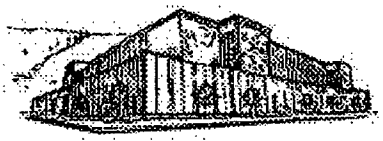
2002

Information and communication technology in education: Toward building a literacy program.

Bryan A. Hansen
The University of Montana



Maureen and Mike
MANSFIELD LIBRARY

The University of
Montana

Information and Communication Technology in Education:

Toward Building a Literacy Program

by

Bryan A. Hansen

B. A. Central Washington University, 2000

presented in partial fulfillment of the requirements

for the degree of

Master of Arts

The University of Montana

May 2002

Approved by:

Chairperson

Dean, Graduate School

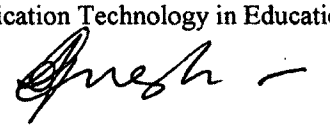
5-29-02

Date

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

Hansen, Bryan A. M.A., May 2002 Communication Studies

Information and Communication Technology in Education: Toward Building a Literacy Program

Director: Shiv Ganesh 

There is a push to integrate information and communication technology (ICT) in education and it is consequently important that students become literate with these new media. The first chapter considers factors that contribute to that push such as the metaphors of "information age" and "information revolution" as well as notions of techno-optimism and interactivity. The second chapter considers two issues of implementation: bridging the digital divide and dealing with the costs of integration. Given the integration of ICT in education in recent years, a new media literacy program is proposed. The contention of the third chapter is that new media literacy programs be developed that analyze not only the content carried through a medium, but the medium itself. Notions such as the relationship between the technological medium and democratic practices, the propensity of a medium to encourage/discourage interiority (reflection) and the effects of a medium on attention are discussed. Also included is an examination of how a medium influences the constitution of rationality, responsibility, community, identity, and reality. The fourth and final chapter outlines three workshop seminars that could be used to educate those who feel it is important to begin developing a literacy program for students.

ACKNOWLEDGMENTS

I would like to thank several people for walking with me as I worked through this project. It is easy to become so immersed in something that it takes over your life. In various and sundry ways, the following people provided a way out of the box and helped me keep my sanity and perspective.

First I'd like to thank Shiv Ganesh for the willingness to walk with me through this process, for countless hours spent reading and commenting, for inspiration and enthusiasm about the project, and for consistently looking out for me when I needed it. Also, you were tactful and honest in your appraisals which I greatly appreciate. Thanks also for helping me gain more discretion in my writing—the poet sometimes needs to be put in the basement! Your hard work and sacrifice do not go un-noticed.

Thanks to Len Foster for lively discussions in class that helped whet my curiosity in this endeavor we call education, and for his critical comments on early drafts of this paper.

Some others really helped me stay sane through this. Steve Schwarze not only gave great feedback about my ideas, but also broke trail for an out-of-shape snow-shoer in some of the nastiest weather of the year, during which time I was able to forget about some of my troubles in the valley below! Thanks. Thanks go to my twin and an icon in his own right, Dan Lair, for partnering on several projects that contributed to the development of this one and for sharing great music and baseball. Good luck in the new chapter of your life! Thanks to Kelly Schackmann for great lunch company, to Rebecca Gill for keeping spirits up and letting me think out loud, and to the rest of my UM peers for making a great community to work in. Thanks to Duane Zehr for introducing me to fly fishing. Of all respites, the river drowns many worries. It is nice to think like fish and bugs from time to time. Thanks to my parents for their spiritual support without which I would be floundering still.

Lastly, I want to thank my wife Nancy. No one else has sacrificed more for me the last few years in order to make this happen. Thank you for your willingness to work hard and endure much so that I can realize my dreams. You truly are my best friend and have been more than supportive during this project as evidenced in spending more time without me than you would prefer and in knowing when I needed to put it down and spend time with what is most important in my life. You brought the most sanity and served as an anchor in the midst of crazy times. Thank you.

Correspondence concerning this work should be addressed to Bryan Hansen, email: hansenbryan@yahoo.com

TABLE OF CONTENTS

In a broad sense, the following pages attempt to answer the question: what is happening at the confluence of information communication technology (ICT) and education? In a more specific sense, these pages address how to pragmatically answer that question by extending ideas of new media literacy to students, and to education practitioners and administrators as well. There is a clear push to integrate ICT into education and this has resulted in some interesting trends that merit attention. Former President Clinton urged that we put a computer in every classroom in the country (US Dept. of Education, 1996, Executive summary). More recently, the U.S. Secretary of Education Rod Paige stated that it is "not enough now to have computers and Internet connections in schools, it's time for the next step . . . It's pointless to integrate them if they don't add value to the curriculum" (in Krebs, 2002). Some in the computer industry and society are saying that there is a severe shortage of technicians in the field and that schools need to do everything they can to provide the opportunities for students to develop the skills to be technicians (Bushweller, 2001). Telecommunications, computer, and software companies are not opposed to the idea of integrating their products into another market. If every classroom in the U.S. gets a computer wired to the Web (and there are a *lot* of classrooms), there is significant money to be made. Coupled with this drive to put computers in classrooms is the willingness of some in the education community to let them do so (IBM, 2001b).

With all the push for educational technology, and the subsequent implementation of such technology, problems have arisen. Popular optimism surrounding technology and what benefits it will have for education tends to mask problems, even though they have been studied. These problems have been the subject of numerous publications[1], mostly centered on implementation, but also about how to overcome problems such as cost, teacher training, maintenance, connections to networks and the web, technical support, equity, and access. Some less optimistic writers have begun to question whether or not computers improve student performance or learning, as well as teacher effectiveness. Much research in this area is positive—computers improve student performance as evidenced by such things as higher test scores,

[1] For a few bibliographies that include many resources highlighting these themes, see http://www.realworld.org/morereading.html and http://www.media-awareness.ca/eng/webaware/netsurvey/resources/litreviewfull5.htm

learning more in less time, developing positive attitudes about learning, and higher level reasoning[2]. But more recently, criticisms have arisen of such research claiming that it is fundamentally flawed or inadequate. Cradler (2002) notes that the development of ICT for education outpaces research on ICT for education. Consequently, such research is somewhat irrelevant to current advances in hardware, software and connection speeds that are being used or proposed for use in schools. Kirkpatrick and Cuban (1998) note that some critics have brought up issues such as,

> small sample size of the studies; lack of control groups; small effect sizes (that is, outcomes that were statistically significant but had limited practical impact); short duration of the studies; no control for teacher effects, lack of details on environment and inappropriate achievement tests. ("Critical Reviews" ¶ 2)

These shortcomings are seldom mentioned in discussions about the efficacy of ICT in classrooms.

Aside from research issues, Rukeyser, (1998) raises several questions and points out: "Schools are a zero-sum game: for everything you add, you have to take away something else. What are we giving up to pay for equipment that may cost $100 billion up front and an additional cost of $35 billion a year? What about the personnel cost? Will teachers lose teaching time because they will be fixing or maintaining computers, networks, etc.?" In a 1997 address to the National Association of Elementary School Principals (NAESP), Samuel G. Sava, president of the organization at the time, pointed out that in an often quoted study that shows higher achievement scores, the reality is that "the improvement occurred before computers were introduced, because of other changes: longer class periods, new books, after-school programs, and an emphasis on student projects." In Sava's same address, he quotes Edward Miller, the former editor of the *Harvard Education Letter* saying that "most knowledgeable people agree that most of the research isn't valid. It's so flawed it shouldn't even be called research" (1997, p. 2).

Still others have questioned the motivation of computer companies, school boards, superintendents, public officials and business leaders to integrate computers into the classroom. Arnone (2001) asks some questions about the recent collaboration of Microsoft and Blackboard, such as: will the other platforms that Blackboard clients use (such as Linux and Unix) be slowly ushered out by a Microsoft

---

[2] See Schacter's 1999 study, that contains summarizations and references to a significant amount of the research on this.

platform? If so, won't this leave those institutions that presently use those systems needing to spend more resources to replace the systems they have—systems that are often considered to be (compared to Microsoft's) "more powerful, reliable, and adaptable . . . that scale better to large institutions" (Arnone, 2001, Security Hazards section, ¶1)? Helm (1997) reports that "educational software companies are wooing administrators to win contracts" (line 32) by inviting school officials on dinner cruises, to three-day retreats, and hiring former superintendents to help open doors into schools. Helm quotes one superintendent who says: "Once they give you a big invite, they expect something from you" (line 36). Kirkpatrick and Cuban (1998) also pose the possibility that superintendents may want to "leave their fingerprints" on the district by way of technology. It should be noted that these cases of questionable motivation may be the exception and not the rule. However, such a qualification does not make corporate philanthropy a non-issue. These are important issues to address, because if the influence to put computers in schools is based on increasing the bottom line of ICT companies, and not on teaching practices supported by good research, then there may be little benefit for students.

In the midst of this sea of discourse, a small island of people are asking different kinds of questions. Questions like: What are the effects of computer use on childhood development? On our culture? On our notions of education? (Calvert, 1999; DeGrandpre, 1999; Healy, 1990, 1998; Postman, 1985) These sorts of questions deal not with computers as tools, but with computers as a medium. Marshall McLuhan's concept of "the medium is the message" addresses how different mediums have certain biases and that media are in actuality extensions of the human sensory system (McLuhan, 1964). "All of man's artifacts – whether language, or laws, or ideas and hypotheses, or tools, or clothing, or computers – are extensions of the physical human body or the mind" (McLuhan, 1988). It is to these sorts of ideas that writers such as Neil Postman turn our attention.

Postman contends that all information that comes through the medium of television becomes entertainment (whether it is meant to or not), including educational programs (Postman, 1985). Consequently, students come to expect learning to be entertaining—a formidable obstacle for the teacher who may not be as entertaining as the musically and visually charged medium of T.V. Postman takes as an example Sesame Street, and talks about its effects on notions and methods of education. He argues that "television's principal contribution to educational philosophy is the idea that teaching and entertainment are

inseparable" (p. 146). But he does not blame television, or Sesame Street. "We can hardly expect those who want to make good television shows to concern themselves with what the classroom is for. They are concerned with what television is for. This does not mean that "Sesame Street" is not educational. It is, in fact, nothing but educational—in the sense that every television show is educational" (p. 144). But he adds that,

> whether or not 'Sesame Street' teaches children their letters and numbers is entirely irrelevant. We may take as our guide here, John Dewey's observation that the content of a lesson is the least important thing about learning. As he wrote in *Experience and Education*: "Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only what he is studying at the time. Collateral learning in the way of formation of enduring attitudes . . . may be and often is more important than the spelling lesson or lesson in geography or history . . . For these attitudes are fundamentally what count in the future." (p. 144)

But if education via television makes that education entertaining, what is the problem with that? The students seem to enjoy learning more, so what is wrong with education being entertaining? Well, in part, it depends on what we mean by wrong. Postman says that educational programming like Sesame Street "undermines what the traditional idea of schooling represents" (p. 143) and outlines some of the changes that subsequently take place, such as lower social interaction, and that fun becomes the end of education and not the means to an end. The media used to convey education shape the way that education is perceived and what is expected of it. This occurs in ways that, as Postman notes, undermine traditional notions of teaching and learning and it is not that teaching or learning should not or cannot change, but that such changes ought to be *intentional, calculated,* or at the very least, *understood.* In order to understand these changes, some important questions need to be considered. When education is conveyed through a computer, what will that education become? How do computers as a medium shape the information which they purvey (Bowers, 1998)? What gets filtered out? What is emphasized? How are these emphasized? Furthermore, what are the effects of information technologies on student learning behavior and on teacher instructional behavior? How do students navigate and manage the vast amount of information they encounter and how can teachers assist them in this navigation? Furthermore, how do administrators begin to intelligently address these sorts of questions before investing much time, energy and other resources into the endeavor?

In the following pages, I discuss these questions. My focus is to amplify some of the different discourse and arguments recently advanced in the debate about technology in education—positions that are

often muffled voices that I feel need to be brought from backstage to center stage for at least a scene or two. More specifically, there are two issues that I concern myself with:

First, I am concerned that not enough is being done to assist students to become media literate, and even less being done to help them be media literate with newer developments in ICT. Therefore, *I aim to consider what might be appropriate considerations for developing a literacy program.*

Second, I am also concerned at the amount of resources being funneled to implementing ICT in education for several reasons that I will discuss later. *I hope to be able to bring to these reasons to bear on the discussion of ICT in education with the intention of tempering optimism with a little skepticism.*

In order to translate these two issues into practical outcomes, *I would like to create a series of seminars or workshops for the purpose of sharing these concepts* with teachers, school board members, administrators, parents or other concerned individuals who find themselves guiding a school out onto the open seas of information and communication technology.

