New Technologies/New Literacies: Reconstructing Education for the New Millennium

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As we enter a new millennium, most people are by now aware that we are in the midst of one of the most dramatic technological revolutions in history that is changing everything from the ways that we work, to the ways that we communicate with each other, to how we spend our leisure time. The technological revolution centers on computer, information, communication, and multimedia technologies. It is often interpreted as the beginnings of a knowledge or information society, and therefore ascribes education a central role in every aspect of life. This Great Transformation poses tremendous challenges to educators to rethink their basic tenets, to deploy the new technologies in creative and productive ways, and to restructure schooling to respond constructively and progressively to the technological and social changes that we are now experiencing.

At the same time that we are undergoing technological revolution, important demographic and sociopolitical changes are occurring in the United States and throughout the world. Immigration patterns have brought an explosion of new peoples into the United States in recent decades and the country is now more racially and ethnically diverse, more multicultural, than ever before. This creates the challenge of providing people from diverse races, classes, and backgrounds with the tools and competencies to enable them to succeed and participate in an ever more complex and changing world.

In this essay I argue that we need multiple literacies for our multicultural society, that we need to develop new literacies to meet the challenge of the new technologies, and that literacies of diverse sorts — including a more fundamental importance for print literacy — are of crucial importance in restructuring education for a high tech and multicultural society and global culture. My argument is that in a period of dramatic technological and social change, education needs to foster a variety of new types of literacies to make education relevant to the demands of a new millennium. My assumptions are that new technologies are altering every aspect of our society and culture, and that we need to comprehend and make use of them both to understand and transform our worlds. My goal is to introduce new literacies to empower individuals and groups traditionally excluded and thus to reconstruct education to make it more responsive to the challenges of a democratic and multicultural society.

Technology and the Restructuring of Education

To dramatize the issues at stake, we should seriously consider the claim that we are now undergoing one of the most significant technological revolutions for education since the transition from oral to print and book-based teaching. Just as the transition to print literacy and book culture involved a dramatic transformation of education, as Marshall McLuhan, Walter Ong and others have argued, so too does the current technological revolution require a major restructuring of education today

with new curricula, pedagogy, literacies, practices, and goals.[1] Furthermore, the technological revolution of the present era makes possible the radical reconstruction and restructuring of education and society argued for in the progressive era by Dewey and in the 1960s and 1970s by Ivan Illich, Paulo Freire, and others who sought radical educational and social reform.

Put in historical perspective, it is now possible to see modern education as preparation for industrial civilization and minimal citizenship in a passive representative democracy. The demands of the new global economy, culture, and polity, however, require a much more informed, participatory, and active citizenship and thus increased roles and challenges for education. Modern education, in short, emphasizes submission to authority, rote memorization, what Freire called the "banking concept" of education in which learned teachers deposit knowledge into passive students, and which more broadly inculcates conformity, subordination, and normalization. These traits are becoming obsolete in a global postindustrial and networked society with its demands for new skills for the workplace, new social and political realities, and novel forms of culture and everyday life.

Hence, I argue that the technological revolution renders necessary the sort of thorough restructuring of education that radicals demanded during the last century, indeed back to the Enlightenment if one includes Rousseau and Wollstonecraft who saw the radical restructuring of education as the key to democracy. Today, however, intense pressures for change now come directly from technology and the economy and not ideology or educational reformist ideas, with a new global economy and new technologies demanding new skills, competencies, literacies, and practices. While this technological revolution has highly ambiguous effects — that I will note in this study — it provides educational reformers with the challenge of whether education will be restructured to promote democracy and human needs, or whether education will be transformed primarily to serve the needs of business and the global economy.

It is therefore a burning question what sort of restructuring will take place, in whose interests, and for what ends. Indeed, more than ever we need philosophical reflection on the ends and purposes of education, on what we are doing and trying to achieve in our educational practices and institutions. In this situation, it may be instructive to return to Dewey and see the connections between education and democracy, the need for the reconstruction of education and society, and the value of experimental pedagogy to seek solutions to the problems of education in the present day. Hence, a progressive reconstruction of education will require that it be done in the interests of democratization, ensuring access to new technologies for all, helping to overcome the so-called digital divide and divisions of the haves and have nots, so that education is placed á la Dewey and Freire in the service of democracy and social justice.[2]

Yet we should be more aware than Dewey of the obduracy of divisions of class, gender, and race, that we work self-consciously for multicultural democracy and education, and that we valorize difference and cultural specificity, as well as equality and shared universal Deweyean values such as freedom, equality, individualism, and participation. Theorizing a democratic and multicultural reconstruction of education thus forces us to confront the digital divide, that there are divisions

between information and technology have and have nots, just as there are class, gender, and race divisions in every sphere of the existing constellations of society and culture. The latest surveys of the digital divide, however, indicate that the key indicators are class and education and not race and gender, hence the often-circulated argument that new technologies merely reinforce the hegemony of upper class white males must be questioned.[3]

With the proper resources, policies, pedagogies, and practices, we can, I believe, work to reduce the (unfortunately growing) gap between haves and have nots, although I want to make clear that I do not believe that technology alone will reconstruct anything in a positive way. That is, technology itself does not necessarily improve teaching and learning and will certainly not of itself overcome acute socio-economic divisions. Indeed, without proper resources, pedagogy, and educational practices, technology might be an obstacle or burden to genuine learning and will probably increase rather than overcome existing divisions of power, cultural capital, and wealth.

