Social Transformation through Critical Technical Literacy

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ABSTRACT

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A main function of education has always been citizenship formation. However, today's main educational aim is centered on a neo-liberal economic motivation, which has education constructed around the dominant economic reality of capitalism. In this context, the major aim of education is to increase productivity, which is in keeping with capitalistic production, not with responsible citizenship. Computer technology and technical literacy courses are on the rise in primary and secondary schools because the public is being convinced that this is an inevitable road to the future.

Our society tends to venerate technology as a neutral construct. This pacifies people from taking a critical role in determining how technology should be used. It is the result of technocratic ideology. This thesis aims to understand this phenomenon and come up with a more viable version of the usage of computer technology in primary and secondary schools and an adequate definition of critical technical literacy that does not comply purely with technocratic interests.

It is based on a comprehensive literature review on the historical-structural form of education in technocratic capitalistic societies and an assessment of the arguments set forth by techno-advocates and techno-critiques on computer technology and technical literacy in classrooms. It concludes that a critical technical literacy is vital for ensuring that education does not continue to perpetuate socio-economic stratification and instead is democratic with the goal of developing responsible citizens.

Dedication

This thesis is dedicated to my parents, Pertti and Eila, without whom I never would have been able to pursue my academic career to such lengths. Their support and encouragement has been invaluable and I hope to continue to make them proud.

I also dedicate this thesis to all those in the world who are current struggling to overcome the social reality that has been imposed upon them.

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To Dr. Ailie Cleghorn, who taught me the importance of evaluating literacies on a global, democratic, and communal level.

To Dr. Minoo Derayeh, who opened my eyes to the political nature of education and introduced me to my inspiration, Paolo Freire.

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Table of Contents

Chapter One

Introduction

"The most powerful weapon in the hand of the oppressor is the mind of the oppressed." Steve Biko, South African Activist

"Washing one's hands of the conflict between the powerful and the powerless means to side with the powerful, not to be neutral." Paolo Freire

The purpose of this study is to analyze the increasing roles computer technology and technical literacy play in primary and secondary schools. By technical literacy I mean having a critical understanding of the values, cultural biases, prejudices, and power relationships that have led to the current usage and presence of computer technology in our society as well as knowing how to use a computer in general and retrieve accurate information from the internet. I have chosen technical literacy as a focus of analysis because I feel its promotion is partially due to capitalistic motivations and reasoning. By not questioning the motivations for introducing computer technology into classrooms, i.e. by not examining how critically the technology is used and for what purpose, we are only adding to the ever-spiraling situation of the loss of democracy and economic stratification. My objectives are to:

1. look at how and why computer technology and literacy is being promoted for classroom use;

2. examine the ramifications of utilizing computer technology in the classroom setting; and

3.   assess the relationship between technical literacy with responsible

citizenship.

In the context of these objectives my research questions are:

➢   What are the motivations for introducing computer technology into

classrooms?

➢   What are the drawbacks for students/society in having classroom

access to computer technology?

➢   Does technical literacy promote responsible citizenship?

Scope

With critical theory as my theoretical framework for this study, I analyze

how cultural attitudes and values influence the type of ideology being

disseminated through education. Critical theory encompasses a vast array of

concepts and, due to the constraints of space and time, I do not go into a historical

survey of critical theory. Instead, I define it from the perspective of the critical

theorists of education and educational technology that I draw on for the purpose

of this thesis. Furthermore, I do not examine the Frankfort school; rather I focus

on Apple (1999), Giroux (2003), McLaren and Farahmandpur (2005), and Freire

(1998), drawing extensively on their educational application of critical pedagogy

to the study of technology in education.

To shed light on the concepts, I draw on some original sources that I feel

are still extremely relevant even though they may seem slightly outdated. This

also provides a basis from which further research on critical technological literacy

can be undertaken. In regards to critical theory, I draw on the secondary sources

such as Sarup (1993), who gives a sound overview of the development of critical

theory, Noam Chomsky (2001), and Bourdieu (1998).

For the critical pedagogy background, I use original thinkers such as

Freire (1974), Bernstein (1973), Bowles and Gintis (1976), Dewey (1986), and

Emig (1983). I draw on Freire (1974) extensively as it is of fundamental

importance in understanding the roots of critical pedagogy, which is my

conceptual framework and the impetus for this thesis. Some of the secondary

sources I use for this are Apple (1999), Osborne (2001), Giroux (2003), and

Torres (1998).

The original sources I utilize for critical theorists of technology are Kuhn

(1962) and Roszak (1969). I also employ several secondary sources including

Hughes (1987), Pacey (1983), Clayton (2004), Stoll (1995), and Aikenhead

(1990).

This is not a complete list of all of my sources but it reflects the dominant

conceptual framework of this thesis.

I focus on the introduction and promotion of computer technology and

technical literacy in schools. This is because of the significant role that computers

are increasingly playing in our educational system. In Canada, primary and

secondary schooling is mandatory for the population. Therefore, it is my

contention that this technology and the resulting literacy are at the heart of

citizenship formation.