To begin, I outline some of the current cultural trends that emerge as one observes the intersection of the educational and technological landscapes. In this discussion, I address issues such as the metaphors of the information age and information revolution. Following this is a discussion of how our notions of interactivity and education are influenced by these trends. Secondly, I summarize some of the literature on the more pragmatic aspects of implementing ICT in education such as cost, effective use, maintenance, etc. Thirdly, I look at less familiar aspects of ICT in education such as the effects of ICT on the developing brain, current developments in media literacy curriculum, and some areas where I believe such curricula need to be extended—namely, a critical look at the medium itself. Finally, I conclude with a proposal for three workshops in which these aforementioned ideas might inform the issues and decisions education practitioners and administrators face regarding information and communication technology.

CHAPTER 1: TRENDS IN TECHNOLOGY AND EDUCATION

Metaphors, Optimism, Interactivity, and Student Performance

The "Information Age" Metaphor

Any conscious observation of the discourse about our present times must conclude that we are in an information age. Clearly, information seems to be the lifeblood of the industrial world. "We are deluged with information, accumulating by the millisecond on video and audio tapes, film, microfiche, floppy disks, hard drives, and memory chips, and spewing incessantly over airwaves, light waves, television cables, and telephone wires" (Hobart & Schiffman, 1998, p. 1). Granted, there have been some who argue that the information age has passed and we are entering into a different age. Some call this new age the "communication age" (Thornburg, 1994) while others call it the "knowledge age" (Snobelen, 1996; Dyson et. al., 1994) or "post-information age" (Negroponte, 1995) or the "digital age" (Dyson, 1997). David Scott, former chancellor of the University of Massachusetts at Amherst calls the new age a culmination of these first three named "the integrative age" (2000). Stan Davis, hailed by some as the world's foremost futurist takes it a step further into the future, saying that we are on the brink of what he calls the age of the "bio-economy" where bio-technology will drive the economy instead of information (Johnson, 2001). Whatever this age is called, information and communication technology (ICT) is at its core. As Davis states in reference to the bio-economy age, the focus is on biology, but "the tools that it uses are closer cousins to the information technology world of computers" (Johnson, 2001).

These labels, while somewhat arbitrary, influence the ways we think about education. One important aspect of this influence is the way in which information and knowledge are reified. The idea is that information or knowledge becomes a commodity—something that is seen as solid and exchangeable. Commodification of knowledge is problematic because knowledge is not a material object but by treating it as such those elements of knowledge that are immaterial are obscured. Furthermore, there is an economic component in commodification, exemplified in the economic basis for how we term the ages: Agricultural Age, Industrial Age, Information Age and now, according to Davis, the Bio-*economy* Age. Whatever it is called, once knowledge is reified and commodified, it can be bought and sold, passed around like a material object. The ambiguous array of terms with which we label the present age, coupled with the thunderous volume at which they are heralded by commercial advertising blurs the line between information and

knowledge, and the purposes to which they are put. Brown and Duguid's (2000) book, *The Social Life of Information* provides a very good discussion of some distinctions that can be made between information and knowledge. Here are a few of their observations.

First, knowledge entails a knower. This difference can be highlighted by asking one question regarding the location of information or knowledge: "Where is that information?" contrasted with, "where is that knowledge?"-- "Where is that information" seems much more natural. Knowledge seems more personal, and more abstract. Second, knowledge is harder to detach than information. Information is "something that people pick up, possess, pass around, put in a database, lose, find, write down, accumulate, count, compare and so forth. Knowledge, by contrast doesn't take as kindly to ideas of shipping, receiving, and quantification" (Brown & Duguid, p. 120). Third, knowledge requires more in the way of assimilation than information: "Knowledge is something we digest rather than merely hold" (p. 120). For example, teachers often caution students not to cram for tests because the information will not be assimilated—it will be information that will be lost. Additionally, it is often said that what "they" can't take away from you is your education. One of the aims of education is to not merely have access to information but to also assimilate that information. This is a difference between what Scheffler (1960) called "knowing that" vs. "knowing how." Furthermore, he differentiated along these same lines between teaching and telling: teaching being knowledge centered, and telling being information centered.

The blurring of information and knowledge contributes to what has been called a consumerist mindset among college students regarding their education, one that complicates the purposes of education: I (the student) give you tuition (money) and you give me an educational product (McMillan & Cheney, 1996). This consumer metaphor is further reinforced through university and college slogans from the recent past such as "Education is our business" (Temple University Center City Campus, 2002; Oregon Institute of Technology, 1998; MIT, 1995) and statements such as the following: "It's not a comfortable thought, but we must at least consider that a change in technology – a change that will facilitate the flow of the university's essential commodity, information – might provoke a change in the nature of the enterprise" (Wulf, 1995). The consumerism mindset, reinforced by statements like these, helps to apply the business metaphor to educational practices. In some instances this may be appropriate (in administrative planning for example), but in others it may not, which I would like to allude to here. Blurred as the boundaries are

between information and knowledge, distinctions such as those suggested by Brown and Duguid should be made between them because they have implications for what we believe to be the purposes and thus the means of education.

With this in mind, it is not enough that we wire every classroom. We must know how to effectively use what gets wired in a way that goes beyond telling and becomes teaching. This is echoed in Education Secretary Paige's comments mentioned earlier regarding computers in education: "It's pointless to integrate them if they don't add value to the curriculum" (in Krebs, 2002). This statement seems logical and it is. If a treatment works to improve a condition, why not use it? This seems logical enough. What is illogical is that these machines and connections have, to a great extent and at great expense, been integrated into classrooms without *first* seriously determining if and how the investment will prove efficacious. If we do not know if ICT will improve education, or if we know that it will but we do not know *how*, then what justification is there for promoting and implementing ICT, especially on such grand scale as done with "Net Day"[3] or as promoted by so many others? Why did we get the cart in front of the horse? There are several valid explanations but two of them follow: The first centers around the metaphor of "information revolution" and the second centers around the presence of "techno-optimism."

The "Information Revolution" Metaphor

The term "information revolution" is widely used to describe the changes associated with the collapse of space and time as regards the transfer and flow of information. Ours is not the first such information revolution. The printing press brought on a sort of information revolution. Insofar as Martin Luther was concerned, the availability of the Bible to the common citizen and not just the papacy closed the distance between the laity and God[4]. The train systems of early American history collapsed space and time by bringing mail to hitherto separate places, bringing what once seemed so far away much closer. The telegraph did the same. Most advances in communication technology shrink the distance between places by connecting them in ways that foster faster communication than the technology before it. The Internet is an advance over previous means because it provides more points of connection and at faster speeds than

[3] 'Net Day was a program in 1996 in which an old-fashioned "barn-raising" approach was applied to rally support in a concerted effort to implement ICT into California schools.

[4] However, the true revolution wouldn't come until several centuries later with the advent of the industrial age. That is when people became literate enough to benefit from the access to the information that print made possible (Warschauer, 1999).

previously possible with "snail-mail." This revolution, like previous revolutions, promises an upheaval of oppressive influences and perpetuation of equality (Forrester, 1989). Though this is not a primarily political revolution, the idea behind a revolution—if that is what we are going to call the rapid nature of change around us—has political underpinnings. After all, the American Revolution led to the independence of America from the British. Other political revolutions have had similar aims—to restore social justice. Information technology is often heralded as the great equalizer. It will smash managerial hierarchies (Naisbitt, 1984), provide greater opportunity to rural students, and create a more open democracy (Licklider, 1980). Langdon Winner writes in detail about the metaphor of revolution and what that implies when applied to information. He asks some important questions about revolutions:

> It seems all but impossible for computer enthusiasts to examine critically the *ends* that might guide the world-shaking developments they anticipate. They employ the metaphor of revolution for one purpose only—to suggest a drastic upheaval, one that people ought to welcome as good news. [...] One might suppose, for example, that a revolution of this type would involve a significant shift in the locus of power; after all, that is exactly what one expects in revolutions of a political kind. Is something similar going to happen in this instance? One might also ask whether or not this revolution will be strongly committed, as revolutions often are, to a particular set of social ideals. If so, what are the ideals that matter? Where can we see them argued? To mention revolution also brings to mind the relationships of different social classes. Will the computer revolution bring about the victory of one class over another? Will it be the occasion for a realignment of class loyalties? (in Forrester, 1989, p. 84)

He later asks, "where do we see increased democratization? Social equality?" and says in effect that rather than power shifting, "if there is to be a computer revolution, the best guess is that it will be distinctly conservative in character" (p. 88). One could argue that there are elements of truth to this myth of the computer revolution. The potential for such of changes exists, but they will not occur without an intentional focus to achieve them, contrary to what Winner calls the "almost religious conviction that widespread adoption of computers and communications systems along with easy access to electronic information will *automatically* produce a better world for human living" (p. 87, italics mine). This conviction that the computer revolution offers salvation for our social ills seems to be changing. Critical observers have written that it is not a panacea and the message is spreading (DePalma, 1999; Rukeyser, 1998; Banks & Renwick, 1997; Bloom, 1996; Cuban, 1996). But while the Education Secretary has argued against blindly integrating computer technology in the classroom, the current administration still heavily funds technology programs for education, and the computer industry has not ceased aggressively marketing their products to educators. It is estimated that schools spent $6.9 billion in 1999 on ICT (Kleiman, 2000). There may

certainly be a revolution, but it might better be called a revelation: a lot of money can be made with ICT. It is important that we keep the implications and limitations of the revolution metaphor in mind, because the assumed presence of the revolution is often used as justification for proposals that are not necessarily aimed at restoring some sort of social justice or democratic principles.

Notions of Techno-Optimism

Besides the promulgation of the "information revolution" metaphor, there is a second explanation for why we have gotten the cart in front of the horse insofar as putting computers in classrooms is concerned and that is the notion of "techno-optimism." Techno-optimism is the belief that technology is utterly desirable. It is an uncritical, unquestioning enthusiasm for technology. In December of 1999, the Web-based Education Commission issued a call to action that the committee members felt was urgent for the incoming administration:

> We must immediately put to rest the notion that full development of Web-based technology for education is a choice . . . The Internet is revolutionizing[5] all parts of society, but its impact on education is just beginning to be understood. We believe that a national mobilization is necessary to ensure that the tremendous potential of this new technology is harnessed to benefit all learners whether in our nation's schoolhouses, college campuses, corporate training rooms, or at their kitchen tables. (Senator Bob Kerry (D-Neb.) HPCNET.org, 1999)

This quotation presents the idea that ICT for education is inevitable and that there is nothing we can do about it but learn to accept and understand it. This rather deterministic view fails to recognize the ways that ICT is socially constructed and that there may indeed be a choice. Following from this premise is the notion that since ICT will have an inevitable effect on education, it is necessary to implement it so as to understand and use it correctly. This, in turn, fails to consider the possibility that certain elements of Web-based technology may actually be detrimental to educational purposes. Senator Johnny Isakson (R-Ga.), vice chair of the commission also added: "Every stakeholder in American education must make it a priority to work in collaboration to realize the Internet's potential in education" (HPCNET.org, 1999). Such optimistic notions fail to recognize that there are disadvantages to every introduction of a technology[6].

---

[5] Note the revolution metaphor, and how it is underscored by the term "national mobilization."

[6] At the other end of the techno-optimist continuum is technophobia, or techno-pessimism. Such a position fails to acknowledge that there are benefits to technology, or that whatever benefits exist are not worth the detriments of the technology. I would like to make it clear that I am not a techno-pessimist. I find computers to be very useful and I indeed advocate them for use in education in many instances. To put my position more clearly, I consider myself a techno-skeptic. I have seen and experienced some of the pitfalls of my own technology use and I have questions. I would like to know more before I wholeheartedly begin

History is riddled with examples of us welcoming some new technology with open arms, only to be shocked when that technology fails. At Three-Mile Island, designers had backups on their backups but when a valve failed to operate properly, Harrisburg, Pennsylvania nearly became an epicenter of catastrophe. These technological risks are also evidenced in the numerous environmental disasters over the course of history such as Chernobyl, the Love Canal, CFCs and global warming, among innumerable others. Charles Perrow (1984) argues that all technologies have risks associated with them. Even when we have backups on our backups, technologies are still susceptible to what he calls "normal accidents." Peter Neumann (1995) outlines some specific risks that have bearing on this discussion of the optimism surrounding computers in schools.

