Through its use, we legitimate the status quo of computer use and, as Hawisher

and Selfe note, “de-legitimate critique”(53)—thus allowing ourselves to think erroneously that the use of computers and networks provides discursive landscapes that are, in Mary Louise Pratt’s words, “the same for all players”(38).

The rhetoric of technology obscures the fact that, within our current educational system—even though computers are associated with the potential for great reform—they are not necessarily serving democratic ends. Computer interfaces, for example, are *also* sites within which the ideological and material legacies of racism, sexism, and colonialism are continuously written and re-written along with more positive cultural legacies.<sup>3</sup> Perhaps the most salient evidence for this claim lies in the different uses to which computers are put in minority classrooms and majority classrooms. Sheingold, Martin, and Endreweit, for example, note that “in schools with large minority enrollments computers are used primarily to provide basic skills instruction delivered by drill-and-practice software . . . In contrast, computer use in majority schools is characterized by its emphasis on the use of computers as tools to develop higher order literary and cognitive skills as objects of study (e.g., instruction focused on computer literacy and programming”(89). Charles Piller, in a recent article in *MacWorld*, notes that minority populations and lower socioeconomic populations are America’s growing “technological underclass” (218) and, thus, that these students are the least likely to gain skills during their public schooling experience that will serve them well in a world increasingly dependent on technology.

The recognition of this situation, for many computer-using teachers of English, is not possible without a great deal of pain. It demands our realization that—while we, as individual English teachers, may very strongly support democratic reform, broad involvement, or egalitarian education, and while our teaching and computer use may be aimed toward these ends—we are also simultaneously participating in a cultural project that, at some level and to some degree, seems to support racist, sexist, and colonial attitudes. This is true even as our profession broadly supports more productive and progressive forms of educational action. If we hope to get English composition teachers to recognize how our use of computers achieves both great good and great evil—often at the same time, as Joseph Weizenbaum points out—we have to educate them to be technology *critics* as well as technology users. This recognition requires that composition teachers acquire the intellectual habits of reflecting on and discussing the cultural and ideological characteristics of technology—and the implications of these characteristics—in educational contexts. With such a realization, we maintain, English composition teachers can begin to exert an increasingly active influence on the cultural project of technology design.

## Mapping the Interface of Computers as Educational Space

The project that we have described is not a simple one, nor is it one that we can describe fully here. We can, however, provide an extended example of the agenda we want to pursue by focusing in particular ways on computer *interfaces*, those primary representations of computer systems or programs that show up on screens used by both teachers and students. Within the virtual space represented by these interfaces, and elsewhere within computer systems, the values of our culture—ideological, political, economic, educational—are mapped both implicitly and explicitly, constituting a complex set of material relations among culture, technology, and technology users. In effect, interfaces are cultural maps of computer systems, and as Denis Wood points out, such maps are never ideologically innocent or inert. Like other maps that Wood mentions—the medieval *mappaemundi* that offer a Christian-centered vision of the 13th century world or the Mercator projection that provides a Euro-centric view of the Earth's geography in the 20th century—the maps of computer interfaces order the virtual world according to a certain set of historical and social values that make up our culture. The users of maps, as a result, read cultural information just as surely as they read geographical information—through a coherent set of stereotyped images that the creators of maps offer as “direct testimony” (Berger 69) of the world, of social formations and socially organized tendencies, of a culture's historical development (Wood 145). The enhanced power of maps, growing out of their long association with the projects of science and geography, resides in the fact that they purport to represent fact—the world, a particular space—as it is in reality, while they naturalize the political and ideological interests of their authors (Wood 2).

Given this background, we can better understand why it is important to identify the cultural information passed along in the maps of computer interfaces—especially because this information can serve to reproduce, on numerous discursive levels and through a complex set of conservative forces, the asymmetrical power relations that, in part, have shaped the educational system we labor within and that students are exposed to. What is mapped in computer interfaces—just as what is mapped in other social and cultural artifacts such as our educational system—is both “ownership” and opportunity (Wood 21). In this sense, we maintain, the “ferocious” (Wood 25) effectiveness of computer interfaces as maps is established as much by what they do *not* show about American culture as by what they *do*. Primary computer interfaces do not, for example, provide direct evidence of different cultures and races that make up the American social complex, nor do they show much evidence of different linguistic groups or

groups of differing economic status. It is only when we recognize these gestures of omission for what they are, as interested versions of reality, that we can begin to examine the naturalizing functions of computer interfaces and, as educators, break the frame to extend the discursive horizon (Laclau and Mouffe 19) of the landscape we have created and that, in turn, creates us and the students in our classes.