This computer technology and technical literacy analysis is done within

the framework of critical pedagogy and democratic education and as such I

examine the motivating factors for and consequences of introducing computers into a classroom setting for the purpose of technical literacy. The current mindset is to view computers and technical literacy as the road to the future. However, adherents of this position often do not stop to consider the ethical, societal, and economic implications of this aim. For this reason, I explore these issues and attempt to discern the most viable version of this much sought after technological vision of the future. I also look at the counter-arguments, especially those advanced by the advocates of neo-liberal forms of education, i.e. market-based forms. The functions of the state and power relationships are so multi-layered and complex that microanalyses are required to come to a macro analysis of our social reality.

Significance

The slow loss of democracy is evidenced by the ever-widening global economic gap. For this reason, my abstract proposition is that because of continuing economic stratification we need a curriculum involving critical technological literacy to foster social transformation. This is the true significance of this thesis.

Another rationale for pursuing this thesis is that a review of the existing literature suggests that few scholars have used critical theory to challenge the implementation of computer technology into classrooms for the purpose of promoting technological literacy. In line with the tenets of critical theory and pedagogy, I attempt an analysis that involves integrating different theories of power in order to have a holistic picture, as Bernstein (1973) suggests. According

4

to Torres (1998), to hold the state responsible for economic disparity is only possible through a "historical-structural analysis of educational processes in capitalist societies" (p.37). He cites Foucault as saying power is a "productive network, which runs through the whole of social body" (p. 55). Thus, it becomes imperative to look at the power dynamics in the society in general and in the educational process in particular.

I hope that this thesis uncovers how dominant power structures continue to exert their influence when curriculum is not critical of technological and political structures. I also hope it shows how a curriculum involving critical technological and political literacy is socially transformative, with far-reaching effects for humanity.

Organization of the Thesis

This thesis is organized into five chapters, with this introductory chapter being considered as chapter one. Chapter two is the setting of my conceptual framework. I set out the key concepts that I refer to in chapter three's historical-structural examination of education in technocratic capitalistic societies. Since each concept has several possible definitions, it is necessary for me to clarify how I use these concepts and in the end, how I relate them to each other and come up with my conceptual framework. These terms are state, education, democracy, democratic education, critical theory, critical pedagogy, critical thinking, citizen [ship], technocracy, neo-conservatism, and neo-liberalism.

Chapter three is a historical-structural examination of education in technocratic capitalistic societies. I carry out this examination to illustrate how a

society based on the economic structure of capitalism functions and how education serves to maintain this economic structure. By doing this, what needs to be changed in the educational system in order for it to be democratic may become clear.

Chapter four consists of a microanalysis of how education functions to maintain technocratic capitalist production. This chapter looks into the arguments put forth by techno-advocates such as Fred D'Ignazio (in Clyde, 1998), Hounsell (2000), Means (1997), and as related by techno-critics such as Stoll (1995) and Pacey (1983), to name but a few. This chapter then breaks down these arguments. I expose the flaws in their arguments and explore the negative consequences of introduction of technology for students, society, and democracy of blindly accepting these claims by drawing on the contentions of techno-critics.

In chapter five I present my conclusions and assess whether or not technical literacy, as it is being promoted by techno-advocates, promotes responsible citizenship in its most ideal democratic form. The conclusion I arrive at through my theoretical framework of critical theory and critical pedagogy makes it clear that since education is a primary site of social reproduction, teachers and students must be educated with a critical technical literacy in order for education and society to be truly democratic. I discuss all of the various factors that must be addressed or rectified in order for this to occur.

Chapter 2

Conceptual Framework

In this chapter, I operationalize the main concepts I refer to in chapter

three i.e. historical-structural examination of education in technocratic capitalistic

societies. This is essential in order to understand my line of reasoning. There are

multiple definitions of each concept and they each relate to each other in complex

ways. Therefore, I lay down a framework of how they are related to each other in

the context of this study. Each concept relates to the objectives and research

questions stated earlier. The concepts of state, technocracy, and neo-conservatism

and neo-liberalism are discussed to illuminate the driving force behind the

implementation of computer technology and technical literacy in the classroom.

The concepts of education, democracy, democratic education, and citizenship are

brought forth to assess whether or not this aim promotes responsible citizenship.

These concepts are operationaized in the overall framework of critical theory and

critical pedagogy in order to examine the drawbacks of computer technology and

technical literacy in the classroom setting.

State

Society, according to Bowles and Gintis (1976), is organized around *Sites

and Practices.* In a capitalist social formation, like ours, there are three sites:

state, family, and capitalist production. Each site has its own social relations and

structures. Family and capitalist production have relations of dominance, whereas

the state is thought of as neutral. Each site structures its own societal practices,

which are the basis of social interactions. There are four types of societal practice

within each site: Appropriative (where labor transforms nature), political (manipulation of a site through the rules of the game), cultural (how social bonds are created) and distributive (how power, for example, is distributed). The societal practices of each site are transportable within the sites making them a contradictory totality. This also would indicate that the state is hard pressed to remain neutral.