First, there are issues of reliability. Computers aren't always accurate. They have glitches and these glitches lead to certain failures. In his book *Computer Related Risks* (1995), Neumann collected examples of times when technology failed. As an example, one child was required to repeat the fifth grade because of an extra space between the student's first and last name on a test (p. 192). It wasn't until six weeks into the year that the problem was corrected, in spite of protests from parents. Neumann also mentions how parts of the information super highway fail due to their reliance on faulty computer technology, such as the software that serves as a check in crash-recovery of phone service.

A second risk is complexity. The Internet and networking connects us in many ways. And the more we get connected, the more complex the system becomes and the more vulnerable it is to risks, as is evidenced in the recent worms that attach themselves to email lists and spread throughout the internet, disabling everything from individual hard drives to corporate servers. This push to get connected has connected us in ways that are so interdependent that one computer could have virus that spreads throughout cyberspace, crippling not just the computers, but the systems and subsystems that they create. We need to evaluate our dependency and the risks and see if it is worth the gamble in education. The problem with this evaluation is that when systems are as complex and open as the Internet, prediction is an impossible task. We may try to account for all sorts of difficulties and potential problems, but there is an increased likelihood that we won't even be able to consider the scope of the potential problems (Pool, R. 1997). Not

---

using it to teach, or before I vote to commit resources to buying technology for schools. There are negative consequences for technology use and I would like to understand those consequences.

that we shouldn't try—I think that there is a place for computers in education, but we must weigh the advantages and disadvantages that we can, and this is something that our techno-optimistic mindset has hindered us from doing.

A third risk associated with implementing all these computer and information technologies is security. Not in the sense mentioned above—the security of predictability—but in things like protecting student records and privacy. Again, our optimism often hinders us from carefully considering these factors.

Besides the risks noted by Neumann, historian David Noble is another voice that seeks to temper this techno-optimism. He has been labeled a Luddite by some critics—but he feels that Luddites are people to be emulated because "they were not at all the mindless, hapless victims that people portray them as. They were essentially demanding a policy on technology" (in Young, 2000). If we look, we will find that there are many reasons ICT is being pushed into schools and several of them have little to do with pedagogy and more to do with such ideas as religious motivation, a desire for transcendence, or the interests of engineers and administrators (Noble, 1984; 1997). These are the sorts of influences we need to become aware of in order to make effective policies about how ICT might best be integrated into schools.

Interactivity and Education

Interactivity implies an interface with an other. That other may be human or machine. Furthermore, such interaction tends to utilize a greater number of our senses than non-interactive or less interactive processes, thus investing ourselves more deeply with the other. This investment results in more ownership and integration of the knowledge and experiences gained from the interaction. One of the key selling points for integrating ICT into our schools is that it promotes interactivity. Behind this claim lies the premise that traditional teaching is not interactive—or not interactive enough—and that computers will solve this problem. But what is the value of interactivity, and do computers fulfill what we are aiming for when we desire this interactivity? Are there other ways of attaining the same goals without using ICT? Is non-ICT instruction really non-interactive? The concept of interactivity is multifaceted, so much in fact, that it is beyond the scope of this paper to explore its nuances thoroughly. However, some general comments and questions can be raised about how interactivity is used to promote ICT in education.

First, as mentioned above, there is a premise lying behind the supposed interactive function of ICT and the consequent benefits it will have for education, claiming that traditional teaching or learning models

are inadequately interactive. Is this claim valid? In order to address this question, it is helpful to discuss the role of interactivity in learning. Benjamin Bloom's seminal work (1956) describes three general domains of learning objectives: cognitive, affective and psychomotor. The cognitive domain is the acquisition and use of knowledge. The affective component is how students feel about what they are learning. The psychomotor domain centers on skills that are physical in nature. This taxonomy serves as a general starting point for educational objectives. There is certain information that we want students to acquire and assimilate, we want them to value what they assimilate, and we want them to put it into practice. There are a variety of instructional models that may serve to attain these objectives. Darling (1990) describes two such models: information processing models and social models. The former focus on "the cognitive dimensions of learning" and the latter "stress social *interaction* and human interdependence" (p. 267, italics mine). The social model is more interactive in nature, but that does not imply that the information processing model cannot be interactive.

Information processing models "share two fundamental assumptions about learning and teaching: first, that learning content matter is the primary purpose of instruction and, second, that effective instruction develops students' natural information-processing abilities (eg. skills in observing, inferencing, and hypothesizing)" (Darling, 1990, p. 258). It is important to note that learning content is a primary, but not the only, goal of information processing models. Social models, on the other hand:

> focus on social interaction and human interdependence and make two assumptions about teaching and learning. First, they assume that the primary responsibility of schools is to teach individuals how to operate in a social world. Second, they assume that learning is most productive when individuals construct their own learning experiences. These modes are designed, then, to engage students in interdependent activities and to make them responsible for their own learning. (p. 273)

Paulo Freire (1993) said, "Knowledge emerges through invention and re-invention." This invention occurs through interaction with the material beyond rote memorization. In fact, it is not knowledge unless it is invented and students are not inventing if they are merely receptacles for information. The process of invention is an interactive one. Darling offers three specific information-processing models that promote interactivity: advanced organizers, concept attainment, and Suchman inquiry, and three specific social

models that promote interactivity: group investigation, role playing, and jurisprudential inquiry.[7] Research on the efficacy of the information-processing models "reported strong and positive achievement gains in schools using the models" (p. 268). Lectures can indeed be interactive, and while integrating computers may afford interactivity to information-processing models, it is reasonable to argue that a change in pedagogy on the part of lecturing instructors will also achieve this without the expense and other detriments of integrating computers into the classroom.[8] Research on social models shows that such models are "effective tools for teaching both problem-solving skills and prosocial behavior" (p. 273). Like lecture-style instruction, this socially oriented instruction can also be improved through informed pedagogy. The communication and education literature has a wealth of empirically supported suggestions for effective teaching strategies (Armes & Archer, 1980; Bailey, 1989; Basset & Smythe, 1979; Hurt, Scott & McCroskey, 1978; Klopf & Cambra, 1983; Shulman, 1986; Taba, 1966; Weimer, 1987, to name a few). Computers may be effectively integrated while employing such methods, but such success is doubtful without effective teaching methods. An effective instructor operating from an informed pedagogical perspective, who promotes interactive learning, can effectively educate with or without a computer[9].

But the benefits of interactive teaching represents only part of the issue. Interactivity is useful, but it is not the answer to every instance of poor instruction. Andersen, Nussbaum, Pecchioni, & Grant (1999) write that "instructional research documents interactive teaching as best suited for accomplishing some, but not all, instructional goals" (p. 360) and that "although interaction is facilitative of many instructional goals for most students, it appears to be generally detrimental to highly communication-apprehensive students" (p. 362). If it is interactivity that promotes some good educational practice, and it can be achieved without ICT, then why not do so? In part, it is because there are types of interaction that computers afford students that are not afforded to them otherwise. However, to say that ICT will improve instruction because of its

---

[7] For a detailed account of these methods, see Darling, A.L. (1990). Instructional models. In Daily, J., Friedrich, G, & Vangelisti, A. (Eds.) *Teaching communication: Theory, research and methods* (pp. 267-278). Hillsdale, NJ: Erlbaum.

[8] These detriments are considered in section two of this paper: *Implementation*

[9] It is not my intention in this paper to delve into the details of what right pedagogy is. Education and instructional communication scholars have considered such details, and to some degree they have done so in regards to ICT; however, the research suggests that more needs to be done. My focus is to bring to the fore of our minds the need for informed pedagogy so that it might be further considered, not to necessarily detail what those considerations ought to be. It is noted later (pp. 17-19) what some of the research says needs to be present in order to ICT to be efficacious for student learning.

inherent interactive nature is to draw attention away from improving instruction in the classroom via other means, tending to rely too heavily on the optimistic view that ICT has for revolutionizing or redeeming education and too little on the research, theory and practice found in scholarship. But there are applications for ICT in education that can indeed prove useful for improving learning, solving problems of student interaction in classrooms.

At the beginning of this section, I mentioned that interactivity can be with human or with machine and I would also add that it might also be both as is the case with computer-mediated communication (CMC). A closer look would reveal that all interactivity, even when it is only with a machine, such as browsing databases, is actually interaction with another human being because there, behind the hypertext, software, or hardware is a human or group of humans who created it.[10]. Given this, it would seem that the interactive nature of ICT is not just supposed, but real. But as Miles and Thomas write, there are "gradations of interactivity" (1995, p. 259) ranging from minimal to higher levels of interactivity. In education, the supposition is that the higher the interactivity, the more learning will take place, despite the previously mentioned argument that interactivity between students and teachers does not always result in more learning because of the communication apprehension present among some students (Andersen et al., 1999). But one of the advantages of CMC is that those students (or people in general) who are apprehensive about communicating in a classroom or public are less apprehensive communicating online (Wallace, 1999). Other possibilities afforded by ICT are interactions between teachers and other teachers, students and other students, students with teachers and lastly, both students and teachers with outside sources. The nature of this interaction, however, can be both beneficial and detrimental. Anonymity affords us the ability to discuss personal problems, test ideas, play harmless jokes, complain, ask dumb questions, try out different identities, rally political support or consciousness in an oppressive regime, and vote (Dyson, 1997) without directly bearing the consequences of doing so as we would if we were without anonymity. But the downside of anonymity is that it can first be "done to excess and is not healthy for individuals, though this is a free country and a free Net. Second, because even good people tend to be "less good" when they're not

[10] While such interactivity is not at the fore of our minds, it is nonetheless an important aspect to consider because these technological inventions have inventors who have various reasons—some educationally based, some economically based—for developing these technologies. Because of this, there are interactions that users have that are often taken for granted.

recognized and building (or keeping) a reputation" (Dyson, 1997, p. 239). There is also less incentive to tell the truth, making the Net a great place for criminals, as can be seen in the recent cybercrimes such as the scams put on Ebay, the child-pornography rings, and identity theft.

So, while interactivity is a cornerstone of teaching and ICT is generally interactive, it is important that we critically think about this key selling point of ICT for education. It is not enough to simply put ICT into schools and assume interactivity[11].

Distance Learning, Traditional Learning, and Student Performance

Another trend that merits attention is whether or not the use of ICT in education actually improves student performance. As stated earlier, some research shows that it does (see summaries of Shacter, 1999 and of Cradler, 2002) yet, as noted earlier, others have argued that there are fundamental problems with the research (Institute for Higher Education Policy, 1999; Kirkpatrick and Cuban, 1998; Oppenheimer, 1997; Rukeyser, 1998, June/July and February/March; Sava, 1997). It is important to note that the two general areas studied are; 1) distance learning and 2) the use of computers in classrooms. These can be further broken down into three categories (Kirkpatrick & Cuban, 1998): CAI (computer-assisted instruction), CMI (computer-managed instruction), and CEI (computer-enhanced instruction). These areas have distinct differences, though popular and promotional discourse is often ambiguous to where exactly ICT is being applied. A distinction should be made between ICT for distance learning and ICT as a means of enhancing traditional teaching methods. The difference seems to be that in the latter, ICT is incorporated in a supplementary fashion in the classroom rather than as new method, enhancement, or sort of replacement of correspondence courses. The reason for advocating this sort of distinction is that there is so much overlap in the jargon of ICT and where it is applied that confusion seems to be widespread and consequently one possible reason for much of the debate about the usefulness of ICT in education.

Distance education or distance learning[12] is generally a new form of the correspondence course (Saunders & Weible, 1999). While certainly more interactive than the older versions, it is nonetheless a means of taking a course without being in the same geographic or temporal realm of the instructor. This has

---

[11] Not that schools are doing this, but it does seem to be what advertising and other related discourse from the ICT industry often suggests.