Once we recognize these functions, we also begin to understand the ideological gesture of the interface's map as a "flawed, partial, incomplete" (Wood 26) and interested vision of reality, at least partly constructed from the perspective of, and for the benefit of, dominant forces in our culture. In particular—given that these technologies have grown out of the predominately male, white, middle-class, professional cultures associated with the military-industrial complex—the virtual reality of computer interfaces represents, in part and to a visible degree, a tendency to value monoculturalism, capitalism, and phallogoc thinking, and does so, more importantly, to the exclusion of other perspectives. Grounded in these values, computer interfaces, we maintain, enact small but continuous gestures of domination and colonialism. To examine these claims, we have to turn directly to examples that illustrate the ways in which such maps "name, marginalize, and define difference as the devalued Other" (Giroux 33)—not in a totalizing fashion but through many subtly potent gestures enacted continuously and naturalized as parts of technological systems. Such examples are not difficult to come by if we examine the borderland of the interface from the perspective of non-dominant groups in our culture.

### *Interfaces as Maps of Capitalism and Class Privilege*

In general, computer interfaces present reality as framed in the perspective of modern capitalism, thus, orienting technology along an existing axis of class privilege. The graphically intuitive Macintosh interface provides a good example of this orientation. That interface, and the software applications commonly represented within it, map the virtual world as a *desktop*—constructing virtual reality, by association, in terms of corporate culture and the values of professionalism. This reality is constituted by and for white middle- and upper-class users to replicate a world that they know and feel comfortable within. The objects represented within this world are those familiar primarily to the white-collar inhabitants of that corporate culture: manila folders, files, documents, telephones, fax machines, clocks and watches, and desk calendars. We can grasp the power of this ideological orientation—and thus sense its implications—by shifting our perspective to what it does *not* include, what it leaves unstated. The interface does not, for example, represent the world in terms of a kitchen counter top, a



mechanic's workbench, or a fast-food restaurant—each of which would constitute the virtual world in different terms according to the values and orientations of, respectively, women in the home, skilled laborers, or the rapidly increasing numbers of employees in the fast-food industry.

Built into computer interfaces are also a series of semiotic messages that support this alignment along the axes of class, race, and gender. The white pointer hand, for example, ubiquitous in the Macintosh primary interface, is one such gesture, as are the menu items of the Appleshare server tray and hand, calculator, the moving van (for the font DA mover), the suitcase, and the desk calendar. Others images—those included in the HyperCard interface commercial clip art collections, and in the Apple systems documentation—include a preponderance of white people and icons of middle- and upper-class white culture and professional, office-oriented computer use. These images signal—to users of color, to users who come from a non-English language background, to users from low socio-economic backgrounds—that entering the virtual worlds of interfaces also means, at least in part and at some level, entering a world constituted around the lives and values of white, male, middle- and upper-class professionals. Users of color, users from non-English language background, users from a low socio-economic class who view this map of reality, submit—if only partially and momentarily—to an interested version of reality represented in terms of both language and image.

When users recognize the corporate orientation of the interface, they also begin to understand more about how computers as a technology are ideologically associated with capitalism. Computer interfaces, for example, can serve to reproduce a value on the commodification of information. On the Macintosh desktop, for instance, the raw material of information is gathered in databases and files, stored in folders and on hard drives, accumulated within artificially expanded memory spaces, and finally manipulated and written in the form of documents that acquire their own authority and value within a capitalist economy.

All of these information products—following the prevailing model of text-as-commodity established in what Jay D. Bolter calls the “late age of print” (1)—are “owned” by an author who can protect work with a “password” and accord “privileges” to readers according the relationship and involvement she would like them to have with a text. This commodification of information is also played out at additional levels within computer interfaces. Through interfaces, for example, students now learn to access and depend on sources like BITNET or Internet, library systems in other states, and information bases around the world for the information they need. These electronic spaces—which are subject to increasing legislation and control—are at the same time becoming more expensive and

more rigidly aligned along the related axes of class privilege and capitalism. The refinement and use of packet charging technologies, for example, and the increasing exploitation of large-scale commercial networks that appeal to the public will continue to support such an alignment. Recent figures published in a recent *New York Times* article indicate that commercial public networks such as Prodigy and Compuserve charge approximately \$50 for starter kits on their systems, between \$8 and \$15 for basic use each month, and some additional per-message or per-minute charges as well. The capital stake that commercial groups have in promoting these electronic systems to citizens is not a small one: Information-as-commodity is big business—approximately 3.4 million people subscribe to commercial networks at the rates we have mentioned (Grimes 13–15).