Education is a part of two of the sites: state and capitalist production. Education is a part of the state site because society has decided over time that people have a right to be educated and the state implements this right. It is a part of capitalist production realm because education reproduces the dominant capitalistic philosophy that is in tune with capitalistic production. If state is seen as neutral and capitalist production is not, this makes the aims of education seem contradictory. 'Rights' are generated by political practice in the three sites. Human rights are contested on the site of the state, patriarchical rights on the site of the family, and capitalist production deals with property rights. Therefore, schools help articulate for both human and property rights. Bowles and Gintis (1976) suggest that change must take place at the site of capitalist production if society as a whole is to be transformed.

Carlos Torres (1998) draws on Weber's definition of state as one based on legalized, monopolized force, yet it is also constructed around liberal democratic principles of autonomy. Its citizens are formed through pedagogy, which is executed through education. The state, which includes administrative, policing and military institutes, has the mandate to "extract(s) resources from society"

(Torres, 1998, p. 17). This is at odds with a democratic system and yet in tune with capitalist production. So once again, the idea of a neutral state is a paradox. The state is a concentration of power and force, which it exercises in mediation between different elite groups' interests to retain control and authority. With capitalism at the core of most power relations, the state must find a way to balance profit making with democratic principles. Thus according to Torres (1998):

> . . . political life is not divorced from the basic determinants of social and economic life. Therefore, domination, exploitation, oppression, inequality, and discrimination are an intrinsic part of state activities, reverberating in the constitution and exercise of state power (p. 26).

Apple (1999) states, from a neo-Marxist perspective, that all institutions are a part of a system that reproduces unequal power relations in a capitalistic society. These include family, the state, and cultural institutions. To understand cultural reproduction and the maintenance of capitalist production Apple draws on Bernstein's analysis of curriculum formation to argue that it is primarily formed by the middle class. Within the middle class different positions are occupied in respect to the social divisions of labor. Some are concerned directly with economy while others are concerned with culture. Yet cultural possessions, such as a university degree, are eventually converted to economic capital and everything is thus linked to capitalism. This is the state of our educational system. It is now a system which maintains capitalistic means of production. More evidence of this comes from a direct analysis of the state. Even though curriculum

and pedagogy are formulated for and by the middle class (because it secures their class position), the state plays a role by sponsoring 'market-oriented' programs. Since a part of the middle class directly links curriculum to economy this means that the state also represents this group, while at the same time being relatively autonomous, and serving its own needs of legitimacy and control.

In conclusion, the state is characterized as the following by Bowles and Gintis (1976), Torres (1998), and Apple & Bernstein (1999): it is neutral yet cannot remain so as it is affected by family and capitalist production, societal practices and/or interests. Education is an extension of the state and also of capitalist production. This means that it cannot be neutral as it represents both human rights and property rights, which are at odds with each other. The state is based on legalized, monopolized force and around liberal democratic principles of autonomy, which means that it can either function as a means of maintaining and serving elite groups' interests or it could be a potential site for revolution.

Understanding how the state functions is relevant to the question regarding the motivation for implementing computer technology into primary and secondary classrooms. Education is an extension of the state and state interests are intricately tied to capitalist production. Thus, education is a vehicle for maintaining capitalistic means of production, which may be at odds with human rights. The motivation for introducing computer technology into classrooms may simply be a part of capitalist production needs, not citizens' needs.

Education

Education, as mentioned above, is not a neutral entity. There are

underlying social constructs, in particular capitalist production and state interests,

that determine curriculum and pedagogy. The purpose of education is contested;

for some it should be the formation of democratic citizenship (Dewey, 1986) for

others it should focus on economic productivity. Today's neo-liberal economic

motivation articulates education in terms of the dominant capitalistic economic

reality. Thus, the major aim of education today is to increase productivity. Citizen

creation is at the heart of pedagogy, but whether or not pedagogy is formulated in

the best interest of the people or is truly democratic is arguable. I contend that

education should be a means for positive, democratic social transformation. It

should serve the needs of citizens, not an economy that is not entrenched in

human rights. I bring up the concept of education in conjunction with my question

regarding responsible citizenship. As stated earlier, one of the main aims of

education is citizen formation. Therefore, a pedagogy that is concerned with

economic production might be negligent of responsible citizenship formation.

This, in my opinion, is problematic.

Democracy

Democracy is a contested concept with no one definition. According to

Torres (1998), the most prevalent form of democracy is liberal. It is a form of

government causing more conflict than solutions, transforming the nature of

power to a veto position being held by large corporations. Once again, we are

back down to economics, in particular capitalism.

Torres (1998) discusses the difference between democracy as content and

as method. The content of democracy should be a government which fully understands and empathizes with all views and is constantly working out policy etc. in conjunction with a plurality of meaning perspectives and social realities, not in relation to economy or corporate interests. It should strive to do away with inequality based on class, gender, race, language, etc. Equality must be present for all in both the public and private spheres, as one naturally extends into the other. In other words, there should be a community spirit. Extreme individualism is a product of uncontrolled capitalism.