In general, studies of the implementation of technology in the schools reveal that without adequate teaching training and technology policy, the results of introducing computers and new technologies into education is highly ambiguous. During the rest of this essay, I want to focus on the role of computers and information technology in contemporary education and the need for new pedagogies and an expanded concept of literacy to respond to the importance of new technologies in every aspect of life. My goal is to propose some ways that new technologies and new literacies can serve as efficacious learning tools which will contribute to producing a more democratic and egalitarian society and not just provide skills and tools to privileged individuals and groups. How, indeed, are we going to restructure education to provide individuals and groups with the tools, the competencies, the literacies to overcome the class, gender, and racial divides that bifurcate our society and at least in terms of economic indicators seem to be growing rather than diminishing?

Before taking on this challenge we must address the technophobic argument against new technologies per se. I have been developing what I call a critical theory of technology that criticizes uses or types of technology as tools of domination, that rejects the hype and pretensions of new technologies, that sees the limitations of pedagogy and educational proposals based primarily on technology without adequate emphasis on pedagogy, teacher and student empowerment, that insists on developing educational reform and restructuring to promote multicultural democracy, and that calls for appropriate restructuring of technology to democratic education and society. Yet a critical theory of technology also sees how technology can be used, and perhaps redesigned and restructured, for positive purposes such as enhancing education, democracy, and overcoming the divide between haves and have nots, while enabling individuals to democratically and creatively participate in a new economy, society, and culture.

Hence, a critical theory of technology avoids both technophobia and technophilia. It rejects technological determinism, is critical of the limitations, biases, and downsides of new technologies, but wants to use and redesign technologies for

education for democracy and social reconstruction in the interests of social justice. It is also, in the Deweyean spirit, pragmatic and experimental, recognizing that there is no agreed upon way to deploy new technologies for enhancing education and democratization. Thus, we must be prepared to accept that some of the attempts to use technology for education may well fail, as have no doubt many of our own attempts at use. A critical theory of technology is aware that technologies have unforeseen consequences and that good intentions and seemingly good projects may have results that were not desired or positive — but such is life and it is now a time to be daring and innovative and not conservative and stodgy in our rethinking of education and the use of new technologies in educational practices and pedagogies.

Consequently, the question is not whether computers are good or bad in the classroom or more broadly for education. Rather, it is a question of what to do with them: what useful purposes can computers serve, what sort of skills do students and teachers need to effectively deploy computers and information technology, what sort of effects might computers and information technology have on learning, and what new literacies, views of education, and social relations do we need to democratize and improve education today?

Education and Literacy

Both traditionalists and reformists would probably agree that education and literacy are intimately connected. "Literacy" in my conception comprises gaining competencies involved in effectively using socially-constructed forms of communication and representation. Learning literacies involves attaining competencies in practices in contexts that are governed by rules and conventions. Literacies are socially constructed in educational and cultural practices involved in various institutional discourses and practices. Literacies evolve and shift in response to social and cultural change and the interests of elites who control hegemonic institutions.

Literacy thus involves gaining the skills and knowledge to read and interpret the text of the world and to successfully navigate and negotiate its challenges, conflicts, and crises. Literacy is thus a necessary condition to equip people to participate in the local, national, and global economy, culture, and polity. As Dewey argued, education is necessary to enable people to take part in democracy, and without an educated, informed, and literate citizenry a robust democracy is impossible. I would thus argue that there are crucial links between literacy, democracy, empowerment, and participation, and that without developing adequate literacies differences between haves and have nots cannot be overcome and individuals and groups will be left out of the emerging economy, networked society, and culture.

To reading, writing, and traditional print literacies, one could argue that in an era of technological revolution and new technologies we need to develop new forms of media literacy, computer literacy, and multimedia literacies that I and others call by the covering concept of "multiliteracies" or "multiple literacies."[4] New technologies and cultural forms require novel skills and competencies and if education is to be relevant to the problems and challenges of contemporary life it must expand the concept of literacy and develop new curricula and pedagogies.

I resist, however, extreme claims that the era of the book and print literacy are over. Although there are discontinuities and novelties in the current constellation, there are also important continuities. Indeed, in the new information-communication technology environment, traditional print literacy takes on increasing importance in the computer-mediated cyberworld as one needs to critically scrutinize and scroll tremendous amounts of information, putting new emphasis on developing reading and writing abilities. Indeed, Internet discussion groups, chat rooms, e-mail, and various forums require writing skills in which a new emphasis on the importance of clarity and precision is emerging as communications proliferate. In this context of information saturation, it becomes an ethical imperative not to contribute to cultural and information overload, and to concisely communicate one's thoughts and feelings.