[12] Again, a distinction should be made between these two, but as is almost always the case, it is not made in the popular discourse. See King, et al (2001) for a detailed account of this in their article: *Defining distance learning and distance education.*

become increasingly popular as lifelong learning has become a more acceptable way of achieving educational goals in our culture. Students have changed. They "have different needs than those in the past. They need to have flexible class times and access to instructors and research facilities. However, they need to have access to these learning opportunities where they work and live" (Card & Horton, 2000, p. 235). Coupled with a change in job loyalty and stability, adults need to seek more training to become more marketable. They are often bound by family, work, and other obligations that prevent them from meeting in traditional classroom settings. Distance learning provides a means for them to get the training they desire. Research on this type of application of ICT seems to show that such courses seem to fare at least as well as traditional classroom courses on student outcomes such as grades and scores, student attitudes about learning and overall student satisfaction with the course. However, The Institute for Higher Education (1999) created a report summarizing research on distance education and noted that "it should be emphasized that the review provided striking evidence of the fact that there is relative paucity of true, original research dedicated to explaining or predicting phenomena related to distance learning" (p. 13). Furthermore, they note that what original research exists is of poor quality, rendering findings inconclusive. Aside from research needing to be further developed in this area, some anecdotal evidence suggests some apparent problems with online courses. The State University of New York at Buffalo's School of Management abandoned its Web-based M.B.A. program, joining a growing list of such institutions (Mangan, 2002). The reasons for such a shut-down may vary, (and one is that the outside organization that helped to finance the SUNY program backed out) but what is clear is that a lot of resources were invested in development and maintenance here that could have been invested in something else.

Online courses are making their way into secondary education as well. One of my students mentioned to me that she went to a small school in a small town and they did not have a calculus teacher so a handful of students took the class from a teacher who taught in another town. The teacher taught through a system of video cameras and television monitors through which the students could interact with the teacher with the ability to see her, ask her questions, etc. I asked her what she thought of the experience. Her answer echoes the answers found in much other research: "It was pretty good," she said. "But it was hard not being able to talk to the teacher after class, or actually meet her." While online classes may be

slowly making their way into secondary education[13], other means of using ICT have been employed in primary and secondary schools with more regularity.

The research on ICT in secondary and primary education is not nearly as ambiguous as it is in higher education's distance learning. However, critical questions still need to be asked of the fundamental methodologies of the research. John Schacter (1999) summarized several studies, indicating positive and negative findings. Positive findings included higher achievement test scores with computer based instruction; students learned more material in less time; students like their classes more; special needs children showed increased achievement; some higher-level reasoning (though the findings were not conclusive); teacher practices tended toward more cooperative group work; depending on the program, computer aided instruction proved more cost effective than reducing class size or instructional time and cross age tutoring programs; math skills improved; students exhibited better depth of understanding, reflection, progressive thought, taking multiple perspectives, and independent thinking. The negative findings were mostly along the lines of no significant differences between traditional and computer enhanced instruction. "There is however, evidence in some of these studies that learning technology is less effective or ineffective when the learning objectives are unclear and the focus of the technology use is diffuse" (Schacter, 1999, p. 10). Cradler (2002) notes some other positive findings that do a better job of explaining some of the additional components that need to be present for ICT to really be efficacious:

> The effectiveness of technology tends to vary as a function of the curriculum content and instructional strategy delivered by the technology. When content and strategies are determined to meet accepted education standards, research shows that technology:
>
> - Increases performance when interactivity is prominent
> - Increased opportunities for interactivity with instructional programs
> - Is more effective with multiple technologies (video, computer, telecommunications, etc.)
> - Improves attitude and confidence—especially for "at risk" students
> - Provides instructional opportunities otherwise not available
> - Can increase opportunities for student-constructed learning

[13] In Maryland, the "state Department of Education hopes to open an online high school, called the Maryland Virtual Learning Community, in fall 2002 with 350 "virtual" seats" (Ball, 2001). This is done in the hope that it will alleviate the shortage of teachers and courses.

- Increases student collaboration on projects
- Increase mastery of vocational and work force skills
- Help prepare students for work when emphasized as a problem solving tool
- Significantly improves problem solving skills of learning handicap students
- Improves writing skills and attitudes about writing for urban LEP students
- Improves writing skills as a result of using telecommunication (p. 1)

Additionally, research seems to show benefits for teaching "with a shift from the more traditional directive to a more student-centered approach" (p. 1). There seems to be abundant support for ICT in classrooms at these pre-college levels of education but it is important to note that such integration must be accompanied by informed educational theory and practice in order to truly be effective. Kirkpatrick and Cuban (1998) summarize the issue of effective research this way:

> Even if policymakers, practitioners, and parents did decide what their goals were and even if the research findings supported one of several configurations of hardware and software, deciding when, how, or if to use technology (or any other reform) in the classroom is not likely to be determined solely on these bases. Many other factors—ranging from parental pressure to superintendents wanting to leave their fingerprints on the district to technology corporations promoting their products—shape decisions to buy and allocate technologies to schools. Given these pressures, it is much more imperative that educators have a clear sense of their goals for technology and that researchers focus accordingly. What can be reasonably concluded from what is known (and not known) about computer use in classrooms should, at the minimum, be put on the table for policymakers, practitioners, and parents—along with other interested advocates and skeptics—to use in their deliberations. (The Role of Research, ¶ 1)

In the following chapter, *Issues of Implementation,* I outline some of the other issues and obstacles that ought to be included in deliberations about whether or not to incorporate ICT into educational settings. I will not go into great detail on some of them, but I hope that readers will go to and use the works cited in this section to help inform their decisions regarding ICT in education. After section two below, section three deals with two other aspects that I feel should also be present at discussions where integration of ICT into education are carried out: issues surrounding the digital divide, and cost.

CHAPTER 2: ISSUES OF IMPLEMENTATION

Equity and Cost

So far, I have covered some of the cultural and educational trends that I believe merit our attention and critical eye. The objective there was to highlight and consolidate some of the issues that are sometimes overlooked when administrators, practitioners or other concerned individuals consider the push for ICT in education and why it exists. My purpose here is to include what I believe to be the pertinent aspects of integration that are commonly considered. However, I do not intend to provide elaborate details but rather will include resources where such details can be explored. The two broad areas covered below are: 1) issues of equity as found in discussions about the digital divide, and 2) the cost of integrating ICT into classrooms, paying attention to maintenance and securing funding for such endeavors.

Equity: The Digital Divide

Another issue regularly brought up regarding ICT in education is the idea of the "digital divide"—the idea that students are not getting equal access to ICT. The data supports that the divide exists, and among those less likely to have access to the Internet are people with disabilities, Blacks, Native Americans and Hispanics, seniors, the poor and least educated, and those in rural areas (Wilhelm, 2001). Being literate in the age we live in is increasingly coming to include being able to effectively use the Internet. Insofar as there is a lack of ICT to create courses in schools such as 'Surfing the 'Net 101,' there is a distinct disadvantage for those without such access. As research tools, computers wired to the Internet are unsurpassed in quickly granting access to a wealth of information, though as a method of research they are not without problems, such as information overload, relative scarcity of academic rigor as found in peer reviewed journals, and the fact that the Internet is a hotbed of advertising.

Another premise behind the drive to close the digital divide is that schools without computers are worse if they do not have the same ICT resources as schools with them. However, others have argued that the real divide isn't a digital one, but a quality one (McAdoo, 2000) and that it is not an issue of equality of access but of quality of use. As mentioned before, effective teachers will be effective with or without computers. They may be more effective with them, but poor teaching may only be amplified, not improved by technology. Therefore, putting computers in every classroom and wiring them to the Internet in order to

afford equal educational opportunities to all students is not what will bridge the divide; rather, what will provide equal educational opportunity is effective use of technology in all classrooms. And, to date, the research is inconsistent as to how this ought to be done. With that in mind, this gap called the digital divide will not effectively be bridged until the gap in the research about effective use practices is bridged.

Cost: Expenses, Securing Finances, Start-up, and Maintenance

One thing is clear: implementing ICT costs quite a bit of money. Local school districts collectively spend roughly $4 billion nationally on new technology each year. This might not seem like much when compared to the over $300 billion spent on primary and secondary education each year, but given the general scarcity of resources, it represents a considerable sum. The expenses stem from many sources. Below I outline some of those sources, followed by general means of funding them.

There are various sources of expense for integrating ICT into education. Some are obvious, while others are not. Among those that are obvious are hardware, software, internet service providers and network development. These are items that can generally be bought with a lump sum distribution of funds. But once a school has these material technologies, it must also consider some often neglected costs: maintenance and support. Painter (2002) has outlined several purchasing pitfalls for computers. Among them, the first is to consider training and support. Computers crash. What do you do when this happens? If a teacher is trained, he or she can fix the problem himself or herself. But training costs time and money and depending on the depth of the training, substitute instructors may be necessary which are yet another added expense. If the computer problem is beyond the scope of a decently trained teacher (even with training, they are not technicians), then support will need to be acquired. Again, this also costs money. But beyond these more obvious costs are the costs of time lost. What is lost in education due to time spent working out these frequent and common problems?

> A consultant reviewing the computer support needs of the Fairfax County (Va.) Public Schools calculated that the district, which has 225 schools, was actually spending the equivalent of 330 full-time equivalent teaching positions, or $16.5 million a year, in the amount of teacher time devoted to computer support. (This calculation assumed that each teacher spent an hour a week trying to fix a problem that could have been avoided with better support or standardized equipment, and that 5 percent of teachers are "technical wizards" who have to spend an additional 1.5 hours a week helping peers who call on them for assistance. (Fitzgerald, 1999)

These common problems result in loss of teacher time and in some senses this translates into opportunities to teach giving way to the need to fix technical problems.

Besides the bugs that cripple systems, another factor that may end up crippling these ICT frameworks is obsolescence, especially when combined with the Internet. Moore's law is the almost axiomatic trend that microprocessor speeds double every 18 months. While some argue this may be slowing (Leyden, 1997), given the price schools pay to invest in ICT, if these investments become obsolete, what is to become of them and the institutions which rely on them? Education regularly does better than business in keeping costs down—or at least having lower costs. They buy cheaper PC's and software than businesses. They use computers for typically five years and not three (Fitzgerald, 1999). But one of the current trends is toward broadband access to the Internet. Right now, it is prohibitive for certain web hosts to offer some sorts of files due to their sheer size that makes downloading them via a standard dial-up modem too slow for the patience of many users. The broadband capability so far exceeds that of the dial-up modem that there is a rush to close this other gap in the digital divide now that broadband is becoming the norm (Dickard, 2002). As larger files are able to be transferred over the Internet, they will need a place to be stored and viewed. That requires faster CPU's and larger storage space. Again, an added cost.

Painter offers several other considerations as do many other writers[14] that should provide anyone with a basic framework from which to begin addressing these common issues to help identify costs. Beyond identifying the general sources of expense, we need to consider where to obtain funding for ICT, especially in light of the general scarcity of financial resources in education budgets. Funding comes in two ways: from external sources or by reallocating existing budgets.

The first option for financing ICT is to obtain additional external funding. This may come in several forms. "In the past, money for technology improvements has come largely from special external sources: grants, community donations, bond initiatives" (Dede, 1997). Whichever form this takes, it is never easy. Obtaining grants is competitive. Bond initiatives may or may not pass, and regardless, communities are reluctant to give up money to taxes for schools. Community donations pose other problems. While one-time donations may fund capital investment in ICT, it is only a shot-in-the-arm fix

[14] Boschmann, 1995; Chamberlain, 2000; and Fitzgerald, 1999 highlight some important considerations. Likewise, http://www.iste.org/resources/funding/index.html gives pointers on how to fund ICT in schools, giving methods and resources.

and does little in the long term. Sometimes the donations come in the form of technology or service itself. For example, the "Net Days" of the late nineties brought together thousands of volunteers "to help wire more than 30,000 schools in 40 states for Internet connections" (Benton.org, 2000).

Besides external funding from the public, external funding from private corporations such as telecommunications and computer companies can help alleviate cost. For example, IBM has allocated $25 million to help reinvent education. "Reinventing Education" is the name of the program through which IBM aims to improve teacher quality "through investments in teacher education and professional development" and by "building new on-line networks for teachers and faculty of all levels" (IBM.com, 2001). By getting in on the ground stage through donations to school districts, these companies are setting themselves up nicely to maintain and upgrade these systems they give, so while this is a good source of funding, we must carefully consider what we are doing when we accept their support. How long will they be able to continue this without charging for their services? Moreover, if schools rely on these sorts of programs and the company hits hard times and has to pull out (as was the case with the State University of New York when the donator of the funding for their online program pulled out and the course had to be cancelled (Mangan, 2002), where does that leave schools? Do they have a backup plan? We need to consider such questions when looking to external private sources. Some other external sources noted by Phipps & Wellman (2001), (though geared more toward higher education) are debt financing, vendor arrangements, leasing arrangements, revolving funds, user fees, E-commerce, or creation of for-profit subsidiaries. While these work for start-up costs, they are often not residual enough to provide for support, maintenance and upgrades.