Torres (1998) also highlights the inherent conflict/paradox in our liberal democracy in regards to content versus method. Under the definition of democratic content are the concepts of equality and liberty. It is these two that give rise to paradox in conjunction with capitalism. Liberty, whether personal freedom or corporate/technological autonomy, cannot be at the cost of equality. Therefore, if equality at both the community and global level is to occur, capitalism cannot continue to behave autonomously, creating disharmony with its policies. The freedom to pursue economic interests should not be at the expense of human rights. It should be advocated that ethics/morality be (re-)inserted into the content and method of democracy. If this is done then I doubt whether technology and other products of capitalism will continue to be so revered and policies effecting education will change.

Dewey (1986) lays out two principles of ideal democratic society. The first is that interests are shared and communicated within a social group and the second is that the social group interacts fully with all other social groups and

continuously readjusts through this contact. This is Dewey's criterion for measuring the 'worth' of a given society. If everyone in a given social context agrees upon how life and society should be structured, and they also have freedom of speech and mobility, then the society is democratically ideal. This must be the form of ideal democracy due to a high level of individualization and a widening of societal interest. If this ideal is constantly readjusted then and only then will it remain ideal as society is ever changing; if society does not readjust with the times it will stagnate, as it will no longer meet the needs of individuals.

In regards to my research question of responsible citizenship, a liberal democracy that concerns itself more with capitalistic production than basic human rights (education being one) contributes to the view that education meets the needs of capitalistic production. Torres' (1998) yardstick for measuring the value of a given society would rate our liberal democracy very poorly as it does not meet the needs of all citizens. It is mainly meeting the needs of corporate or capitalistic interests. Dewey's democratic ideal becomes harder to attain or maintain if the liberal democracy is solely geared to serve the interest of the capital as it leaves little or no room for societal and inter-group readjustments.

Democratic Education

Education is a primary site of social reproduction and teachers and students must be educated critically in order for education and society to be truly democratic. In this sense democratic education is essentially characterized by the praxis of critical pedagogy. Democracy is, according to Osborne (2001) ". . . a continual debate and deliberation in which the end goal is more debate and

deliberation" (p. 53). We must ensure that education keeps teaching the skills to do so! An education, which fails to give its students the skills to reflect and act democratically, is anti-democratic because as Roszak (1969) suggests the greatest threat to democracy is when "some force other than reason shapes reality" (p. 12). If democracy includes equality and freedom of speech then it should follow that democratic education is based on these principles as well. Students and teachers should be in equal partnership in the pursuit of knowledge and there should be no restriction on the dialogue it produces through critical thinking. As Dewey (1986) states, "Any education given by a group tends to socialize its members, but the quality and value of the socialization depends upon the habits and aims of the group" (p. 83).

A deeper understanding of democratic education highlights what needs to be improved or altered when examining the usage of computer technology in classrooms. It is with this conception of democratic education that I conclude what the most suitable form of technical literacy and the use of computer technology should be in the coming chapters.

Critical Theory

According to Sarup (1993), Max Horkheimer and his contemporary Theodor Adorno coined the term "critical theory," which they derived from Kant's (18th-century) and Marx's (19th century) use of the term "critique". It is a social theory that critiques and strives to change society. This is in contrast to traditional theory which only tries to understand or explain it. However, the most

14

crucial difference between the two is that critical theory sees society in a capitalist

economy as resulting in:

> ... the domination of external nature, ... the domination of human
>
> beings who are adapted to the system of production through social
>
> engineering and psychological manipulation. ... [this means that] the
>
> social forms engendered by (technical or) instrumental rationality
>
> represent a profounder threat to human freedom than class struggle. ...
>
> even the space for individual responsibility and initiative, which was
>
> opened during the early phases of capitalism, is now closed by the
>
> administered society (Sarup, 1993, pp. 69-70).

This theory holds that individuals are controlled through remote administrative

structures, which function in compliance with intangible policy(s). This is a

radical, emancipatory form of Marxian theory because it no longer contends that

social revolution will occur naturally. People are too pacified under impersonal

administrative machinery. People must be retaught to think critically about their

social reality in order to create change.

In the 1960s, Habermas redefines critical theory to avoid linking it to

Marxism alone by expanding its scope to include "world systems theory, feminist

theory, postcolonial theory, critical race theory, queer theory, social ecology, the

theory of communicative action (Habermas, 1971), structuratian theory, and neo-

Marxian theory" (Critical Theory, Wikipedia, 2005). McLaren (2005) discusses

the fact that this theory's most important characteristic is its commitment to

action.

Through the lens of critical theory, I assess the function of education in a liberal democratic society (based on capitalistic production). Looking through this lens it becomes clear that education, which serves the purpose of socializing students to meet the needs of a system of production, presents a risk to basic human rights and freedoms. This is considered when I analyze the motivations for setting up computers in classrooms.

Critical Pedagogy

Critical Pedagogy is the natural application of critical theory in the field of education. This is because critical theory obligates itself to actual practice. Thus, critical pedagogy is concerned with transforming society through education.