Media Literacy: An Unfulfilled Challenge

In the new multimedia environment, media literacy is arguably more important than ever. Cultural studies and critical pedagogy have begun to teach us to recognize the ubiquity of media culture in contemporary society, the growing trends toward multicultural education, and the need for media literacy that addresses the issue of multicultural and social difference. There is expanding recognition that media representations help construct our images and understanding of the world and that education must meet the dual challenges of teaching media literacy in a multicultural society and sensitizing students and publics to the inequities and injustices of a society based on gender, race, and class inequalities and discrimination. Recent critical studies see the role of mainstream media in exacerbating or diminishing these inequalities and the ways that media education and the production of alternative media can help create a healthy multiculturalism of diversity and more robust democracy. They thus confront some of the most serious difficulties and problems that face us as educators and citizens as we move toward the twenty-first century.

Yet despite the ubiquity of media culture in contemporary society and everyday life, although it is widely recognized that the media themselves are a form of pedagogy, and despite copious criticisms of the distorted values, ideals, and representations of the world in media culture, media education in K-12 schooling has never really been established and developed. The current technological revolution, however, brings to the fore more than ever the role of media like television, popular music, film, and advertising, as the Internet rapidly absorbs these cultural forms and creates new cyberspaces and forms of culture and pedagogy. It is highly irresponsible in the face of saturation by Internet and media culture to ignore these forms of socialization and education; consequently a critical reconstruction of education should produce pedagogies that provide media literacy and enable students, teachers, and citizens to discern the nature and effects of media culture.

Media culture teaches proper and improper behavior, gender roles, values, and knowledge of the world. One is often not aware that one is being educated and constructed by media culture, thus its pedagogy is often invisible and subliminal, requiring critical approaches that make us aware of how media construct meanings, influence and educate audiences, and impose its messages and values. A media

literate person is skillful in analyzing media codes and conventions, able to criticize media stereotypes, values, and ideologies, and thus competent in reading media critically. Media literacy thus helps people to use media intelligently, to discriminate and evaluate media content, to critically dissect media forms, and to investigate media effects and uses.[5]

Yet within educational circles, there is a debate over what constitutes the field of media pedagogy, with different agendas and programs. A traditionalist "protectionist" approach attempts to "inoculate" young people against the effects of media addiction and manipulation by cultivating a taste for book literacy, high culture, and the values of truth, beauty, and justice, and by denigrating all forms of media and computer culture. Neil Postman in his books *Amusing Ourselves to Death* and *Technopolis* exemplifies this approach.[6] A "media literacy" movement, by contrast, attempts to teach students to read, analyze, and decode media texts, in a fashion parallel to the cultivation of print literacy. Media arts education in turn teaches students to appreciate the aesthetic qualities of media and to use various media technologies as instruments of self-expression and creation. Critical media literacy, in my conception, builds on these approaches, analyzing media culture as products of social production and struggle, and teach students to be critical of media representations and discourses, stressing the importance of learning to use the media as modes of self-expression and social activism.

Developing critical media literacy and pedagogy also involves perceiving how media like film or video can be used positively to teach a wide range of topics, like multicultural understanding and education. If, for example, multicultural education is to champion genuine diversity and expand the curriculum, it is important both for groups excluded from mainstream education to learn about their own heritages and for dominant groups to explore the experiences and voices of minority and excluded groups. Thus, media literacy can promote multicultural literacy, conceived as understanding and engaging the heterogeneity of cultures and subcultures that constitute an increasingly global and multicultural world.

Critical media literacy not only teaches students to learn from media, to resist media manipulation, and to use media materials in constructive ways, but it is also concerned with developing skills that cultivate citizens and that make them more motivated and competent participants in social life. Critical media literacy is thus tied to the project of radical democracy and concerned to develop skills that enhance democratization and participation. Critical media literacy takes a comprehensive approach that teaches critical skills and how to use media as instruments of social communication and change. The technologies of communication are becoming more and more accessible to young people and average citizens and can be used to promote education, democratic self-expression, and social progress. Thus, technologies that could help produce the end of participatory democracy, by transforming politics into media spectacles and the battle of images, and by turning spectators into cultural zombies, could also be used to help invigorate democratic debate and participation.[7]

Indeed, teaching critical media literacy could be a participatory, collaborative project. Watching television shows or films together could promote productive

discussions between teachers and students (or parents and children), with emphasis on eliciting student views, producing a variety of interpretations of media texts and teaching basic principles of hermeneutics and criticism. On the one hand, students and youth are often more media savvy, knowledgeable, and immersed in media culture than their teachers, and thus can contribute to the educational process through sharing their ideas, perceptions, and insights. On the other hand, critical discussion, debate, and analysis ought to be encouraged with teachers bringing to bear their critical perspectives on student readings of media material. Since media culture is often part and parcel of students' identity and most powerful cultural experiences, teachers must be sensitive in criticizing artifacts and perceptions that students hold dear, yet an atmosphere of critical respect for difference *and* inquiry into the nature and effects of media culture should be promoted.