### *Interfaces as Maps of Discursive Privilege*

The orientation of the interface along the axis of class privilege is made increasingly systematic by the application of related discursive constraints. Primary interfaces, for example, also generally serve to reproduce the privileged position of standard English as the language of choice or default, and, in this way, contribute to the tendency to ignore, or even erase, the cultures of non-English language background speakers in this country. Although the global expansion of technology is exerting an increasingly strong influence on the computer industry—and thus interfaces in other languages are becoming more common—these influences are resisted at many levels and in many ways, and this resistance is represented vividly in the maps of computer interfaces. A more particular example of this orientation exists in most word-processing programs—those tools we present students with so that they can “express” themselves in the language of our choosing. Many such programs commercially distributed in this country present their menued items only in English, despite the fact that, as Mary Louise Gomez reminds us, most schools can expect 30–40% of their student population to come from a non-English language background by the end of the decade (319). Those word-processing programs that *do* present an alternative-language interface market their non-English language background products separately, adding additional cost; or market them only in other countries, making them difficult to obtain especially with education discounts; or retain the privileged position of English simply by default. WordPerfect 5.1 for the IBM, for instance, which presents English menus as the default interface, does allow users operate in other languages—among them three versions of English (Australian, Great Britain, and United States) and only one of Spanish, in addition to Catalan (*WordPerfect for DOS* 325). To write or edit in another language, users must

go to a "Layout" pull-down menu and then select—with some irony, we hope—the item labeled "Other" (324). As the manual for WordPerfect notes, moreover, the thesaurus and spell checkers accompanying the regular WordPerfect package come only in English. One can order versions of this thesaurus and spell checker in other languages, but they come at an additional cost. The telephone number which one uses to place such an order, the *Reference* manual notes, further, is "not toll-free" (326).

This decision to use English as a default language—articulated, as we have pointed out, with the custom of identifying non-English language background speakers as a marginalized "Other" and the socio-economic forces that limit access to software in other languages—clearly has important implications for our educational system, for teachers and for students. In schools, this default position means that students from other races and cultures who hope to use the computer as a tool for empowerment must—at some level—submit to the colonial power of language and adopt English as their primary means of communication, even if this submission is only partial or momentary. Few schools and few teachers can find a realistic perspective from which to resist the tendential forces associated with this default to English as a standard. Certainly, those schools that may most need fully functional bi- and tri-lingual interfaces are the *least* likely to have the monies available to purchase additional packages. This characteristic focus of interfaces on Standard English is further supported and exacerbated by the fact that style and grammar packages are generally based on an overly narrow—and erroneous—vision of "correct" language use and spelling checkers that exert a continuously normative influence (LeBlanc) within the setting of colonial discourse. Both kinds of software can serve to de-value linguistic diversity and inscribe nonstandard language users as Other within the interface, the classroom, the educational system, and the culture.

We got an idea of just how powerful and evenly dispersed this cultural inscription is—how systematically it operates when we attended the 1992 convention of the National Council of Teachers of English. At that gathering, a software company demonstrated a word-processing package designed to present a bilingual (Spanish/English) interface. The package was available in a low-cost, school-edition package for approximately \$300 and in a site-license, networkable version for approximately \$1500. As the package's literature pointed out, users could employ a pull-down menu system to select the Spanish mode—where all menus, dialog boxes, help, and messages appear in Spanish. When we tested the software in the Spanish mode, however, we found the keystroke options did not change correspondingly to the same language. In fact those options, which depend, for the most part on mnemonic aids—apple-D for "delete"—remain

keyed to the English words even when the corresponding Spanish menu items—"eliminar," for example—start with different letters. A student using this program, then, should she want to use the keystroke options, might be able to write in Spanish, but would have to think at some level in English.

This value on English as the privileged language of computer interfaces—and the effects of the design decisions that support this system—are certainly not limited to the United States. For example, a recent international gathering on computer-based instruction (Teleteaching '93) sponsored by the International Federation for Information Processing and focused on the use of computers for global distance education projects, required all sessions and discussions to be conducted in English—even though the conference was held in Norway and many representatives from non-English speaking countries were in attendance. This decision, presented to participants as a necessary convenience, recognized the extent to which Americans have influenced computer design, computer use, and computer applications over the past decade, and the fact that English has been, during this same period, the world language of science and technology. The language of computers has thus become English by default: The majority of standard interfaces are English, much of the documentation for these interfaces and the machines they operate on is in English, and the systems that currently support global computing networks rely on English as a standard exchange language. At the conference in question, several presenters from non-English speaking countries, for instance, noted that the educational conversations and projects they set up for French, German, Russian, or Slovakian students were conducted in English because these exchanges relied on the ability to link computers and systems through a common exchange standard called American Standard Code for Information Interchange (ASCII) that does not adequately support languages other than English. ASCII—because it was originally based on a 7-bit code—can handle, as Charles Petzold points out, only "26 lowercase letters, 26 uppercase letters, 10 numbers, and 33 symbols and punctuation marks" unless it is extended by 8-bit byte computer systems that allow it to handle 128 additional characters. Even with these additional characters, ASCII's alphabetic limitations preclude the full and adequate representation of Greek, Hebrew, Cyrillic, and Han characters (374–75).