A second way of securing money for ICT is through budget reallocation. Budget reallocation is a necessary step if the integration is going to be effective for the long haul. "To be sustainable over the long run . . . resources for technology must come from reallocating existing budgets by reducing other types of expenditures" (Dede, 1997). But what will be the nature of these reductions? According to Sava (1997), in 1996 "a California school killed its music program to hire a technology coordinator. Another freed up funds for computers by replacing its librarian with a part-timer. A district in Massachusetts dropped proposed teacher slots in art, music, and physical education to spend $300,000 on computers." Before proceeding to cut such programs and replace them with technology, districts must first seriously consider whether or not

the substitution really compensates for the cuts. Early on, I mentioned two purposes for education, both of which are important: information processing and social learning. By focusing on information processing models, where we are primarily concerned with what students do with content, we may lose our focus on those other elements that provide society with members who are not just knowledgeable, but socially responsible, emotionally and physically healthy, and who can interact with their communities in genuinely helpful ways.

I believe the above discussions to this point have addressed some important issues that ought to be considered due in large part to their prevalence in the discourse about technology in education. Below I discuss some of the less familiar ideas that exist that I argue need to be brought to the deliberation table as well, based on the effects that they have on students. The following section addresses new media literacy as both an analysis of content and an analysis of the medium.

CHAPTER 3: NEW MEDIA LITERACY

Analyzing Content and Communication Media

"New media," "infomedia," "digital media," "information technology" (IT), "information and communication technology" (ICT), and "computer mediated communication" (CMC), are each terms used to loosely describe contemporary media through which we experience our world. Other less novel media are still in use today such as television, radio, and books. All of them serve as mediators between us and ideas. I am choosing to use the term *new media* and *new media literacy* for a couple of reasons. The *new* in *new media* is useful because it emphasizes that something is different about present media from previous media. Also, *new* in *new media literacy* implies that the meaning of literacy is different from previous literacies. At the same time, while these meanings of literacy focus on the novelty of the medium and its corresponding literacy, and appeal to our penchant for the novel (a useful tool for pleading one's cause), they do, however, tend to neglect previous media and corresponding literacies such as writing, television, or radio that are still just as prevalent, if not more so than new media. However, my intention in using the terms *new media* and *new media literacy* is to include previous media as well as the newer computer mediated ones.

The objective of the remaining pages of this paper is to outline what ought to be considered in building a literacy program for students at all levels of education. While certain considerations would need to be made by instructors of such programs concerning the cognitive appropriateness of the concepts contained here, the following is meant to provide an overview of some of the very basic ideas that ought to be considered.

New Media Literacy Part I: Analysis of the Medium

Typically, media literacy programs focus on the messages conveyed through television, especially advertising. As outlined above, the notions of literacy should be expanded to include analysis of a variety of types of messages and not those found only in advertising on television. These are necessary given the amount of time we as a society spend in front of television and that roughly forty percent of network television is explicit advertising. But there are other messages that also need to be examined that are less explicit, and because of the implicit messages found in programming itself and the often taken for granted

reasons behind the inclusion of these messages, literacy programs ought to contain goals that address these issues. However, it is not enough to address the messages or texts only. We must consider the medium.

Research concerning the effects of the medium on us is somewhat unclear. I realize that saying "the effects of the medium on us" carries with it deterministic tendencies about technology. Such deterministic tendencies typically fail to acknowledge the role that we have in the creation of technologies. In contrast, the non-deterministic view is often referred to as the social construction of technology. These two ends of the technology continuum—determinism on one end, and constructionism on the other—make a problematic assumption. Both positions consider technology to be autonomous—merely a material artifact. For the determinist, the artifact shapes us. For the constructionist, we shape the artifact. As McOmber (1999) puts it, for the determinist "technology's autonomy from culture can suggest the obligation to cooperate with new technological developments" and for constructionists, "technology's independence from culture may suggest that technology is out of control" (p. 138).

In both cases, there are three assumptions we make about technology (Jackson, 1996). The first assumption is that the context and the technology are separable. The second is that there is a readily definable moment of introduction of the technology. The third is that the technology is wholly represented in the material artifact. These three assumptions grant autonomy to technology that is perhaps less clear than popular discourse suggests. I contend that the line between technology and us is a lot more blurry that we might think. Though considered a determinist by some critics, Marshall McLuhan did seem to understand that the boundaries between us and technology are not clear and perhaps even non-existent. When he said that media were extensions of us, I think that he realized that technology is not autonomous. Bicycles, cars and other transportation technologies are extensions of our feet. Writing is an extension of our memory, (which Plato contended would render our memories ineffective). Clothes are extensions of our skin. As Postman (1993) puts it, "technologies alter the structure of our interests: the things we think *about*. They alter the character of our symbols: the things we think *with*. And they alter the nature of community: the arena in which thoughts develop" (p. 20). A new media literacy program ought to consider the connections between technology and the users of the technology. How these connections are made, what the nature of the connections are, and the implications of those connections need to be investigated. Some authors have begun to address issues such as the relationship between the technological medium and

democratic practices, the propensity of a medium to encourage/discourage interiority (reflection) and the effects of a medium on attention. Such authors have also examined how a medium influences the constitution of rationality, responsibility, community, identity, and reality.

Democracy

Concerning democracy and the medium, Sclove (1992) notes that some technologies are more prone toward democratic practices than others, and that they can "exert an ideological force" on users that prevents them from considering alternative choices. He constructed eleven criteria that ought to be considered to ensure more democratic design of technologies. It was noted earlier that media literacy ought to include social participation in the design of ICT. Sclove's criteria may prove helpful in regarding the medium itself. Using such criteria to analyze the research and development processes of ICTs such as Microsoft products is one example of where these criteria may be utilized to increase media literacy among students.

Interiority

Regarding interiority, or reflection, there are differences in how we think based on what we use *to* think (Postman, 1993). For example, writing on a computer is different from writing on paper with a pen or pencil. With a computer, those instances when ideas are flowing too fast to record are aided because typing can be faster than writing by hand. However, writing by hand, because it requires more work encourages us not to waste that work so it further encourages us to reflect more before we write, looking more thoroughly for clearer words to articulate our thoughts (Stoll, 2000). If we are going to use computers for writing in education, it is important that we are aware of the advantages and disadvantages so we can make informed choices about our pedagogical approach.

Attention

It has been speculated by some psychologists (Healy, 1990; DeGrandpre, 1999; and Hallowell & Ratey, 1994) that communication media affect childhood mental, social and physiological development, resulting in what Hallowell & Ratey call pseudo-ADHD. This may have benefits, such as the ability to multi-task, and it may have detriments, such as difficulty in concentration on linear subjects, but such areas should be considered in research and in developing a literacy program. Furthermore, if children's minds are

wired in the manner that Healy (1990) posits[15], then it is important that we understand *how* this wiring takes place, and what implications it has.

Rationality

Postman (1985) contends that "every epistemology is the epistemology of a stage of media development" and argues that certain communication media are more acceptable as truth-tellers. What is rational and what is not is determined by an overall epistemology and media have epistemic consequences. As an example, he notes that in academia, the written word is given more weight than the spoken. It is likely assumed that a source quoted in this paper from a written reference is more accurate than a spoken one (for example personal experience). The communication medium, to some degree influences what counts as knowledge. In a literacy program, this issue could be explored by analyzing *why* certain sources are considered more believable than others, or by comparing the believability of the same information conveyed through different media.

Responsibility

I said earlier that media are extensions of us. If valid, it follows that one possible nuance of such an extension is that it distances us from the other with whom we communicate. In the case of responsibility, the farther we perceive we are from something, the less likely we are to feel responsible. For example, Sproull and Kiesler (1986) determined that "people behaved irresponsibly more often on e- mail than they did in face-to-face conversations" (p. 1509). Technologies, insofar as they are extensions of us, alter our perceptions of responsibility. What then might be the implications of using computers to teach? First, teachers may be less responsible for student learning. This may be good in that learning may be more student directed as is the case with distance learning courses, or it may be bad in that teachers may feel that they do not need to pursue students and encourage them.

Community

Sclove (1992) noted an instance of how the advent of indoor plumbing resulted in unintended alteration in the community of a village because the need to fetch water was eliminated along with the social interactions that fetching water and doing laundry provided. While the advantages of indoor

[15] Healy argues that students not be exposed to computers until after the age of 7 because the mind is still developing. This could affect our decisions about appropriate educational use of ICT.

plumbing perhaps results in greater cleanliness, less muscle and back pain from hauling water, and more time to do other things, the disadvantages were that the nature of community was altered and this affected the culture. Such effects could be translated to new ICT as well and media literacy should address the question of what is affected by the adoption of new technologies insofar as the issues about "community" are concerned. There has been widespread debate about whether online communities are indeed genuine communities. New technology affects community by rearranging how space and time are perceived and given that communities are constituted within space and time, we need to understand these new forms of community. An effective media literacy program that pays attention to the medium can address this.

Identity

Our identities are partly drawn from our interactions with the communities we belong to. The internet can enable the continuance of certain aspects of our identities by providing connections to people in far off places (Rheingold, 1993). I have a good friend who moved to Florida. We used to play guitar together and I gleaned much of my identity from those interactions. Now that he has moved, those interactions stopped *except* that we continue them through the Internet. That aspect of my identity is maintained because of the connection provided by the internet. On the other hand, using the Internet to build community and identity may be detrimental to geographically local communities by distracting me from participating in them. I may be less apt to vote, or get to know my neighbor, or participate in local projects. Media literacy should consider how media affect *how* we construct our identities differently than perhaps we did prior to the use of those media.

Reality

When "The War of the Worlds" was broadcast on the radio, people became hysterical. They believed that we were indeed being attacked by aliens—that a space invasion was real. Different media constitute reality in different ways (Valovic, 2000). While media may convey reality (as it did when our televisions were all tuned to the news after the terrorist attacks on the World Trade Center), not all that is conveyed via media is reality (as in the case of the War of the Worlds, or with typical tabloid photography alterations). I had a student give a speech on how digital photography could be used to more easily deceive viewers. She used a computer program to alter some pictures she had taken. She informed us that it only took her about twenty minutes to perform the alterations and the results were impressive. Another example

is the recently circulated video showing Osama Bin Laden, which is suspect of superimposition. Since our notions of reality are affected by different media, students should become familiar with how these effects occur.

Though it is unclear how our interactions with technology affect us, it is important that we begin to carry out research and educate ourselves if our world is indeed becoming more digital, and more reliant on ICT.

New Media Literacy Part II: Analyzing Content

At this point, I would like to address the question: "What do we mean by *literacy* in new media literacy?" According to one simple definition, it is "the ability to interpret and create personal meaning from the hundreds, even thousands of verbal and visual symbols we take in everyday through television, radio, computers, newspapers and magazines, and of course advertising" (Thoman, 2002, "What is media..." ¶1). What is useful about this definition is that is includes *creating* as a component of literacy. It also emphasizes that it is primarily a skill, and not merely a finite body of knowledge. But the ideas of "interpreting" and "creating" need further explanation. Another definition expands these to include the ability to "access, analyze, evaluate and communicate information in a variety of forms including print and non-print messages" (Alliance for a Media Literate America, 2002, "A broader..." ¶1). Abdullah (2000) defines it as "the ability to critically understand, question, and evaluate how media work and produce meaning, how they are organized, how they mediate and construct reality, and how they impact our lives." One last, rather thorough definition is provided by Lee (1999):

> It is suggested that infomedia literacy as a life skill in the new information age has several components: (1) an understanding of the nature and functions of infomedia and critical awareness of their impact on individuals and society; (2) the skill of critical analysis of information transmitted through infomedia technology; (3) the skill of efficient search and selection of information; (4) knowledge to use infomedia technology for self-expression; (5) aesthetic appreciation; and (6) social participation by influencing the development of infomedia technology. (p. 134)

All of these definitions have merit. I would like to synthesize them around Bloom's three educational objectives: cognitive, affective, and behavioral. Thus, students should be able to:

1. Understand the history of the medium, including:
    a. Context of the environment, time period, social actors, etc.

b. Dominant modes of communication (the medium—print, television, radio, etc.)

c. Basic component of the medium (word, sound, moving image, data, etc.)

d. Message pattern (linear, mosaic, etc.)

e. Content of literacy (reading and writing, viewing, programming, etc.)

f. Methods of literacy training (language courses, computer studies, etc.)

g. Whether literacy is emphasized as functional or critical

2. Understand the nature and functions of media including how they mediate and construct reality (virtual or otherwise) and how we mediate and construct reality with them (noting arguments about determinism and social construction of technology)
3. Critically analyze verbal, visual and audio information transmitted through media technology.
4. Efficiently and effectively search and select information.
5. Express one's ideas using various media technologies.
6. Influence the development of ICT through social participation
7. Understand censorship, plagiarism and copyright as it pertains to these media
8. Appreciate the aesthetic qualities of the medium

This is a simple list, and there are substantial resources[16] available to develop curriculum for more specific courses.