Media literacy thus involves developing conceptions of interpretation and criticism. Engaging in assessment and evaluation of media texts is particularly challenging and requires careful discussion of specific moral, pedagogical, political, or aesthetic criteria of critique. That is, one can, á la British cultural studies, engage the politics of representation discussing the specific images of gender, class, race, ethnicity, sexual preference, or other identity categories in media texts.[8] Or one could discuss the moral values and behavior represented, what specific messages or representations of social experience are presented, how they are interpreted by audiences with potential pedagogical effects. One can also attempt to determine criteria for aesthetic evaluation, discussing what constitutes a good or bad media text.

In developing media literacy, one needs to develop sensitivity to visual imagery, sound, and discourse, as well as narrative structure and textual meaning and effects. Thus, one draws upon the aesthetics developed in literary, film and video, and art studies, combining such material in addressing the specificities of the particular text or artifact in question. Media studies is exciting and challenging in that it can embrace artifacts ranging from familiar film and television programs, to popular music, to buildings and cities.

A major challenge in developing critical media pedagogy, however, results from the fact that it is not a pedagogy in the traditional sense with firmly-established principles, a canon of texts, and tried-and-true teaching procedures. Critical media pedagogy is in its infancy; it is just beginning to produce results and is thus more open and experimental than established print-oriented pedagogy. Moreover, the material of media culture is so polymorphous, multivalent, and polysemic, that it requires sensitivity to different readings, interpretations, perceptions of the complex images, scenes, narratives, meanings, and messages of media culture which in its own ways is as complex and challenging to critically decipher as book culture.

It is also highly instructive to teach students at all levels to explore critically *popular* media materials, including the most familiar film, television, music, and other forms of media culture. Yet, here one needs to avoid an uncritical media populism of the sort that is emerging within certain sectors of British and North American cultural studies. In a review of *Rethinking Media Literacy*,[9] for instance, Jon Lewis attacked what he saw as the overly critical postures of the contributors to

this volume, arguing: "If the point of a critical media literacy is to meet students halfway — to begin to take seriously what *they* take seriously, to read what *they* read, to watch what *they* watch — teachers *must* learn to love pop culture."[10] Note the authoritarian injunction that "teachers *must* learn to love popular culture," followed by an attack on more critical approaches to media literacy.

Teaching critical media literacy, however, involves occupation of a site above the dichotomy of fandom and censor. One can teach how media culture provides significant statements or insights about the social world, positive visions of gender, race, and class, or complex aesthetic structures and practices, thus putting a positive spin on how it can provide significant contributions to education. Yet one ought to indicate also how media culture can advance sexism, racism, ethnocentrism, homophobia, and other forms of prejudice, as well as misinformation, problematic ideologies, and questionable values. A more dialectical approach to media literacy engages students' interests and concerns, and should involve a collaborative approach between teachers and students since students are deeply absorbed in media culture and may know more about some of its artifacts and domains than their teachers. Consequently, they should be encouraged to speak, discuss, and intervene in the teaching/learning process. This is not to say that media literacy training romanticizes student views that themselves may be superficial, mistaken, uniformed, and full of various problematic biases. Yet exercises in media literacy can often productively involve intense student participation in a mutual learning process where both teachers and students together learn media literacy skills and competencies.

It is also probably a mistake to attempt to institute a program of media literacy imposed from above on teachers, with fixed texts, curricula, and prescribed materials. Diverse teachers and students will have very different interests and concerns and will naturally emphasize varying subject matter and choose examples relevant to their own and their student interests. Courses in critical media literacy could thus be flexible enough to enable teachers and students to constitute their own curricula to address material and topics of current concern and to address their own interests. Moreover, and, crucially, educators should discern that we are in the midst of one of the most intense technological revolutions in history and must learn to adapt new computer technologies to education, and to develop new literacies.

Computer Literacy: An Expanded Concept

Looking toward education in the new millenium, in this section I argue that students should learn new forms of computer literacy that involve both how to use computer technologies to do research and gather information, as well as to perceive computer culture as a terrain which contains texts, spectacles, games, and interactive multimedia which requires new literacies. Moreover, computer culture is a discursive and political location in which students, teachers, and citizens can all intervene, engaging in discussion groups and collaborative research projects, creating their web sites, producing innovative multimedia for cultural dissemination, and engaging in novel modes of social interaction and learning. Computer culture enables individuals to actively participate in the production of culture, ranging from discussion of public issues to creation of their own cultural forms. However, to take

part in this culture requires not only accelerated skills of print literacy, which are often restricted to the growing elite of students who are privileged to attend adequate and superior public and private schools, but also demands new forms of literacy as well, thus posing significant challenges to education.

It is a defining fact of the present age that computer culture is proliferating and transforming every dimension of life from work to education, thus to respond intelligently to the dramatic technological revolution of our time, we need to begin teaching computer literacy from an early age. Computer literacy, however, itself needs to be theorized. Often the term is synonymous with technical ability to use computers, to master existing programs, and maybe undertake some programming oneself. I suggest expanding the conception of computer literacy from using computer programs and hardware to a broader concept of information and multicultural literacy. This requires cultivating more sophisticated abilities in traditional reading and writing, as well as the capability to critically dissect cultural forms taught as part of critical media literacy and multimedia pedagogy.