In a recent article about Unicode—a proposed international replacement for ASCII—Petzold explores some of the implications of relying solely on ASCII:

There's a big problem with ASCII and that problem is indicated by the first word of the acronym. ASCII is truly an *American* standard, but there's a whole

wide world outside our borders where ASCII is simply inadequate. It isn't even good enough for countries that share our language, for where is the British pound sign in ASCII? . . . ASCII . . . is not only inadequate for the written languages of much of the world, but also for many people who live right in my own neighborhood. . . . We simply can't be so parochial as to foster a system as exclusive and limiting as ASCII. The personal computing revolution is quickly encompassing much of the world, and it's totally absurd that the dominant standard is based solely on English as it is spoken in the U.S. (375)

Although this limitation may not represent a large problem to academic professionals, such a limited system makes global computer communications unnecessarily difficult for student learners who speak languages other than English. What remains most interesting about this situation—especially given that teachers, scholars, and computer designers generally acknowledge the limitations of ASCII—is that the change to a more broadly accommodating system has been so slow, even though the technological means for representing other alphabetic systems (e.g., the memory, the programming mechanics, the computer hardware) have been available for some time now. To change ASCII, however, is to work against a complex set of tendential forces encouraging inertia—because changing ASCII means changing existing software, hardware, documentation, and programming approaches. It also requires that individuals and groups in the computer industry abandon English as the *natural* language of, the natural standard for, computer technology. Such changes do not happen easily or quickly.

### *Interfaces as Maps of Rationalism and Logocentric Privilege*

If the map of the interface is oriented simultaneously along the axes of class, race, and cultural privilege, it is also aligned with the values of rationality, hierarchy, and logocentrism characteristic of Western patriarchal cultures. IBM's DOS environment, for example, is fundamentally dependent on an hierarchical representation of knowledge, a perspective characteristically—while not exclusively—associated with patriarchal cultures and rationalistic traditions of making meaning. This way of representing knowledge within computer environments, although not essentially limiting or exclusive by itself, becomes so when linked to a positivist value on rationality and logic as *foundational* ways of knowing that function to exclude other ways of knowing, such as association, intuition, or bricolage. This validation of positivism, rationality, hierarchy, and logic as the only authorized contexts for “knowing” and representing

knowledge continues to inform—and limit—many formal aspects of computer programming and technology design. As Winograd and Flores note, the current rationalistic framework that informs the design of computers and their interfaces is “based on a misinterpretation of the nature of human cognition and language,” one that provides “only impoverished possibilities for modeling and enlarging the scope of human understanding” (78). As a result, these authors continue, “We are now witnessing a major breakdown in the design of computer technology—a breakdown that reveals the rationalistically oriented background of discourse within which our current understanding [of technology] is embedded” (78–79). A similar case has been made by Ted Nelson, a pioneer in the design of hypertext interfaces, who has referred to the conceptual structure of hierarchical file systems as an “enormous barrier” to creative thinking. Nelson has characterized the effects of such systems as both “oppressive and devastating.” The “tyranny” of hierarchical systems, Nelson contends, “imposes intricate, fixed pathways that we must commit to memory” and “forbid acting on inspiration.” He adds, further, that such systems cause programmers to “oversimplify” their representation of data and the uses of such data within computer interfaces (83–84).

As Sherry Turkle and Seymour Papert point out, this conventional validation of—and dependence on—hierarchy, rationality, and logic is all the more potent because it is operative at all levels of computer interface design and programming. Computer programmers are educated to solve problems using hierarchical approaches to problem solving and to represent relationships in programs abstractly, within a strict syntactical system of linear propositional logic. This “formal, propositional” way of constructing knowledge (129) has come to constitute a “canonical style” (133) for programmers who are solving problems and representing information, a privileged way of relating ideas one to the other that has become “literally synonymous with knowledge” (129) in computer science. So synonymous has this way of thinking become with knowledge, in fact, that computer scientists have come to see propositional thinking as *one* way of knowing, but as the *only* way of knowing. It has become equated with “formal” and “logical” thinking, and given “a privileged status” (133) within computer science.

Recently, however, increasing numbers of computer specialists have begun to identify the limitations inherent in relying on hierarchical approaches and data representations—in dealing with learners who have varying levels and kinds of visualization skills, in training programmers to apply epistemologically diverse approaches to programming problems, and in representing non-hierarchically organized information structures like *wicked* or *fuzzy* problems (complex problems with no definitive formula-

tions or solutions), and in coping with natural language input.<sup>4</sup> Several programming paradigms have been suggested as alternatives and supplements to hierarchical representations of knowledge, such as object-oriented programming systems (OOPS) and iconic interfaces that represent knowledge, concepts, or programs through small pictures, called *objects* or *icons*. Such methods of programming and designing computer interfaces, some computer designers contend, can support alternative approaches to constructing meaning—though “bricolage,” for example, a term that Turkle and Papert (135) use in reference to the work of Claude Levi-Strauss. Bricolage, as Turkle and Papert employ the term, refers to the construction of meaning through the arrangement and rearrangement of concrete, well known materials, often in an intuitive rather than logical manner. Bricoleurs get to know a subject by interacting with it physically, by manipulating materials, or symbols, or icons in rich associative patterns, by arranging and re-arranging them constantly until they fit together in a satisfying or meaningful way. Bricoleurs reason “from within” (144) to come to an understanding of a problem through a direct “physical path of access” (145) rather than reasoning with the help of a traditionally validated pattern of logical representation that depends on objective distancing.