Freire (1974) wrote and spoke about critical pedagogy in *Pedagogy of the Oppressed.* He actually practiced critical pedagogy more than he theorized about it. Critical pedagogy is in opposition to 'banking education'. In other words, students should not be viewed as mere vessels to be filled with unquestioned knowledge. Liberation or social transformation will come about when banking education is replaced by one which promotes "the action and reflection of men upon their world in order to transform it" (p. 66). However, action and reflection must be done in an extremely critical fashion. Consciousness must be examined for what it is and how it has been formed or as Freire says, "consciousness as consciousness of consciousness" (p. 67). People must become "conscious beings" and education must involve "problem posing" (p. 66). This type of education also breaks down the traditional role of the teacher from authority figure to one who is

actively involved in a dialogue with the student in the search for truth and meaning.

It is through the definition of critical pedagogy that I examine what form computer technology usage and critical technical literacy should take to be socially transformative and democratically ideal.

Critical Thinking

The absence of critical thinking skills is one of the greatest threats to democracy. Without these skills it is hard to imagine how any serious social or political activism will take place. The first mention of critical thinking can be traced back to Socrates who felt that it was his divine mission to enlighten people about their ignorance. From this idea he developed the most important part of his philosophy of education- *Elenchus*, a method of systematic questioning of one's beliefs and those of others. This is the only way that true expertise can be formed because an expert is someone who has considered all aspects of an idea until the essential truth of it has been discovered (Taylor, 2000). The idea is to adduce various examples of a concept and examine what it both does and does not consist of. The commonalities within the different examples lead to its true definition or primary knowledge. It is a process of hypothesis, classification, and definition. This method of elenchus or critical thinking leads to the essence of knowledge and with that a person can behave and reason in the best manner possible, ethically and morally. Truth cannot simply be taught to people; they must find it on their own. By developing our rational nature through reason and reflection, we are essentially developing the divine. Through reason and elenchus, we can find

the good in our physical and psychological reality. The end result would be a good and just person and society (Cross, 1970).

Freire (1998) discusses proper critical thinking skills in terms of 'conscientization', a process where humans are both in and with the world. It requires objectification of the self and the world, allowing one to properly reflect upon existence in a democratic, egalitarian, communitarian way. In this way, his method is like Socrates' elenchus yet it differs in that truth is seen as hidden in myths, such as the advancement of society through technological development, disseminated and maintained by our educational system. People must train themselves to see through the myths of dependency perpetuated by capitalism and technocracy to be able to democratically challenge the powers/ideology controlling economy and technology so that social transformation occurs. Education should be the key to ensuring proper thinking skills.

In keeping with the tenets of critical pedagogy, critical thinking is of fundamental importance in ensuring a proper technical literacy and the possibility of social transformation. This is referred to again when I discuss the most ideal version of having computer technology and technical literacy in primary and secondary schools.

Citizen[ship]

In 1950, T.H. Marshall carried out one of the most influential studies on the development of the concept of citizenship. According to Oxhorn (in process), Marshall shows that citizenship rights evolved from civil rights which were granted in order to allow the emerging market economy of the eighteenth century

to flourish. These civil rights include individual freedoms and the rights to property ownership. These rights legitimized the social inequalities which are unavoidable in a market economy or capitalism. Capitalism gave rise to new social classes as feudalism began to decay. Classes became distinguished by roles of productivity and the homogeneous class of citizenship emerged. This is why citizenship is an extension of capitalism; it evolved in synchronicity with capitalism as it developed via civil rights. Therefore, we have rights being given to workers, then to all people, as political rights in the nineteenth century. This laid the foundation for social rights and the development of the modern welfare state. Yet according to Marshall (1950), the development of citizenship rights reduced economic disparity due to the birth of the welfare state.

Oxhorn (in process) critiques Marshall's analysis of the emerging economic equality. Oxhorn feels that Marshall ignores the roles that class struggle and social conflict played in the extension of citizenship rights. He also does not agree that civil rights reflect a complimentary relationship between the working class and capitalists. Oxhorn says that civil rights were given as a measure of protection for capitalist endeavors. This, for Oxhorn, means that one must examine the state and economic structure in order to understand what form of civil society and citizenship rights exist and for what reason. Citizenship is a reflection of civil society which has developed in conjunction with an economic structure. If there is a strong civil society, one with a plural government, there will be stronger citizenship rights and vice versa. Most often political stability is maintained through the suppression of the autonomy of the civil society resulting

in a constricted version of citizenship rights. This development can be understood as: an economic structure conditions a civil society and the interaction between state and civil society determines citizenship rights.

In the traditional sense a citizen is understood as:

A person owing loyalty to and entitled by birth or naturalization to the protection of a given nation. 2. A resident of a city or town, especially one entitled to vote and enjoy other privileges there (Rattray, 1990, p. 325).

However, this definition is extremely narrow. It does not explain what 'privileges' are nor does it address the concepts of active democratic citizenry. For my research, I extend the definition of citizen to include 'behaving and thinking in a democratic fashion' in order to be a democratic citizen. This means that critical thinking is an innate part of thinking democratically and will be a part of critical technical literacy.