[16] (a) *Alliance for a Media Literate America (AMLA) website*: http://www.amlainfo.org/medialit_res.html; *(b) Center for Media Literacy:* http://www.medialit.org; (c)*Renee Hobbs:* http://www.renehobbs.org; (d) National Telemedia Council website: http://nationaltelemediacouncil.org; (e) *University of South Carolina Media Literacy Clearinghouse* :http://www.med.sc.edu/medialit

CHAPTER 4: SEMINAR OUTLINES

In the following sessions, practitioners and administrators will become familiar with three different yet interconnected areas of infomedia literacy that influence educational processes. The overall workshop is divided into three sessions. The first addresses the push for ICT in education, speaking to the benefits, the detriments and those areas that we are unsure of. This session will also address some issues that those people who are looking to implement a new media literacy program should consider. The second session addresses the content aspect of the new media, focusing on analysis of the material carried *through* various media. The third and final session addresses the context aspect of new media literacy, focusing on the analysis of the media themselves.

The instructional methods for these sections will vary, but they will focus on methods congruent with what is effective for adult learners. The kinds of methods used in the sessions are reflection, discussion, and lecture. There are several reasons for this, the first of which is that the variety of instructional strategies allows for different learning styles. Some people learn better through interaction, while others prefer a more solitary approach (Cross, 1976). Second, the first two strategies (reflection and discussion) give a little more control to the participants over the learning experience, something that adult learners highly value (Cross, 1981). Thirdly, the lecture is used in order to convey general ideas in a shorter amount of time than what deeper understating requires. These lectures aim to inform participants of issues and concepts they should be aware of and areas that they can investigate further after the workshop is completed. These areas do not require great depth of understanding initially, though the lecture format will allow them to ask for clarification of certain ideas hitherto unfamiliar to them.

Session 1: An Overview and Introduction

Rationale and Objectives

There is a clear push to integrate ICT into educational settings. Given this push, there is a need to equip students with the knowledge and skills to critically interact with these new media. This first session addresses the nature of this push for ICT, and then addresses several key issues that need to be considered in the initial stages of developing a new media literacy program. The objectives of this session are:

- Participants will become more familiar with the nature of the push for ICT in education.
- Participants will debate issues that concern initial considerations for building a new media literacy program.
- Following the sessions, participants will be able to complete the post-session assessment more thoroughly than the pre-session assessments.

[Participants will complete the pre-session assessment found in appendix A at the beginning of this session. The following is delivered as a mini-lecture.]

Part A—The Push: The Good, The Bad and The Ambivalent

The nature of the push—trends and forces.

Rhetorical devices:

- Techno-optimism serves as a backdrop of values that reinforce the push.
- The metaphor of "information age" serves as justification for the push.
- The metaphor of "information revolution" serves as justification for the push.
- The notion of "interactivity" serves as justification for the push.

Voices:

- Presidential administrations influence the push for ICT in education.
  - Clinton and Gore: "A computer in every classroom" + the four following goals
    - "All teachers in the nation will have the training and support they need to help students learn using computers and the information superhighway."
    - "All teachers and students will have modern multimedia computers in their classrooms"

- "Every classroom will be connected to the information superhighway"
- "Effective software and online learning resources will be an integral part of every school's curriculum." (From: Getting America's Students Ready for the 21st Century: Meeting the technology literacy challenge. A report to the nation on technology and education, June 29, 1996.)

- The Bush administration, while calling for caution [U.S. Secretary of Education Rod Paige stated that it is "not enough now to have computers and Internet connections in schools, it's time for the next step...It's pointless to integrate them if they don't add value to the curriculum"], still advocates increasing funding for technology in schools.

- Industry/business sector nearly pleading to have schools provide training so that the void of technicians can begin to be filled.
- For the ICT manufacturers, this is a new market with potential for profit.
- The Education community is willing also.

[At this point in the workshop, feedback will be solicited from the participants regarding the answers they put down from the pre-assessment. They may likely mention the ideas below, but when they do not, the discussions will be complimented with information from below.]

<u>The good: There are advantages to ICT in classrooms.</u>

- Microphones save teachers voices and aid student listening. Elementary teachers as well as college professors use these.
- ICT for presentations (projection technologies such as overheads, and LCD projectors) can save time (writing on a whiteboard) and promote attention, as well as keep the front (instead of the back) of the teacher facing students.
- ICT such as video and audio can help promote attention and interest and students learn more when they are interested.
- Opportunities to use this kind of ICT can aid in workplace skills.

The bad: There are disadvantages as well.

- Cost is the most obvious.
  - $4-6 Billion a year spent on ICT by schools nationally
  - It is estimated that by 2005 (3 short years away), higher education institutions will be spending $5 billion per year on ICT.
  - Training teachers how to use it well costs money.
  - Connecting to the 'Net costs money.
  - Tech support costs money.
  - Upgrading after obsolescence costs money
  - There is a cost in time loss, as per the Fitzgerald (1999) article in which it is noted that teachers lose time teaching by dealing with computer issues and that this translates into lost money.
- If is costs money, where does the money come from?
  - Raising money
    - Bonds and levies—but people are reluctant to vote for more taxes
    - In higher education—raising tuition
  - Budget reallocation
    - But what then is getting cut? Music, Art, PE
    - PE at a time when we hear in the news all the time about how the Surgeon General or an association of doctors has alerted us to problems of child obesity.

The ambivalent: Areas where we just aren't sure yet.

- One such area is that one way that cost is often offset is through corporate philanthropy.
  - IBM: Reinventing Education.
  - Apple has always been big in Education charity.
  - Free drugs on the playground analogy: Once you're dependent, they need to be consistent or you are in trouble.
  - Motivation of ICT corporations and trust

- 3 day retreats, dinner cruises and hiring former superintendents to sell ICT to other district superintendents
- It is not that we cannot trust these corporations; however, before trusting them, we should ask appropriate questions and think about the issues.

- Another area that needs further attention is the research on whether or not ICT in education improves learning.
  - Much research says that it does.
    - Higher test scores
    - Learning more in less time
    - Higher level reasoning
    - Students like learning more
  - But others have noted that much of the research often used to support the integration of ICT in Ed is flawed:
    - ICT development outpaces research of ICT in education.
    - Small sample sizes
    - No control groups
    - Lack of accounting for alternative causes of improvement: For example, is it because I am using technology or because I am being more interactive with students?

- There are also questions about the effects of computers on us. [A focus on the following will be downplayed, as these questions are covered in more detail in Session 3.]
  - Child development: linear vs. mosaic reasoning; social development in early years.
  - Ergonomic questions
  - Sensory addiction/time spent at computers vs. time doing other things
  - The contribution of ICT to edutainment

[Participants will then be asked if there are any other areas that they would include—that perhaps they wrote down in answering the questions they were given in the pre-session assessment.]

Part B—Considerations for initiation

[Hobbs' (1998) "Seven Debates..." (but with a *New* Media Literacy focus) will be used as questions for discussion. Participants will get into groups of three or four to discuss the following questions.]

- Should new media literacy education aim to protect people from negative media influences?
- Should creation (production) be an essential feature of new media literacy?
- Should new media literacy focus on popular culture texts?
- Should new media literacy have a more explicit political and/or ideological agenda?
- Should new media literacy be focused on school-based K-12 education?
- Should new media literacy be taught as a specialist subject or integrated within the context of existing subjects?
- Should new media literacy initiatives be supported financially by media organizations (Ex: IBM, Microsoft, ATT, etc.)?

Session 2: Building A Literacy Program Part 2—A Look At The Medium

Rationale and Objectives

Most literacy programs focus on the content delivered *through* various media. As noted earlier, new media literacy is a *new* sort of literacy. I contend that there ought to be a focus on the media themselves in addition to analyzing various texts. There is a lot that we do not presently know about media themselves. We do however have some ideas that need further exploration and in spite of what we do not know, there are some steps we should consider taking to be proactive in regards to what research and other writers seem to be saying. The objectives for this session are as follows:

- Based on given readings and ensuing discussions, attendees will become more familiar with the notion of new media literacy as it pertains to the medium itself.
- Specifically, through reflection, discussions with their peers and some lecture, attendees will explore:
  - Issues of human health and computers
  - Notions of how "technologies alter the structure of our interests: the things we think *about*. They alter the character of our symbols: the things we think *with*. And they alter the nature of community: the arena in which thoughts develop" (Postman, 1993, p. 20)
- Following the sessions, participants will be able to complete the post-session assessment more thoroughly than in the pre-session assessments.

[Attendees fill out pre-session assessment (see Appendix B). This will accomplish three things. The first is to give a sort of baseline for their present understanding of some basic issues, which is useful in determining what sorts of areas to emphasize during future workshops. The second is that the results are helpful when compared to a post-session assessment to determine the efficacy of the workshop session. The third thing the pre-session assessment will do is to get them thinking more deeply about some of the issues that will be coming later in the session.]

Reflection

Attendees will each be given a copy of chapters 4-6 (90 pages) of Jane Healy's book *Failure to Connect* (1998), chapters 1 (20 pgs.), 7 and 8 (36 pgs.) from Neil Postman's *Technopoly* (1993) and from

Postman's (1985) *Amusing Ourselves to Death*, chapters 1 & 2 (29 pgs.). As they read through these selected readings, they will be given the following directions:

- In the readings, mark, underline, or highlight ideas you find noteworthy in the texts. Also take brief notes, focusing on the following: [A separate sheet will be prepared for each point below with the point printed at the top and the rest of the page blank. This way the participants can "file" their thoughts onto the appropriate page. This will make for more organized discussion later and a more organized way of performing the task for the participants.]
  - Ideas that echo with you—that you find particular agreement with.
  - Ideas you disagree with.
  - Ideas that you are particularly curious about.
  - Any questions you have regarding certain ideas.
  - Anything else you find worth mentioning that does not fit well into the above categories.
  - Be prepared to share some of your thoughts with your small group and with the larger group later on.

Discussion

[Readings will be dealt with one author at a time, beginning with Healy's articles. As groups of 3 or 4, participants will take turns sharing their comments on the texts by stating his or her comment and giving a rationale for it. Before opening up the discussion, each member will air her or his comment and rationale, following the order below.]

1. The ideas that the participants were in particular agreement with the author.
   a. Each participant will give his or her comment and rationale.
   b. After everyone in the group has shared his or her comment and rationale, the group can open up the discussion, addressing one another's comments and the broader category (in this case—"ideas that participants were in particular agreement with").
2. Ideas that participants disagreed with. [This (and the following steps) will follow (a) and (b) from above.]
3. Ideas that participants were particularly curious about.

4. Any questions participants had regarding certain ideas.
5. Anything else participants thought was worth mentioning.

Lecture

Part I:

In order to gain a better understanding of what concerns the attendees have, the facilitator will proceed question by question as above, soliciting each group's feedback for one question before proceeding to the next question. When completed, the facilitator will summarize their comments (verbally and perhaps written), summarize this part of the session, and thank them for their participation in the group activity.

Part II:

Here are some examples of the sorts of potential content of a new media literacy curriculum that have been somewhat explored and warrant our further attention.

The effects of media on:

I. Interiority (reflection)
   A. EX: Electronic writing vs. writing with paper and how writing with paper, while slower, allows for reflection and deliberation rather than reaction.
   B. This has benefits and detriments. We need to think about what they are so that we can maximize what we want while minimizing what we don't.

II. Attention
   A. It has been speculated by some psychologists (Healy, 1990; DeGrandpre, 1999; & Hallowell and Ratey, 1994) that changes in communication media affect childhood development, resulting in what Hallowell and Ratey call pseudo-ADHD, and an altogether different way of thinking for people.
   B. Again, this may have benefits (such as an ability to multi-task) or detriments (an inability to concentrate), but we need to actively pursue answers to these questions.

III. Rationality

A. As noted in the readings by Postman, and in some of Healy's work, truth may be validated by the medium.

B. This is exemplified in Postman's argument that spoken words don't carry the same weight at written words, even if they are the same words from the same person.

IV. Democracy

A. If technologies are social structures (and not merely tools), and democracy is participation in effectively guiding social structures, then it follows that we should be involved in the design of these structures.

B. This is often not the case however, as is evidenced in the pervasive presence of Microsoft products to be used for computing. There are other choices (Linux and Unix for example), but they are effectively negated.