In my expanded conception, computer literacy thus involves learning how to use computers, access information and educational material, use e-mail and list-serves, and construct websites. Computer literacy comprises the accessing and processing of diverse sorts of information proliferating in the so-called "information society."[11] It encompasses learning to find sources of information ranging from traditional sites like libraries and print media to new Internet websites and search engines. Computer-information literacy involves learning where information is found, how to access it, and how to organize, interpret, and evaluate the information that one seeks.

One exciting development in the current technological revolution is that information is accessible from the entire world. To some extent, the Internet is potentially the all-encompassing library, imperfectly constructed in Alexander, Egypt, that would contain the great books of the world. Yet while a mind-boggling amount of the classics are found on the Internet, we still need the local library to access and collect books, journals, and print material not found on the Internet, as well as the essential texts of various disciplines and the culture as a whole. Information literacy, however, and the new tasks for librarians, thus also involves knowing what one can and cannot find on the Internet, how to access it, and where the most reliable and useful information is available for specific tasks and projects.

But computer and information literacies also involve learning how to read hypertexts, traverse the ever-changing fields of cyberculture, and participate in a digital and interactive multimedia culture that encompasses work, education, politics, culture and everyday life. There are two major modes and concepts of hypertext, one that is primarily literary, which involves new avant-garde literary/writing strategies and practices, contrasted to one that is more multimedia, multisemiotic, multimodal, and that mushroomed into the World Wide Web. Hypertext was initially seen as an innovative and exciting new mode of writing that increased potentials for writers to explore novel modes of textuality and expression.[12] As multimedia hypertext developed on the Internet, it was soon theorized as

a multisemiotic and multimodal form of communication that is now increasingly seen as the dominant form of a new hyperlinked, interactive, and multimedia cyberculture.[13]

Hence, on this conception, genuine computer literacy involves not just technical knowledge and skills, but refined reading, writing, research, and communicating ability that involves heightened capacities for critically accessing, analyzing, interpreting, processing, and storing both print-based and multimedia material. In a new information/entertainment society, immersed in new multimedia technology, knowledge and information come not merely in the form of print and words, but through images, sounds, and multimedia material as well. Computer literacy thus also involves the ability to discover and access information and intensified abilities to read, to scan texts and computer data bases and websites, and to access information and images in a variety of forms, ranging from graphics, to visual images, to audio and video materials, to good old print media. The creation of new multimedia websites, data bases, or texts requires accessing, downloading, and organizing digitized verbal, imagistic, and audio and video material that are the new building blocks of multimedia culture.

Within multimedia computer culture, visual literacy takes on increased importance. On the whole, computer screens are more graphic, visual, and interactive than conventional print fields which disconcerted many of us when first confronted with the new environments. Icons, windows, mouses, and the various clicking, linking, and interaction required by computer-mediated hypertext requires new competencies and a dramatic expansion of literacy. Visuality is obviously crucial, requiring one to quickly scan visual fields, perceive and interact with icons and graphics, and use technical devices like a mouse to access the desired material and field. But tactility is also important, as one must learn navigational skills of how to proceed from one field and screen to another, how to negotiate hypertexts and links, and how to move from one program to another if one operates, as most now do, in a window-based computer environment.

Thus, in my expanded conception, computer literacy involves technical abilities concerning developing basic typing skills, mastering computer programs, accessing information, and using computer technologies for a variety of purposes ranging from interpersonal communication to artistic expression to political debate. There are ever more hybrid implosions between media and computer culture as audio and video material becomes part of the Internet, as CD-ROM and multimedia develop, and as new technologies become part and parcel of the home, school, and workplace. Therefore, the skills of decoding images, sounds, and spectacle learned in critical media literacy training can also be valuable as part of computer literacy as well.

Multimedia and Multiple Literacies: The New Frontier

The new multimedia environments thus require a diversity of types of multisemiotic and multimodal interaction, involving interfacing with words and print material and often images, graphics, and audio and video material. As technological convergence develops apace, one needs to combine the skills of

critical media literacy with traditional print literacy and new forms of multiple literacies to access and master the new multimedia hypertext environments. Literacy in this conception involves the abilities to engage effectively in socially-constructed forms of communication and representation. Thus, reading and interpreting print was the appropriate mode of literacy for books, while critical media literacy requires reading and interpreting discourse, images, spectacle, narratives, and the forms and genres of media culture. Forms of multimedia communication and culture involve print, speech, visuality, and audio, in a hybrid field which combines these forms, all of which involve skills of interpreting and critique.