Turkle and Papert contend that allowing for bricolage as a way of representing knowledge will encourage an “epistemological pluralism” within the “computer culture” (153) that might especially benefit individuals who feel “more comfortable with a relational, interactive, active, and connected approach to objects” (150). In particular, Turkle and Papert link bricolage with approaches to problem solving that are culturally determined and articulated with gender. Drawing on the work of Carol Gilligan, Evelyn Fox Keller, and Sandra Harding and Merrill Hintikka, these authors suggest that women, in particular, might benefit from conceptual frameworks that would support bricolage, but not exclude rationalistically determined approaches such as hierarchical representations. It could be a mistake, however, as Judith Butler points out, to see gender itself in such fixed terms or to consider the continual construction and re-constructions of gender identities as other than complex, momentary, and contradictory “intersections” (3) of cultural and political forces. As played out realistically within the maps of computer interfaces, Turkle and Papert’s suggestions prove more problematic. The Macintosh interface, for instance, allows for both bricolage and rationalistically determined representations of hierarchy—that is documents, folders, and text nodes can be arranged and re-arranged according to alternative relations of space, time, association, and intuition *or* according to more traditional logical relations of hierarchy and classification. As we have tried to indicate, however, the alignment of

these cultural maps along the articulated axes of capitalism, class, gender, and race creates a set of tendential forces that continues to value approaches associated primarily with dominant ideological positions.

Given the characteristics of the interface as a linguistic contact zone, our uses of computers in English classrooms certainly seem capable of supporting what Henry Giroux calls "imperialist master narratives" (57) of colonial dominance, even as they make the promise of technological liberation and progress. Students who want to use computers are continually confronted with these grand narratives which foreground a value on middle-class, corporate culture; capitalism and the commodification of information; Standard English; and rationalistic ways of representing knowledge. These values simultaneously do violence to and encourage the rejection of the languages of different races and the values of non-dominant cultural and gender groups. When students from these groups enter the linguistic borderlands of the interface, in other words, they often learn that they must abandon their own culture or gender and acknowledge the dominance of other groups. As Pratt and Said, among others, note, such individuals are forced, at some level, into "simultaneously identifying with dominant groups" and disassociating themselves from the colonial values of these groups (Pratt 59, citing Moreau).

This is, as we see it, one of the ways in which educators use computers—albeit unconsciously—to enact what Elspeth Stuckey calls "the violence of literacy." Each time we ask students from a marginalized cultural group use computers, we ask them—require them—to learn a system of literacy that "distance[s] them from the ways of equality" (94). When we connect the regularly dispersed violence of literacy education to the use of computers, as technology critics like C. Paul Olson and Andrew Feenberg point out, we get more than the sum of the parts. We get, indeed, a master narrative that resonates all too successfully with modernist myths of technological progress: Civilization and reason, as manifested in an increasingly literate people, are supported in their historical evolution by continual improvements of industry and science. If teachers hear this resonance, we think they understand the need to identify and correct the tone.

### What to Do?

Scholars who use technology and educators who teach with technology will, no doubt, find it difficult to study the maps of computer interfaces in a critical light to identify the many layers of culture and ideology they represent. As Denis Wood suggests, the greatest difficulty of all comes when we understand that we must locate ourselves in relation to the map. At this point, we end up asking ourselves where we stand in this colonial



landscape, how we have cast our own multiple subjective positions within the territory that we have created and examined. Are we the cartographers who compose the map in our own cultural image—as white-collar professionals, many of us white or privileged? Are we members of a dominant group that profits from the map's reproductive function—as official representatives of an educational system and, in the case of many institutions of higher learning, the State? In part, of course, we do (already and always, as they say) stand in these places, but we can also—by revealing the partial and flawed nature of the map, by acknowledging our own role in composing the map—claim other vantage places as well. In particular, we can take with increasing seriousness the role of serving as technology critics when we use computers in the classroom and when we work with other teachers to integrate technology within these learning spaces. As Elspeth Stuckey, in *The Violence of Literacy*, says of literacy education in general—when we finally get around to “seeing” how a system supports repression, we can also find ways to alter the nature of our involvement in it:

A system takes a lot of trouble. A system must be devised and implemented. To be sure, much of its design is tacit, its implementation an extension of usual modes of comfortable life. That is why uncomfortable people can often change a system. They can see it. (126)

So what do we do as educators and as the teachers of teachers? In our own classrooms, the continuing process has to be centered on a continuing foregrounding of the problems we have sketched out here, which leads us to suggest some related strategies for re-drawing the territory of the interface with students. To begin, however, we have to learn to recognize—and teach students to recognize—the interface as an interested and partial map of our culture and as a linguistic contact zone that reveals power differentials. We need to teach students and ourselves to recognize computer interfaces as non-innocent physical borders (between the regular world and the virtual world), cultural borders (between the haves and the have-nots), and linguistic borders. These borders, we need to recognize as cultural formations “historically constructed and socially organized within rules and regulations that limit and enable particular identities, individual capacities, and social forms” (Giroux 30). We also need to teach students and ourselves useful strategies of crossing—and demystifying—these borders. It is important to understand that we continually re-map and re-negotiate borders in our lives.