V. Responsibility

A. Marshall McLuhan (1964) argued that technologies are extensions of us.

1. Car for foot; clothes for skin; knives for teeth
2. We are, for example, apt to feel less guilt (responsibility) for using a gun to kill someone that if we were to use our bare hands.

B. What do new media do to our notions of responsibility?

1. For example, when computers are used to teach, will teachers become less responsible for student learning?
2. What are the implications of such a shift? Which are desirable? Which are not?

VI. Community

A. Sclove (1992) recalls how the advent of indoor plumbing resulted in unintended alterations in the community of a village because the need to fetch water was eliminated as well as the social interactions that fetching water and doing laundry provided.

B. Healy points out that automobiles did a similar thing in the U.S. in that while they are a benefit in the sense that we can visit family far away, the family probably wouldn't be as far away if there were no automobiles.

VII. Identity

A. There are debates about whether online communities (communities here are one of those places that we draw our identities from) are really communities.

B. In some ways they promote community in some senses, while demoting it in others.

1. Extending some forms of community such as synchronous chat with friends in other geographic locations, providing a means of maintaining friendships that might otherwise deteriorate.

2. Local habitations may be neglected for cyber habitations.

C. This has implications for democracy and community, but identity as well in that our identities are shaped by our participation (democratic and otherwise) in various communities.

VIII. Reality

A. During the "War of the Worlds" radio broadcast, people thought that what they were hearing was real.

B. What sorts of things do we encounter on new media that we think are real, even when they are not? What sorts of things do we think are not real when they are?

[The sessions will be briefly summarized and participants will complete the post-session assessment (Appendix C).]

Session 3: Building A Literacy Program Part 3—Analyzing Content

Rationale and Objectives

The following areas are important for critical thinking skills because students approach ICT as the gateway to information, relationships, and a considerable portion of their experiences. While there is a lot of information available on the Internet, it is often riddled with problems and biases that may go undetected if not critically examined. In this session, we will examine the fundamental components of a new media literacy program, focusing on asking questions about the content of a medium. Furthermore, this session affords practitioners the opportunity to begin exploring available resources that address new media literacy issues. The objectives for this session are:

- To give attendees some of the principles that should be considered when developing a literacy program that focuses on the content of the message.
- Participants will gain knowledge about the variety of resources available to them for helping students critically analyze various media messages.

[The following will be taught via mini-lecture using basic principles from Thoman's (2002) work.]

The following form a very basic background for a new media literacy program as it pertains to content, including basic questions to ask about messages, and a fundamental process for students to work through these issues. Participants will be given an opportunity to go through this process, using these questions. After this first activity, we will perform a second activity in which participants may familiarize themselves with the resources available to them regarding media literacy.

Concepts for critical thinking:

- What techniques are being used to attract my attention?
- What lifestyles, values and points of view are represented in the message?
- How might different people understand this message differently from me?
- What is omitted from this message?
- Who created this message and why are they sending it?

The literacy process: Action Learning (Thoman, 2002)

Action Learning, based on the work of the late Brazilian educator Paolo Freire, can be summarized as a four-step "empowerment" process: Awareness, Analysis, Reflection and Action.

- In the Awareness step, the group participates in some activity (like counting the number of violent incidents in a children's cartoon, that leads to the insight: "Oh! I never thought of that before."
- The next step, Analysis, provides time for the group to figure out "how" an issue came to be.
  - Core questioning and close analysis are two techniques used in this step to better understand the complexity of the selected media topic.
  - Production experiences could also help the group understand "how" and "what" happens in the exchange between media producers and their audiences.
- In the Reflection step, the group looks deeper to ask "So what?" or "What ought we to do?" about the identified media issue.
- Finally the Action step gives participants an opportunity to formulate constructive action ideas actions that will lead to personal changes in their own media choices and viewing habits as well as working for change locally, nationally or globally.

[The above section helps to emphasize *creation* in the literacy process and promotes student action. Next, participants will have an opportunity to practice these skills.]

Activity 1:

[Using an example from a given web page, participants will go through the above process as outlined below.]

- Awareness/Analysis—describe what you see/hear.
  - What techniques are being used to attract my attention?
  - What lifestyles, values and points of view are represented in the message?
  - How might different people understand this message differently from me?
  - What is omitted from this message?
  - Who created this message and why are they sending it?
- Reflection—So what?

- Action (For the sake of time and resources, simply discuss possibilities here that could be carried out.)

Activity 2:

[Participants will get online (this will require a computer lab) and explore the Internet resources listed below in order to become more familiar with what is available to them.]

Resources and examples.

- Alliance for a Media Literate America (AMLA) website

  http://www.amlainfo.org/medialit_res.html

- Center for Media Literacy

  http://www.medialit.org

- Renee Hobbs

  http://www.renehobbs.org

- National Telemedia Council website

  http://nationaltelemediacouncil.org

- University of South Carolina Media Literacy Clearinghouse

  http://www.med.sc.edu/medialit

Further reading.

- Lee, A.Y.L. (1999). Infomedia literacy: An educational basic for young people in the new information age. *Information, Communication and Society, 2,* (2), 134-155.
- Thoman, E. (2002). *Skills and strategies for media education.* Retrieved January 16, 2002 from http://www.medialit.org/readingroom/keyarticles/skillsandstrat.html

References

Abdullah, M.E. (2000). Media literacy. *ERIC Digest D152* (rep. No. EDO-CS-00-03; Eric Document Reproduction Service no. 442 147). Abstract available: http://www.edrs.com/webstore/detail.cfm?ednumber=ED442147

Alliance for a Media Literate America (2002). What is media literacy? Retrieved March 7, 2002 from http://www.nmec.org/medialit.html

Andersen, J., Nussbaum, J., Pecchioni, L. & Grant, J. (1999). Interaction skills in instructional settings. In Daily, J., Friedrich, G, & Vangelisti, A. (Eds.) *Teaching communication: Theory, research and methods* (pp. 267-278). Hillsdale, NJ: Erlbaum.

Armes, N.R. & Archer, P.F. (1980). *Building success in the classroom.* New York: Media Systems Corporation.

Arnone, M. (2001, November 23). Too close for comfort? Some experts fear that ties between Microsoft and Backboard could diminish colleges' choices. *Chronicle of Higher Education, 13.* Retrieved November 20, 2001 from http://chronicle.com/free/v=48/i13/13a02701.htm

Bailey, J. (Ed.) (1989). *The TA at U of D* (5th. ed.) Dover, DE: Center for Teaching Effectiveness.

Ball, M. (2001). Online high school may open in '02. *Washington Post.* Retrieved March 6, 2002 from http://www.washingtonpost.com/ac2/wp-dyn/A46106-2001Sep5?language=printer

Banks, S. & Renwick, L. (1997, June 8). Technology remains promise, not a panacea. *Los Angeles Times,* p. A1.

Bassett, R.E. & Smythe, M.J. (1979). *Communication and instruction.* New York: Harper & Row.

Benton.org (2000). What's going on. The learning connection: Schools in the information age. Retrieved on December 8, 2001 from http://www.benton.org/Library/Schools/

Bloom, B. (1956). *Taxonomy of educational objectives: The classification of educational goals.* New York: David McKay Co., Inc.

Bloom, G. S. (1996, April). Caveat emptor buyer beware (Technohype). *Thrust for Educational Leadership (magazine of the Association of California School Administrators).*

Boschmann, E. (Ed.) (1995). *The electronic classroom: A handbook for education in the electronic environment.* Medford, NJ: Learned Information, Inc.

Bowers, C.A. (1998). The paradox of technology: What's gained and lost? In (2000) *Thought and Action: The NEA Higher Education Journal, 16,* (2), 111-120.

Brown, J. S. & Duguid, P. (2000). *The social life of information.* Boston: Harvard Business School Press.

Bushweller, K. (2001). The new networkers: The path to hot IT jobs begins in high school. *Electronic School: The School Technology Authority, 188,* (1) pp. 16-19.

Calvert, S. (1999). *Children's journeys through the information age.* Boston: McGraw-Hill.

Card, K.A. & Horton, L. (2000). Providing access to graduate education using computer-mediated communication. *International journal of Instructional Media, 27,* (3), p. 235.

Chamberlain, S. (2000). A tech coordinators road map for the information superhighway. In. D.T. Gordon (Ed.) *The Digital Classroom: How technology is changing the way we teach and learn.* Cambridge, MA: Harvard Education Letter

Cradler, J. (2002). Summary of current research and evaluation findings on technology in education. Retrieved February 25, 2002 from http://www.wested.org/techpolicy/refind.html

Cross, K.P. (1981). *Adults as learners.* San Francisco: Jossey-Bass.

Cross, K.P. (1976). *Accent on learning: Improving instruction and reshaping the curriculum.* San Francisco: Jossey-Bass.

Cuban, L. (1996). Techno-Reformers and classroom teachers. *Education Week on the Web.* Retrieved October 22, 2001 from http://www.edweek.org/ew/vol-16/06cuban.h16

Darling, A.L. (1990). Instructional models. In Daily, J., Friedrich, G, & Vangelisti, A. (Eds.) *Teaching communication: Theory, research and methods* (pp. 267-278). Hillsdale, NJ: Erlbaum.

Dede, C. (1997). Rethinking how to invest in technology. In (2000) *The Jossey-Bass Reader on Technology and Learning.* San Francisco: Jossey-Bass, Inc.

DeGrandpre, R. (1999). *Ritalin nation: Rapid fire culture and the transformation of human consciousness.* New York: W.W. Norton & Company.

DePalma, P. (1999). http://www.when_is_enough_enough.com: Putting microcomputers in their place. *American Scholar, 68,* (1), 61-69.

Dickard, N. (2002). Federal retrenchment on the digital divide: Potential national impact. *Benton Foundation.* Retrieved May 23, 2002 from http://www.benton.org/policybriefs/brief01.html.

Dyson, E. (1997). *Release 2.0: A design for living in the digital age.* New York: Broadway Books.

Dyson, E., Gilder, G. Keyworth, G. & Toffler, A. (1994). Cyberspace and the American dream: A magna carta for the knowledge age. Retrieved February 25, 2002 from http://www.pff.org/position.html

Fitzgerald, S. (1999, September). Technology's real costs. *Electronic-school.* Retrieved October 22, 2001 from http://www.electronic-school.com/199909/0999sbot.html

Forrester, T. (ed.) (1989). *Computers in the human context.* Cambridge, MA: MIT Press.

Freire, P. (1993). *Pedagogy of the oppressed.* New York: Continuum Books.

Hallowell, E.M. & Ratey, J.J. (1994). *Driven to distraction: Recognizing and coping with attention deficit disorder from childhood through adulthood.* New York: Simon and Schuster.

Healy, J. M. (1990). *Endangered minds: Why our children don't think.* New York: Simon and Schuster.

Healy, J. M. (1998). *Failure to connect: How computers affect our children's minds—for better and worse.* New York: Simon and Schuster.

Helm, L. (1997, June 9). High tech sales goals fuel reach into schools business: Firms increasingly push computers as educational reform. Critics fear another failed reform. *Los Angeles Times,* p. A1. Retrieved October 22, 2001 from http://www.realworld.org/archives/timesarticle2.html

Hobart, M.E. & Schiffman, Z.S. (1998). *Information ages: Literacy, numeracy, and the computer revolution.* Baltimore, MD: Johns Hopkins University Press.

Hobbs, R. (1998). The seven great debates in the media literacy movement. *Journal of Communication, 48*(2), 9-29.

HPCNET (1999). Web based education commission issues urgent call-to-action to harness Internet's power for learning. Retrieved, March 12, 2002 from http://www.hpcnet.org/cgi-bin/global/a_bus_card_cgi?SiteID=203877

Hurt, H.T., Scott, M.D., & McCroskey, J.C. (1978). *Communication in the classroom.* Reading, MA: Addison-Wesley.

IBM.com (2001). *Reinventing education: $25M expansion of reinventing education.* Retrieved November 17, 2001 from http://www.ibm.com/ibm/ibmgives/grant/education/programs/reinventing/invest.shtml

IBM.com (2001b). *Reinventing education: IBM and education: A perfect match.* Retrieved December 11, 2001 from http://www.ibm.com/ibm/ibmgives/grant/education/programs/reinventing/kanter.shtml

Institute for Higher Education Policy, (1999, April). *What's the difference? A review of contemporary research on the effectiveness of distance learning on higher education.* Retrieved January 20, 2002 from http://www.ihep.com/Publications.php?parm=Pubs/PubLookup.php

Jackson, M. (1996). The meaning of "communication technology": The technology-context scheme. *Communication Yearbook, 19,* (229-267).