The term "multiple literacies" thus points to the many different kinds of literacies needed to access, interpret, criticize, and participate in the emergent new forms of culture and society. Obviously, the key root here is the multiple, the proliferation of media and forms that require a multiplicity of competencies and skills and abilities to access, interact, and help construct a new semiotic terrain. Multiple literacies involve reading across varied and hybrid semiotic fields and being able to critically and hermeneutically process print, graphics, images, as well as moving images and sounds. The term "hybridity" suggests the combination and interaction of diverse media and the need to synthesize the various forms in an active process of the construction of meaning. Reading a music video, for instance, involves processing images, music, spectacle, and sometimes narrative in a multisemiotic activity that simultaneously draws on diverse aesthetic forms. Interacting with a website or CD-ROM often involves scanning text, graphics, moving images, and clicking onto the fields that one seeks to peruse and explore, looking for appropriate material. This might involve drawing on a multiplicity of materials in new interactive learning or entertainment environments whereby one must simultaneously read and interpret images, graphics, animation, and text.

While traditional literacies involve practices in contexts that are governed by rules and conventions, the conventions and rules of multiliteracies are currently evolving so that their pedagogies comprise a new although bustling and competitive field. Multimedia sites are not entirely new, however. Multisemiotic textuality was first evident in newspapers (consider the difference between *The New York Times* and *U.S.A. Today* in terms of image, text, color graphics, design, and content) and is now evident in textbooks that are much more visual, graphic, and multimodal than the previously linear and discursive texts of old. But it is CD-ROMs, web sites, and new multimedia that are the most distinctively multimodal and multisemiotic forms. These sites are the new frontier of learning and literacy, the great challenge to education for the millennium. As we proceed into the Twenty-First century, we need to theorize the literacies necessary to interact in these emergent multimedia environments and to gain the skills that will enable individuals to learn, work, and create in new cultural spaces and domains.

Cultivating new literacies and reconstructing education for democratization will also involve constructing new pedagogies and social relations. Multimedia technologies enable group projects for students and more of a problem-solving pedagogy á la Dewey and Freire than traditional transmission top-down teaching models. To enable students to access information, engage in cultural communication

and production, and to gain the skills necessary to succeed in the new economy and culture require that students cultivate enhanced literacies, that is abilities to work cooperatively with others, and to navigate new cultural and social terrains. Such group activity may cultivate more egalitarian relations between teachers and students and more democratic and cooperative social relations. Of course, it also requires reconsideration of grading and testing procedures, rethinking the roles of teacher and student, and constructing projects and pedagogies appropriate to the new cultural and social environments.

Moreover, we are soon going to have to rethink SATs and standard tests in relation to the new technologies; having the literacy and skills to successfully access, communicate, work, and create within computer and multimedia culture is quite different from reading and writing in the mode of print literacy. While traditional skills of reading and writing continue to be of utmost importance in cyberculture, they are sublated within multiliteracy, so eventually an entirely different sort of test is going to need to be devised to register individuals' multiliteracy competencies and to predict success in a new technological and educational environment. In this new environment, it becomes increasingly irrational to focus education on producing higher test scores on exams that themselves are becoming obsolete and outdated by the changes in the economy, society, and culture.

Critical pedagogies of the future must also confront the problem of online education, of how the new cultural terrain of cyberspace produces new sites of information, education, and culture; new online forms of interaction between students and teacher, as well as the possibilities of students developing their own spaces, cultural forms, and modes of interaction and communication; and how to balance classroom instruction with online instruction, as well as the strengths and limitations of print versus online multimedia material. Indeed, the new technologies and cultural spaces require us to rethink education in its entirety, ranging from the role of the teacher, teacher-student relations, classroom instruction, grading and testing, the value and limitations of books, multimedia, and other teaching materials, and the goals of education itself.

Online education and virtual learning also confronts us with novel problems such as copyright and ownership of educational materials; collaborations between computer programmers, artists and designers, and teachers and students in the construction of teaching material and sites; and the relative role of federal and local government, the community, corporations, and private organizations in financing education and providing the skills and tools necessary for a new world economy and global culture. Furthermore, the technological revolution of our time forces a rethinking of philosophical problems of knowledge, truth, identity, and reality in virtual environments. Hence, both philosophy and philosophy of education most be reconstructed to meet the challenges of democracy and a new high tech economy.

The technological revolution thus forces into a radical rethinking and reconstructing of education. The terrain and goals of education must be reconsidered and the conception of literacy expanded. Questions of the digital divide must be confronted and the ways that education can promote democratization and social

justice should be discussed and developed. While there are certainly dangers that the technological revolution will increase divisions between haves and have nots, it is possible that old gender, race, and class divisions can be overcome in a society that rewards new literacies and provides opportunities for those who have developed competencies in the new technologies and culture. In this context, it is especially important that appropriate resources, training, and pedagogies be cultivated to help those groups and communities who were disadvantaged and marginalized during the past epoch of industrialization and modernity.

In addition, individuals should be given the capacities to understand, critique, and transform the social and cultural conditions in which they live, gaining capacities to be creative and transformative subjects and not just objects of domination and manipulation. This requires developing abilities for critical thinking, reflection, and the ability to engage in discourse, cultural creation, political action and social movements. Active and engaged subjects are produced in interaction with others, as well as with tools and techniques, so social skills and individual capacities for communication, creativity, and action must be part of the multiple literacies that a radical reconstruction of education seeks and cultivates.