One of the ways to come to this understanding is through working with students and computer specialists to re-design/re-imagine/re-create interfaces that attempt to avoid disabling and devaluing non-white, non-English language background students, and women. Our goal in creating these

new interfaces should be to help rewrite the relationships between the center and the margins of our culture and, in Henry Giroux's words, "extend rather than erase the possibility for enabling human agency" (27) among currently marginalized and oppressed groups represented within the culture and the educational system. Although it is important to recognize—given the strong tendential forces of our cultural and the regularly dispersed nature of ideological systems—that any progress we make toward these goals will be partial, temporary, and contradictory, there are a few practices (what de Certeau might call *tactics*) that could help us enact a border pedagogy in computer-supported writing environments. We would like to spend the last part of this article identifying a few of these practical approaches that might be of use in composition programs at the college and university level.

#### *Becoming Technology Critics as Well as Technology Users*

One tactic for responding to the interested nature of computer interfaces has to do with encouraging a general level of critical awareness about technology issues on the part of both pre-service and in-service teachers. Currently, most teachers of composition studies at the collegiate level are educated to deal with technology not as critics but as users—if, indeed, they are educated to deal with it at all. Few programs that educate college-level teachers of composition, for example, require students to take coursework in technology studies. If they are lucky, new faculty or graduate teaching assistants at an institution may be introduced—during an orientation for instructors or during a graduate course in teaching composition—to a computer facility that they can use for their teaching. Often, these introductions accomplish nothing more than exposing teachers to one or more software programs available for use in the classroom, and allowing time for some minimal hands-on practice with the software. Few composition programs or English departments, however, make a systematic effort to provide parallel instruction on technology issues as they touch on educational projects—stressing readings and discussions on technology criticism, or on the growing body of scholarship and research associated with computers and composition studies.<sup>5</sup> As a result, teachers of composition—and prospective teachers of composition—may learn to use technology, but not to think carefully about the implications of its use within their own classrooms.

Influencing this situation is an additional set of forces that encourage relatively conservative teaching strategies in connection with technology and relatively little room for reflection on these strategies. Given the costs involved in computing, most composition programs and English depart-

ments must depend on access to generic *computing* environments rather than facilities designed specifically to provide computer-supported *writers'* environments. Such generic facilities, because they are administered and maintained by computer specialists rather than teachers of English, foreground an emphasis on the machine and its use rather than on a critical approach to teaching composition with computer support. Characteristic of these facilities, often located in interior rooms or basements, are rows of numbered machines arranged to look very much like traditional classrooms and often networked so that they can be controlled from a single teacher's workstation at the front of the room. In such settings, and often armed with very little preparation or training, teachers of composition also have little encouragement to make changes in conventionally influenced teaching approaches they observe in regular classrooms, as Klem and Moran note (5–22). In such an environment, for example, it may become difficult to have students working in flexible groupings, to avoid a teacher-centered classroom, or to provide students room to take some charge of their own learning.

Operating within these parameters, it is recognizably difficult to educate teachers of composition as technology critics and to inculcate the intellectual habit of reflecting critically on the effects that technology might have within composition classrooms. Writing program administrators and individual teachers can, however, take some steps toward this goal by making sure that their programs—whether pre-service or in-service—are spending at least as much time educating teachers about important technology issues (access to technology, design of technology, ideologies associated with technology) as they are on training them to use technology. Among the efforts that might be undertaken by teachers and program administrators in support of this goal are collecting and circulating articles and books that provide critical as well as optimistic visions of technology, setting up research groups and teaching observations to encourage reflective teaching habits in computer-supported writing facilities, encouraging faculty to participate in e-mail lists that discuss technology issues as they are manifested in English composition classrooms, and sponsoring talks by informed scholars who examine technology issues from critical perspectives.<sup>6</sup>

### *Contributing to Technology Design*

A second tactic for addressing the interested nature of computer interfaces is more narrowly and specifically focused on the efforts of those faculty who are computers and composition specialists. Given the embryonic state of this field and the traditional educational reward structures within which computers and composition specialists must function to earn tenure, pro-

motion, and professional recognition, these colleagues have focused most of their efforts during the past fifteen years on identifying, exploring, and testing pedagogical uses of available computer technologies—suggesting, for example, effective ways to integrate the use of word-processing packages, on-line conferences, or idea generation packages into the teaching of English composition classes.<sup>7</sup> Less effort, therefore, has been available to invest in software design efforts—which can be costly in terms of resources and professional advancement, as LeBlanc points out—and almost no involvement has been encouraged in the design of primary interfaces. Without such an involvement by humanist scholars and teachers—especially those individuals who are familiar with language and learning theory, who understand issues raised by technology studies and cultural studies—interface design will continue to be dominated primarily by computer scientists and will lack perspectives that could be contributed by humanist scholars.