Johnson, C. (2001, September 3). Book review: Information Age will be replaced by bio-economy. *Seattle Times.* Retrieved February 25, 2002 from http://archives.seattletimes.nwsource.com/cgi-bin/texis.cgi/web/vortex/display?slug=bizbook03&date=20010903&query=%22information+age%22

King, F.B., Young, M.F., Drivere-Rishmond, K., & Schrader, P.G. (2001). Defining distance learning and distance education. *Educational Technology Review, 9, (1).* Retrieved January 13, 2002 from http://www.aace.org/pubs/etr/king2.cfm

Kirkpatrick, H. & Cuban, L. (1998). Computers make kids smarter—right? *Technos Quarterly: For Education and Technology, 7.* Retrieved October 22, 2001 from http://www.technos.net/journal/volume7/2cuban.htm

Kleiman, G. M. (2000). Myths and realities about technology in K-12 schools. In Gordon, D.T. (Ed.) *The digital classroom: How technology is changing the way we teach and learn.* Cambridge, MA: Harvard Education Letter.

Klopf, D.W. & Cambra, R.E. (1983). *Speaking skills for prospective teachers.* Englewood, CO: Morton Publishing.

Krebs, B. (2002). Dept. of Education to gage tech role in the classroom. *Washington Post.* Retrieved March 11, 2002 from http://www.washtech.com/news/regulation/14900-1.html

Lee, A.Y.L. (1999). Infomedia literacy: An educational basic for young people in the new information age. *Information, Communication and Society, 2,* (2), 134-155.

Leyden, P. (1997, May 5). Moore's law repealed: Sort of. *Wired Magazine.* Retrieved March 3, 2002 from http://www.wired.com/wired/archive//5.05/ff_moore.2.html?person=gordon_moore&topic_set=wiredpeople

Licklider, J. C. R. Computers and government, in Dertouzos and Moses (eds.), *The Computer Age,* (1980). Cambridge, MA: MIT Press.

Mangan, K. (2002, February 20). SUNY-Buffalo drops online M.B.A. program. *The Chronicle of Higher Education.* Retrieved February 20, 2002 from http://chronicle.com

Massachusetts Institute of Technology (1995). MIt launches new distance learning program for engineering leaders. *MIT News.* November 30. Retrieved March 11, 2002 from http://web.mit.edu/newsoffice/nr/1995/41240.html

McAdoo, M. (2000). The real digital divide: Quality, not quantity. In. D.T. Gordon (Ed.) *The Digital Classroom: How technology is changing the way we teach and learn.* Cambridge, MA: Harvard Education Letter.

McLuhan, M. & McLuhan, E. (1988). *Laws of Media: The New Science.* Toronto: University of Toronto Press.

McLuhan, M. (1964). *Understanding media: The extensions of man.* New York: McGraw-Hill.

McMillan, J. & Cheney, G. (1996). The student as consumer: The implications and limitations of a metaphor. *Communication Education, 45,* 1-15.

McOmber, J.R. (1999). Technological autonomy and three definitions of technology. *Journal of Communication, 49*(3), 137-153.

Miles, I. & Thomas, G. (1995). User resistance to new interactive media: Participants, processes and paradigms. In Bauer, M. (Ed.) *Resistance to New Technology: Nuclear power, information technology and biotechnology.* Cambridge, UK: Cambridge University Press.

Naisbitt, J. (1984). *Megatrends: Ten new directions transforming our lives.* New York:Warner Books.

Negroponte, N. P. (1995). *Being digital.* New York: Alfred A. Knopf, Inc.

Neumann, P. G. (1995). *Computer related risks.* New York: Addison-Wesley.

Noble, D. (1997). *The religion of technology: The divinity of man and the spirit of invention.* New York: Alfred A. Knopf.

Noble, D. (1984). *Forces in production: A social history of industrial automation.* New York: Alfred A. Knopf.

Oppenheimer, T. (1997, July). The computer delusion. *Atlantic Monthly.* Retrieved October 22, 2001 from http://www.theatlantic.com//issues/97jul/computer.htm

Oregon Institute of Technology (1998). President Dow's investiture speech. September 15. Retrieved March 11, 2002 from http://oit.edu/admin/pres/dowinvesiturespeech.html

Painter, J. (2002). Purchasing pitfalls: Why buy a Ferrari when a Chevy will do? Common mistakes in technology buying. Retrieved March 17, 2002 from http://www.electronic-school.com/2002/01/0102f5.html

Perrow, C. (1984). *Normal accidents: Living with high-risk technologies.* New York: Basic Books.

Phipps, R.A. & Wellman, J.V. (April 2001). Funding the "Infostructure": A guide to financing technology infrastructure in higher education. *The Institute for Higher Education Policy, 3,* (2).

Pool, R. (1997). *Beyond engineering: How society shapes technology.* New York: Oxford University Press.

Postman, N. (1993). *The end of education: Redefining the value of school.* New York: Knopf.

Postman, N. (1985). *Amusing ourselves to death: Public discourse in the age of show business.* New York: Penguin Books.

Postman, N. (1983). *Technopoly: The surrender of culture to technology.* New York: Vintage Books.

Rheingold, H. (1993). *The virtual community: Homesteading on the electronic frontier.* Reading, MA: Addison-Wesley.

Rukeyser, W. L (1998, June/July). Technology in our schools. *Our Children.* Retrieved March 5, 1999 from http://www.pta.org/pubs/techsch.htm

Rukeyser, W. L. (1998, February/March). Broken promises: Decisions about computer based instruction must be based on data and analysis, not faith, fear and hype. *Thrust for Educational Leadership.* Retrieved October 22, 2001 from http://www.realworld.org/articles/brokenpromises.html

Saunders, G. & Weible, R. (1999). Electronic courses: Old wine in new bottles? *Internet Research: Electronic Networking Applications and Policy, 9,* (5), pp. 339-347.

Sava, S. (1997, July 25). Electronic genie: Will computers serve schools or run them? Remarks to National Association of Elementary School Principals State Leaders Conference. Retrieved October 22, 2001 from http://www.naesp.org/comm/sava797.htm

Schacter, J. (1999). *The impact of education technology on student achievement: What the most current research has to say.* Retrieved October 21, 2001 from http://www.mff.org/publications/publications.taf?page=161

Scheffler, I. (1960). *The Language of Education.* Springfield, IL: Charles C. Thomas.

Sclove, R. E. (1992). The nuts and bolts of democracy: Democratic theory and technological design. In L. Winner (Ed.), *Democracy in a technological society,* pp. 139-157.

Scott, D. K. (2000). Learning in an integrative age: The university of communication. Retrieved February 25, 2002 from http://www.umass.edu/chancellor/scott/papers/learning.html

Shulman, L.S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15,* 4-14.

Snobelen, J. (1996, June 5). In: Minister of Education and Training comes to York. *Gazette, 26,* (34). Retrieved February 25, 2002 from http://www.yorku.ca/ycom/gazette/past/archive/050596.htm

Sproull, L. & Kiesler, S. (1986) Reducing social context cues: electronic mail in organizational communication. *Management Science,* 32 (11), 1492-1512.

Stoll, C. (2000). *High-tech heretic: Reflections of a computer contrarian.* New York: Anchor Books.

Taba, H. (1966). *Teaching strategies and cognitive functioning in elementary school children.* San Francisco: San Francisco State College, Coop Research Project No. 2404.

Temple University Center City Campus (2001). Retrieved March 11, 2002 from http://www.temple.edu/tucc/extension.htm

The CEO Forum on Education and Technology, (2001). School technology and readiness report: Key building blocks for student achievement in the 21st century. Retrieved December 9, 2001 from http://www.ceoforum.org/downloads/report4.pdf

Thoman, E. (2002). *Skills and strategies for media education.* Retrieved January 16, 2002 from http://www.medialit.org/readingroom/keyarticles/skillsandstrat.html

Thornburg, D. D. (1994). *Education in the communication age.* San Carlos, CA: Starsong Publications.

United States Department of Education (June 29, 1996). Getting America's students ready for the 21st century: Meeting the technology literacy challenge. A report to the nation on technology and education. Retrieved October 31, 2001 from http://www.ed.gov/technology/plan/nattechplan/execsum.html

Valovic, T. S. (2000). *Digital mythologies: The hidden complexities of the Internet.* New Brunswick, NJ: Rutgers University Press.

Wallace, P. (1999). *The Psychology of the Internet.* Cambridge: Cambridge University Press.

Warschauer, M. (1999). *Electronic literacies: Language, culture, and power in online education.* Mahwah, NJ: Lawrence Erlbaum Associates, Publishers

Weimer, M.G. (Ed.) (1987). *Teaching large classes well.* San Francisco: Jossey-Bass.

Wilhelm, A.G. (2001, April). The threw me a computer...but what I really needed was a life preserver. *First Monday, 6,* (4). Retrieved November 14, 2001 from http://www.firstmonday.dk/issues/issue6_4/wilhelm/index.html

Wulf, W.A. (1995). Warning: Information technology will transform the university. *Issues in Science and Technology, 11,* (4), p. 46.

Young, J.R. (March, 2000). David Noble's battle to defend the 'Sacred Space' of the classroom: Jeremiads against online education attract followers; critics say he's an uninformed Luddite. *The Chronicle for Higher Education.* Retrieved May 23, 2002 from http://chronicle.com/free/v46/i30/30a00101.htm

APPENDIX A: SESSION 1 PRE-ASSESSMSMENT

1. There are a lot of computers in classrooms across the country, how did they come to be there—or in other words, what do you believe are the conditions and or agents that influenced the present state of computer proliferation in education?

2. What aspects of this push for computers in classrooms do you think are warranted or beneficial? Why?

3. What aspects of this push for computers in classrooms are not warranted or are detrimental? Why?

4. What areas, if any, do you think need more investigation?

5. Rate your familiarity regarding the initial development of a literacy program. (Place an "x" accordingly along the continuum.)

1----------2----------3----------4----------5----------6
Nothing A little Somewhat familiar Fairly familiar Very familiar Expert

6. What do you consider to be some of the fundamental tensions that occur (or should occur) when schools contemplate building a literacy program?

APPENDIX B: SESSION 3 PRE-ASSESSMENT

Literacy

1. Imagine that you are building a segment of a literacy program that focuses on the medium itself. What are five (5) elements that you would include?

2. Choose two (2) media from the list below. List three (3) ways in which the "same" message might actually be different between the two media that the message is conveyed through.
   a. Newspaper
   b. Internet
   c. Television

3. Look at the differences you described. What would you speculate some possible significances of those differences to be? That is, given the differences you describe—"so what" insofar as student learning is concerned?

Health Issues

4. How much do you feel you know about the effects of computer use on human health? (Place an "X" along the continuum.)

1	2	3	4	5	6
Nothing	A little	Somewhat familiar	Fairly familiar	Very familiar	Expert

5. How long should users be at a computer before taking a break?

6. What should the nature of such a break consist of?

7. What are at least two physiological differences between reading text from a paper page versus reading text from a screen?

APPENDIX C: POST-WORKSHOP ASSESSEMNT

Session 1

1. There are a lot of computers in classrooms across the country, how did they come to be there—or in other words, what do you believe are the conditions and or agents that influenced the present state of computer proliferation in education?

2. What aspects of this push for computers in classrooms do you think are warranted or beneficial? Why?

3. What aspects of this push for computers in classrooms are not warranted or are detrimental? Why?

4. What areas, if any, do you think need more investigation?

5. What do you consider to be some of the fundamental tensions that occur (or should occur) when schools contemplate building a literacy program?

Session 3

Literacy

6. Imagine that you are building a segment of a literacy program that focuses on the medium itself. What are five (5) elements that you would include?

7. Choose two (2) media from the list below. List three (3) ways in which the "same" message might actually be different between the two media that the message is conveyed through.
   a. Newspaper
   b. Internet
   c. Television

8. Look at the differences you described. What would you speculate some possible significances of those differences to be? That is, given the differences you describe—"so what" insofar as student learning is concerned?

Health Issues

9. How much do you feel you know about the effects of computer use on human health? (Place an "X" along the continuum.)

1	2	3	4	5	6
Nothing	A little	Somewhat familiar	Fairly familiar	Very familiar	Expert

10. How long should users be at a computer before taking a break?

11. What should the nature of such a break consist of?

12. What are at least two physiological differences between reading text from a paper page versus reading text from a screen?