Crucially, multiliteracies and new pedagogies must become reflective and critical, aware of the educational, social, and political assumptions involved in the restructuring of education and society that we are now undergoing. In response to the excessive hype concerning new technologies and education, it is necessary to maintain the critical dimension and to reflect upon the nature and effects of new technologies and the pedagogies developed as a response to their challenge. Many advocates of new technologies, however, eschew critique for a purely affirmative agenda. For instance, after an excellent discussion of new modes of literacy and the need to rethink education, Gunther Kress argues that we must move from critique to design, beyond a negative deconstruction to more positive construction.[14] But rather than following such modern logic of either/or, we need to pursue the logic of both/and, perceiving design and critique, deconstruction and reconstruction, as complementary and supplementary rather than as antithetical choices. Certainly, we need to design new technologies, pedagogies, and curricula for the future, and should attempt to design new social and pedagogical relations, but as well we need to criticize misuse, inappropriate use, overinflated claims, and exclusions and oppressions involved in the introduction of new technologies. The critical dimension is needed more than ever as we attempt to develop *alternative* teaching strategies and pedagogy. As we design new technologies and curricula, we must be constantly critical, practicing critique and self-criticism, putting in question our assumptions, discourses, and practices as we experimentally develop new critical literacies and pedagogy.

In all educational and other experiments, critique is indeed of fundamental importance. From the Deweyean perspective, progressive education involves trial and error, design and criticism. The experimental method itself comprises criticism of limitations, failures, and flawed design. In discussing new technologies and multiple literacies, one also needs to constantly raise the question, whose interests

are these new technologies and pedagogies serving: Are they serving all social groups and individuals, who is being excluded and why? We also need to raise the question both of the extent to which new technologies and literacies are preparing students and citizens for the present and future and producing conditions for a more vibrant democratic society, or simply reproducing existing inequalities and inequity.

Finally, cultivating multiple literacies must be contextual, engaging the life-world of the students and teachers participating in the new adventures of education. Learning involves developing abilities to interact intelligently with one's environment and fellow humans and requires rich social and conversational environments. Education requires doing, from practice and social interaction. One can obviously spend too much time with technologies and fail to develop basic social skills and competencies. As Rousseau, Wollstonecraft, and Dewey argued, education involves developing proficiencies that enable individuals to develop successfully within their concrete environments, to learn from practice, and to be able to interact, work, and create in their own societies and cultures. In contemporary U.S. culture, for instance, multiple literacies require multicultural literacies, being able to understand and work with a heterogeneity of cultural groups and forms, cultivating literacies in a multiplicity of media, and gaining the competencies to participate in a democratic culture and society.

Moreover, as Freire reminds us critical pedagogy comprises the skills of both reading the word and reading the world. Hence, multiple literacies include not only media and computer literacies, but a diverse range of social and cultural literacies, ranging from ecoliteracy (for example, understanding the body and environment), to economic and financial literacy to a variety of other competencies that enable us to live well in our social worlds. Education, at its best, provides the symbolic and cultural capital that empowers people to survive and prosper in an increasingly complex and changing world and the resources to produce a more cooperative, democratic, egalitarian, and just society. Thus, with Plato, Rousseau, Wollstonecraft, Dewey, Freire, and others I see philosophy of education as reflecting on the good life and the good society and the ways that education can contribute to creating a better world. But as the world changes, so too must education which will be part of the problem or part of the solution as we enter a new millennium.

The project of transforming education will take different forms in different contexts. In the overdeveloped countries, individuals must be empowered to work and act in a high tech information economy, and thus must learn skills of media and computer literacy, in order to survive in the new social environment. Traditional skills of knowledge and critique must also be fostered, so that students can name the system, describe and grasp the changes occurring and the defining features of the new global order, and can learn to engage in critical and oppositional practice in the interests of democratization and progressive transformation. This requires gaining vision of how life can be, of alternatives to the present order, and the necessity of struggle and organization to realize progressive goals. Languages of knowledge and critique must thus be supplemented by the discourse of hope and praxis.

In much of the world, the struggle for daily existence is paramount and meeting unmet human and social needs is a high priority. Yet everywhere education can provide the competencies and skills to improve one's life, to create a better society, and a more civilized and developed world. Moreover, as the entire world becomes part of a global and networked society, gaining the multiple literacies discussed in this essay becomes important everywhere as media and cyberculture become more ubiquitous and the world economy requires ever more sophisticated technical skills.

This is a time of challenge and a time for experiment. It is time to put existing pedagogies, practices, and educational philosophies in question and to construct new ones. It is a time for new pedagogical experiments to see what works and what does not work in the new millennium. It is a time to reflect on our goals and to discern what we want to achieve with education and how we can achieve it. Ironically, it is a time to return to classical philosophy of education which situates reflections on education in reflections on the good life and society at the same time that we reflect on how we can transform education to become relevant to a high tech society. It is time to return to John Dewey to rethink that intimate connection between education and democracy at the same time we address the multicultural challenges that Dewey in the midst of a still vital melting pot ideology and liberal progressivist optimism did not address.