Fortunately, avenues for involvement in software design efforts are becoming more accessible. Computers and composition specialists who find the penalties associated with the effort to design specific software packages to be overly costly in terms of tenure, promotion, and advancement, can also influence software design through collective professional action aimed at general technology design efforts. Professional organizations such as the Alliance for Computers in Writing,<sup>8</sup> International Federation of Information Processing, and even the National Council of Teachers of English (through committees like the Instruction Technology Committee, and the CCCC Committee on Computers) currently influence the design of software through various formal and informal strategies of collective action: by identifying groups of teachers and professional educators who can engage directly in conversations with software manufacturers and vendors, by charging committees to take on the task of making systematic suggestions to these manufacturers after consulting with reflective computer-using teachers, by identifying outstanding efforts in software design, by publishing papers and reviews that include critical examinations of design implications in the classroom, and by identifying the kinds of products that are limited in their classroom usefulness. Many of these committees and organizations also hold ongoing discussions of computer issues of interest to teachers of composition on the Internet. Within these forums—which often are global in their participation and include a mix of computer scientists, educators, software designers, and content specialists—computers and composition specialists can encourage discussions that focus on interfaces, language issues, cultural reproduction, learning theories, and critical theories of language use. Through these conversations, computers and composition specialists can contribute to an increasingly

critical awareness of technology issues on the part of individuals involved directly in the design of technology. Such conversations—if they can serve to extend and transform the existing intellectual and political terrain for various groups of people—could have, in Laclau and Mouffe's words, a "profound subversive power" (155).

### *Re-Conceiving the Map of the Interface*

A third suggestion for addressing the interested map of reality offered by computer interfaces is to involve composition teachers and students in composition classes in an ongoing project to revise interfaces as *texts*. The purpose of these map-making sessions would be to come up with ideas for changing the interface to reflect a range of cultural, linguistic, and ideological perspectives. Faculty who specialize in computers and composition studies can serve as key resource people in this effort, although the goal is to involve *all* computer-using teachers and students in conceptualizing alternative maps of computer interfaces. The outcome of such sessions should not be to redesign interfaces in a technical sense, but rather to reconceive of them according to the experiences of a broad range of writers and teachers of writing: identifying desirable features generally unavailable in primary interfaces (a light pen for writing in the margins of documents, or a highlighter for color coding related documents), suggesting ways of customizing interfaces for the needs of various writers and readers (adding a read-aloud option for writers who want to hear how their texts sound), or imagining productive metaphors around which interfaces can be built (mechanics' workbenches, kitchen countertops, garages). In these sessions—to further reduce the focus on technical expertise—teachers and students can represent their interface re-revision ideas either through prose descriptions or pencil-and-pen drawings.

For those faculty and teachers who are more adventurous in terms of technology, some relatively simple computer-based tools already exist that could support these projects at a level accessible to non-specialists. Teachers and students can use the computer-based drawing and illustration packages they are already familiar with, for example, to create representations of re-designed interface screens to which they add new features. In addition, software designers for the Macintosh have already published scores of alternative icons and images that can be used by English composition teachers, and students, to customize primary computer interfaces. Matrix Communication Associates of Pittsburgh, for instance, is now marketing a package of African American computer graphics and has plans to market graphics packages that more adequately represent other ethnic groups as well (Creedy). With such packages, faculty and graduate students

who have very little familiarity with computers can illustrate how they would like to incorporate various features into primary interfaces—creating icons for bulletin boards, on-line conferences, multiple user dimensions, or other student-centered learning spaces that they would like to include in an interface. It is possible that the representations identified by writing teachers and students can later be used by software and hardware design specialists as the basis for more technical projects that might actually produce working versions of alternative interfaces.

To support these conceptual redesign efforts, computers and composition specialists can also work with both teachers and students to assemble expanded libraries of images that appeal to writers of different ages, races, sexual preferences, classes, and lifestyles. These icons should be chosen to resonate with a range of different cultural and ideological positions—delicatessens and 7-Elevens, babies and rocking chairs, rosetta stones and piñatas, apartment buildings and subway maps, powwow dances and storytellers—which can be used to customize systems for different groups of writers. The goal in identifying these images and icons, in Henry Giroux's words, would be to help students and teachers focus on the act of crossing borders "moving in and out of borders constructed around coordinates of difference and power," learning and negotiating "the shifting parameters of place, identity, history, and power" (136). This project may help us and students to see that the interests represented within maps are "neither singular nor simple" (Wood 94) and that interests concealed in one map, one representation of a culture, can be revealed and foregrounded in another.