Technocracy

According to a United Nations report (1994): "The tendency among commentators is to consider today's new technologies - . . . - so spectacular as to be overshadowing the past completely and ushering in a new era" (p. 292). Reverence is being given to new technology, which of course is not surprising, as humans tend to venerate anything that seems to speed up work and give a sense of power or control over one's environment. According to Stoll (1995), who is a techno-critic, the invention of new tools or technology is always seen as evidence of further evolution and perhaps even as inevitable. Moreover, there is "a

technocratic belief that [technology] computers and networks will make a better

society" (Stoll, 1995, p. 50).

Societal advances are often viewed in terms of technological

advancements, which Roszak (1969) defines as representing a *technocracy*.

Technocracy is "a social form" of an industrialized society's peak organizational

form. For the state to ensure the functioning of this peak form it must ". . . create

a new social organism whose health depends upon its capacity to keep the

technological heart beating regularly" (p. 6). A technocracy is ideologically

hidden and embodied in society's institutions and policies. It is even embedded in

our school curriculum which Osborne (2001) says, "serves to promote qualities

that are the antithesis of democratic citizenship" (p. 48). Roszak (1969) also refers

to technocracy as a "transpolitical phenomenon" (p. 8) behaving as a neutral tool

of economic efficiency. It is made up of a system of experts who in turn employ

experts to keep the technocracy flourishing.

Bernstein (1973) discusses the role of technocracy in the functioning of

power relations in schools. Curriculum reproduces cultural capital and education

serves the needs of capitalistic power structures which are maintained by

technocracy. People are being persuaded that the structure and role of education

should serve the needs of 'supposed' economic demand.

Technocratic ideology as mentioned above is at the heart of pedagogy. It

is one of the significant factors contributing to the promotion of computer

technology in classrooms. This promotion must be seen for what it is: a way to

keep technocracy prospering. Therefore, computer technology is not an indication

of societal advancement. Rather it is really a technological innovation that produces economic profit.

Neo-conservatism and neo-liberalism

It is important to understand the pervasive political and social ideology and rhetoric that is used to shape our society. These are neo-conservatism and neo-liberalism. Bailey (2001) calls Irving Kristol "the godfather of neo-conservatism" (para. 1). Prior to the late 1960s, traditional conservatives were generally concerned with economic policy and business, not race, education, and welfare. Neo-conservatist academics such as Nathan Glazer, James Q. Wilson, and Seymour Martin Lipset provided conservatives with the information needed to argue against left/liberal social policies (para. 2).

The fundamental departure for neo-conservatism was made by Strauss (cited in Bailey, 2001) who argued for a push to the forefront of religion in "the political life of a nation" (para. 4). It became a way of influencing mass American culture; it appealed to the mistrust people had of liberal and leftist disdain of religious beliefs and was/is a fantastic way of compelling people to go along with neo-conservatist policy.

According to the Wikipedia (2005), neo-conservatism did not start out as being completely against social welfare and at times even supported spending on it more than libertarians did. It really began in earnest as an opposition to communism and as a way to promote democracy in the US. From here, it developed a hard line tactic for foreign policy. Yet regrettably today there has

been a great decline in its stance especially regarding the funding of the welfare state.

According to George (1999), neo-liberalism began at the University of Chicago with the philosopher-economist Friedrich von Hayek and his students. From there a large network of foundations and institutes began to develop and promote their ideas and dogma persistently. George maintains that they understood Gramsci's concept of cultural hegemony; "If you can occupy peoples' heads, their hearts and their hands will follow" (para. 9).

Neo-liberalism gave the market autonomy in that it was given the authority to make major social and political judgments. It also reduced the role of the state in the economy and corporations were given total independence which resulted in citizens receiving less social security. George (1999) continues that "the whole point of neo-liberalism is that the market mechanism should be allowed to direct the fate of human beings. The economy should dictate its rules to society, not the other way around" (para. 5).

This political ideology was further expounded by Margaret Thatcher in 1979 when the neo-liberal revolution began in Great Britain (George, 1999). Central to her thinking and that of neo-liberalism was the concept of competition. Competition was seen as the most effective way of allotting resources based on the concept of the survival of the fittest even if many were left wanting. Bourdieu (1998) sums it up as the following:

Thus, we see how the neoliberal utopia tends to embody itself in the

reality of a kind of infernal machine, whose necessity imposes itself even

upon the rulers. . . . this utopia evokes powerful belief - the *free trade*

faith – . . . For they sanctify the power of markets in the name of

economic efficiency, which requires the elimination of administrative or

political barriers capable of inconveniencing the owners of capital in their

individual quest for the maximization of individual profit, which has been

turned into a model of rationality. . . . and they preach the subordination

of nation-states to the requirements of economic freedom for the masters

of the economy, with the suppression of any regulation of any market,

beginning with the labour market, the prohibition of deficits and inflation,

the general privatisation of public services, and the reduction of public and

social expenses (para. 11).