Most saliently, it is time to take up the Deweyean attitude of pragmatic experimentation to see what it is that the new technologies can and cannot do, to see how they can enhance education, but also to resist the hype, to maintain a critical attitude and pedagogy, and to combine print literacy and classical materials with new literacies and materials. It is a mistake to cultivate an either/or logic of print literacy versus computer literacy, or to privilege books over new technologies, for both can enhance education and life and require different literacies. In the current turbulent situation of the global restructuring of capitalism and worldwide struggles for democratization, I believe that we have for the first time in decades a chance to reconstruct education and society, that technology is a revolutionizing force, that all political parties and candidates are paying lipservice to education, to overcoming the digital divide, and to expanding literacy. Hence, the time is ripe to take up the challenge and to move to reconstruct education and society so that groups and individuals excluded from the benefits of the economy, culture, and society may more fully participate and receive opportunities not possible in earlier social constellations.[15]

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1. See Marshall McLuhan, *The Gutenberg Galaxy* (New York: Signet, 1962) and Walter Ong, *Orality and Literacy: The Technologizing of the Word* (London and New York: Routledge, 1988).

2. See John Dewey, *Democracy and Education* (1916; reprinted, New York: Free Press, 1997), and Paulo Freire, *Pedagogy of the Oppressed* (New York: Herder and Herder, 1972); and Freire, *A Paulo Freire Reader* (New York: Herder and Herder, 1999).

3. See the report, "American in the Information Age: Falling Through the Net," at: http://www.ntia.doc.gov/ntiahome/digitaldivide/.

4. See Courtney Cazden, Bill Cope, Norman Fairclough, James Gee, Mary Kalantzis, Gunter Kress, Allan Luke, Carmen Luke, Sarah Michaels, and Martin Nakata, "A Pedagogy of Multiliteracies: Designing Social Futures," *Harvard Educational Review* 66 (1996): 60-92; Carmen Luke, *Technological Literacy* (Melbourne: National Languages and Literacy Institute, Adult Literacy Network, 1997); and Ladislaus Semali and Anne Watts Pailliotet, *Intermediality: The Teachers' Handbook of Critical Media Literacy* (Boulder, CO: Westview, 1999).

5. I write about these topics in Kellner, *Media Culture* (London: Routledge, 1995), and "Cultural Studies, Multiculturalism, and Media Culture," in *Gender, Race, and Class in Media: A Text Reader*, ed. Gail Dines and Jean Humez (Thousand Oaks: Sage, 1995), 5-17.

6. Neil Postman, *Amusing Ourselves to Death: Public Discourse in the Age of Show Business* (New York: Viking, 1985) and *Technopoly: The Surrender of Culture to Technology* (New York: Vintage, 1992).

7. See Kellner, *Television and the Crisis of Democracy* (Boulder, CO: Westview, 1990) and Kellner, *Media Culture*.

8. Kellner, *Media Culture*.

9. Peter McLaren, Rhonda Hammer, David Sholle, and Susan Reilly, eds., *Rethinking Media Literacy: A Critical Pedagogy of Representation* (New York: Peter Lang, 1995).

10. Jon Lewis, "Practice What You Preach: Response to the Book *Rethinking Media Literacy: A Critical Pedagogy of Representation*," *Afterimage* 24, no. 1 (1996, italics in original): 26.

11. See Frank Webster, *Theories of the Information Society* (London: Routledge, 1995).

12. See George Landow, *Hypertext 2.0* (Baltimore: The Johns Hopkins University Press, 1995).

13. See Nicholas C. Burbules and Thomas Callister, "Knowledge at the Crossroads: Some Alternative Futures of Hypertext Learning Environments," *Educational Theory* 46, no. 1 (1996): 23-50, and Nicholas C. Burbules and Thomas Callister, *Watch IT: The Risks and Promises of Information Technology* (Boulder, CO: Westview, 2000).

14. Gunther Kress, "Visual and Verbal Modes of Representation in Electronically Mediated Communication: The Potentials of New Forms of Text," in *Page to Screen: Taking Literacy into the Electronic Era*, ed., Ilyana Snyder (New South Wales: Allen and Unwin, 1997), 53-79.

15. An earlier and different version of this paper appeared as "Multiple Literacies and Critical Pedagogy in a Multicultural Society," *Educational Theory* 48, no. 1 (1998): 103-22, and I am grateful to editor Nicholas Burbules for discussion that helped develop my ideas. A later version was published as "New Technologies, the Welfare State, and the Prospects of Democratization," in *The Promise of Multiculturalism, Education and Autonomy in the 21st Century: A New Political Science Reader*, eds., George Katsiaficas and Teodros Kiros (New York: Routledge, 1998), 211-36, and I am grateful to the editors for discussion that clarified my position on multiculturalism and education. Yet another version was presented at UCLA on 26 February 1998 as the Kneller Chair Inaugural Lecture and I am grateful to audience members for discussion. The current version was presented as a distinguished lecture at the annual meeting of the Philosophy of Education Society, Toronto, 1 April 2000. Commentary from respondent Nicholas C. Burbules and audience discussion helped greatly in the production of this text. For ongoing discussions, I am especially grateful to Rhonda Hammer and Allan and Carmen Luke.