### **Toward a Critical Reading of Interfaces**

For both teachers and students, Giroux notes, the project of eliminating oppression based on class, race, and gender involves "an ongoing contest within every aspect of daily life," a continual project of mapping and re-mapping the educational, political, and ideological spaces we want to occupy." He continues, "no tradition should ever be seen as received in this project" (155–156). In this sense, English teachers cannot be content to understand the maps of computer interfaces as simple, uncomplicated spaces. Rather, we need to prepare ourselves and the students with whom we work to map these virtual spaces as sites of "multiple and heterogeneous borders where different histories, languages, experiences, and voices intermingle amidst diverse relations of power and privilege" (Giroux 169). At the same time, it is prudent to acknowledge the complications and contradictions inherent in such work. As Winograd and Flores point out, our continuing efforts toward revealing the interested nature of computer

interfaces will, in part, contribute to concealment because “as carriers of a tradition, we cannot be objective observers of it.” This realization, however, cannot provide an excuse for inaction. We must also, as these authors note, take on the responsibility of continuing to “work towards unconcealment . . . and let our awareness guide our actions in creating and applying technology” (179).

*Acknowledgments:* We owe a great deal of gratitude to colleagues who helped us work through the ideas in this article. The generosity and intellectual contributions of Marilyn Cooper, Jim Sosnoski, and Joe Janangelo are evident in the best aspects of this paper.

## Notes

1. For more critical discussions of the overly optimistic rhetoric associated with computer use in composition classrooms, see Faigley’s description of a synchronous network conversation (*Fragments* 163–99), Barton’s discussion of the dominant discourses associated with technology, (“Interpreting the Discourses of Technology”), Hawisher and Selfe’s exploration of teachers’ claims about computer use (“The Rhetoric of Technology”), and Romano’s discussion of bias in on-line conversations (“The Egalitarianism Narrative”).

2. Readers who want to explore the potential of electronic forums on WANs or LANs may want to consult: Barker and Kemp’s “Network Theory” Bruce, Peyton, and Batson’s *Networked Classrooms*; Cooper and Selfe’s “Computer Conferences” Eldred’s “Computers, Composition and the Social View” Faigley’s “Subverting the Electronic Notebook” Handa’s *Computers and Community*; Kiesler, Siegel, and McGuire’s “Social Psychological Aspects;” and Spitzer’s “Computer Conferencing.”

3. Discussions of the ways in which racism, sexism, and power relationships related to colonialism are enacted in connection with technology use can be found in Gomez’s “The Equitable Teaching of Composition,” Hawisher and Selfe’s “Rhetoric of Technology,” Jessup’s “Feminism and Computers,” and LeBlanc’s “Competing Ideologies.”

4. For descriptions of the challenges associated with wicked problems and fuzzy logic, readers may want to refer to: Ambler, Burnett, and Zimmerman; Kurzweil; Seagull

and Walker; Turkle and Papert; and Winograd and Flores.

5. For criticism related to technology, we recommend the works of Feenberg, Kramare, Olson, Ohmann.

6. Several such lists exist for teachers of composition. Megabyte University (MBU), for instance, focuses on issues surrounding the use of computers in writing-intensive classrooms and BreadNet serves to connect English teachers who have attended Breadloaf seminars. To obtain information on Megabyte University, contact Fred Kemp, the founder of MBU, at Texas Tech University (YKFOK@TTACSI.TTU.EDU). To obtain additional information about BreadNet, contact Bill Wright (BWRIGHT@TMN.COM). The National Council of Teachers of English is currently engaged in designing a computer network that will connect teachers of English across the country. For additional information on NCTENet, contact Tharon Howard, Chair of the NCTE Instructional Technology Committee, at Clemson University (THARON@HUBCAP.CLEMSON.EDU).

7. The advent of computers and composition studies is typically dated from 1975, when Ellen Nold’s CCC article, “Fear and Trembling,” gave voice to the concerns English composition teachers had about technology (and thus gave impetus to focused work in this area), or from 1979, when Hugh Burns published the first dissertation that systematically examined the effects of computer-assisted instruction on student writers’ invention efforts. The first fully assembled microcomputer, the Apple II, marketed in 1976, provided the actual technological means of introducing computers into composition classrooms in a meaningful way.

These machines provided composition teachers with word-processing systems that were far easier to teach and far less difficult to use than the clumsy line-editors offered on mainframe computers in the seventies.

8. The Alliance for Computers in Writing is a national coalition of teachers, publish-

ers, professional organizations, and educational institutions interested in promoting the effective use of computers in English composition classrooms. For more information on the Alliance for Computers and Writing, contact Trent Batson, Gallaudet University (TWBATSON@GALLUA.BITNET).

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