The above quote's description of neo-liberalism is often equated with neo-

conservatism policy, not with neo-liberalism. Perhaps because of economic

factors neo-liberals are guilty of falling in line with neo-conservative beliefs. This

is because they have also begun advocating privatization and the reduction of the

welfare state, all of which effect curriculum, for people must be schooled into

their societal roles.

Though neo-liberals, according to Freire (1998), seem better in tune with

the needs of citizens, the system also falters due to the basic doctrine of liberal

democratic principles. Thomas Jefferson's principle of autonomy makes both

people and the state autonomous. This means that the state can act autonomously

to ensure its survival and economic stability. In this regard the unequal division

of labor and reduced individual freedoms are overlooked. I believe that not only is

Canadian neo-liberalism perpetuating an unequal economic stratification because

of American hegemony, capitalism, and globalization, it is doing so because of its

own semantic principles. By understanding the motivations behind both neo-

conservative and neo-liberal policy, it becomes easier to understand why there is

such a push to make education market-driven. This is a part of the influential

force behind convincing people that education should revolve chiefly around

economic productivity. It is arguable as to whether or not there is a real economic

need or if this is simply an extension of technocratic thinking. I discuss this in the

coming chapters.

Summary

     Neo-conservatism and neo-liberalism are far more alike than most would

believe at first glance. Neo-conservatism's political doctrine of aggressive foreign

policy is very much in accord with the neo-liberal economic paradigm that is

concentrated on the market economy; neither are particularly focused on the

welfare state. As such, it can be stated that citizenship rights, which led to the

development of social rights and the modern welfare state, are being neglected

and education in general is not meeting citizenship needs. I bring this to attention

in order to highlight the fact that we are being pacified to not think otherwise

through neo-liberal rhetoric. In light of my research question, does technical

literacy promote responsible citizenship?, the answer is most likely no. I discuss

this conclusion in chapter five. The state is not in tune with the needs of its

citizens and is more focused on the maintenance of capitalism. Even though the state deals with human rights or civil rights this becomes skewed due to the liberal democratic doctrine of autonomy. Thus, inequality is justified under the guise of civil rights as capitalist production is legitimized.

Since education is an extension of the state, its pedagogy and curriculum are constructed around both human rights and property rights, which are at odds with each other. The state's objective for education under neo-liberalism or neo-conservatism is productivity. Education is a site for cultural reproduction therefore, it is vital arena for ensuring the maintenance of the economic system that the state represents. This addresses two of my research questions. First, what are the motivations for introducing computer technology into classrooms? Second, what are the drawbacks for students/society in having classroom access to computer technology? It seems that the motivations are economic and one of the drawbacks is that students are targets of cultural reproduction with the primary goal not being the formation of responsible citizenship.

Technocracy, an industrialized society's peak form, maintains capitalist production by making technology one of the key areas of productivity. It is for this reason that the implementation of computer technology into schools is problematic. People must not get caught up in technocratic convictions that society advances through technological innovation alone. It must be assessed as to whether or not this technology is in tune with the needs of capitalist production or its citizens. If it is not in tune with its citizens then it is adding to a loss of democracy and responsible citizenship and needs to be contended with. Any form

26

of technical literacy in schools must be critical in order to foster social transformation. If its introduction into schools is not being evaluated under this criteria then it will continue to reflect state interests and will not be a democratic enterprise as advocated by critical theory and critical pedagogy.

Chapter 3

A Historical-Structural Examination of the Form of Education in Technocratic
Capitalistic Societies

In this chapter I expand upon my conceptual framework, as set forth in the

previous chapter, in order to build a holistic picture of the current form of our

society and the role of education in order to highlight what needs to be changed in

our educational system in order for democracy to exist. The breakdown of this

chapter is as follows: technology and society: a brief overview, historical and

cultural conditioning: why the masses remain passive, technology is not a neutral

entity, the impact of technical illiteracy, misperceptions and ideology leading to

the 'technology as neutral' view, the structure of technological systems: its

inherent problematics, what is technical literacy?, education as a cog of

technocracy; the effects of capitalism on education, the role of the state in

education, and a summary.

Technology and Society: A Brief Overview

Technological change in the 20th and 21st centuries has been occurring at a

very rapid rate. Most people feel that they have no voice in deciding what should

or should not be done, as though technology was neutral, an entity onto its own,

and beyond human control. This feeling of helplessness is overwhelming and

results in a mostly passive citizenry who idly accept what is being done without

much discussion as to the moral implications of various 'expert' decisions.

Experts and politicians frequently call upon economic or political reasoning to

strengthen arguments that propel certain industries, for example the armament,

but more importantly for this thesis are the arguments used in supporting

computer technology in classrooms. Since technology seems neutral, it is hard to

see that the reasoning behind different technological motivations may be flawed.

Most citizens feel that they could not challenge this reasoning even if they wanted

to.

Aikenhead (1990) provides some insight into how society has evolved to

its present technological state. He does this by examining science and

technological practice from the Canadian perspective. The historical development

of these practices is comparable across North America. From the onset of WWII,

all areas of science and technology expanded and began developing at

exceptionally fast rates. The immediate result was that small, low-budget research

was transformed into big, large-budget research. The most horrifying effect was

that social values were left in the dust. The moral implications of various research

policies were no longer adequately questioned. A patriotic sense, instilled by

WWII, generated public confidence in government and state goals and any

questioning of it was deemed anti-democratic. The 1960s brought about higher

levels of public awareness due to controversies over such highly dangerous

products as DDT; however economic reasoning soon became the next main tool

for maintaining passive public acceptance. It was not, and still is not, the case that

the public is unconcerned with issues concerning quality of life. It is that they/we

do not have a strong enough voice to affect policy making. Technical literacy

would be the key to accessing the economic-social infrastructure responsible for

shaping the nature of our society.

Historical and Cultural Conditioning: Why the Masses Remain Passive

The above description is not based on some sort of 'conspiracy theory'.

Our current state of society is based on historical and cultural conditioning. By

analysing how history and cultural attitudes and values influence the type of

technology and ideology pursued and disseminated we can begin to break the

cycles of technical illiteracy and mass states of powerlessness.

Freire (1997) states that the levels of mass consciousness in a given

society are determined by the society's type of historical and cultural

conditioning. Any resulting perceived reality is due to the relationship between

the "superstructure of an infrastructure" (p. 71). In other words, the workings of

the society or infrastructure determine the nature of the cultural conditioning or

superstructure, which in turn is filled in by myth that supports the nature of the

society or infrastructure. These myths have the effect of muting the dominated

(either the third world specifically or the masses of any given society) if they are

not critically conscious. Even if the dominated or seemingly powerless begin to

see through the myth of a propagated dependency, the dominators still continue to

maintain their power via "economic power and a highly developed technology

[making] the dependent structure too weak to support the slightest popular

manifestation" (p. 73).

This description of how mass consciousness is controlled is a good way of

beginning to understand the subtleties of propagated myths and ideas that

effectively mute the population. However, this muting is highly problematic as

there is constant war, a new war on terror, and economic and environmental

disaster. Yet for some reason the technology pursued under the guise of economic

necessity and national security are barely questioned. I take into account the

politics and ideology of the U.S. as they are one of the largest contenders for

world hegemony and as such, their capitalistic globalization policies affect all

people and nations. These policies affect the type of technology that is pursued,

for example, military spending over environmental issues, especially when the

majority of society is technically illiterate and critically unconscious, which in

turn affect curricula and job formation.

There are many different sectors of technology that could be targeted as

foci for this thesis but I have limited myself to computer technology due to its

inarguable role in the lives of children and, therefore, its critical role in citizenship

formation and democracy.

Technology is not a Neutral Entity

Many authors are in agreement that technology is not neutral. Fleming

(1990) contrasts two definitions of the nature of technological knowledge. The

widely accepted definition is that it is the result of applied-science. However, it

would be far more accurate to define it as a form of cognition. The first definition

distorts the fact that science is not neutral, it is driven by ideology. Fleming goes

even further to separate science from technology as forms of knowledge. They

may inform one another, but neither are neutral nor objective; they are both social

constructs that rely on research and economic success.

Pacey (1983) also supports the fact that technology is a social construct.

Many neutral advocates would claim that technology arises as a response to

changing human needs. However, it is quite easy to argue just the opposite, that

organizational pressures drive new technology. This becomes even more apparent when examining the linear view of historical development, which has virtually made ideas of progress unquestioned.

Pacey (1983) goes back a little further than Aikenhead (1990) to demonstrate how societal values and attitudes drive technological change. The Industrial Revolution in Britain created 'high farming' through the invention of Cornish engines. New innovations were viewed (and still are!) as the result of a natural linear progress of development. This view would claim that "the development of steam for the factory…produced a new economic system: capitalism" (Pacey, 1983, p. 18). However, this makes human society seem like the natural outcome of hardware instead of human activity. It would be far more accurate to say that capitalism arose out of those in power wanting to control the organization of work and that this developed alongside factories. All other inventions were simply the continuation of this work ideology. Therefore, while people thought of technology as neutral, resulting from linear progress, the new technology served only the purpose of further deskilling workers, and creating a division of labour. It is easy to be misled by opinions stating that due to technological innovations people need higher skills and training, and hence will get better jobs. The truth is that through an historical analysis it is easy to see labour being further subdivided to the point that no one is really skilled. This is most adequately described when we examine the knowledge of a repairperson. Most do not understand the components they are working with! It becomes "replacement without knowledge" (Pacey, 1983, p. 23). If people were educated

to understand that technology is the result of social constructs they would be less likely to accept the current structures of our divisions of labour. They may also begin to question why there is such a push for computer technology in classrooms and why technical literacy is being taught. In order to fully understand what drives technology we must begin to understand the social workings related to technology practice. Technological advancements are the result of social, cultural, and technical factors adjusting with each other. Change may be triggered among any three factors but, in the end, they come into contact and affect each other.

The Impact of Technical Illiteracy

Technical illiteracy affects the very structure of our society and every job available. Its seeming neutrality perpetuates biases and assumptions that maintain economic stratification in first, second and third world societies. It is strange that people are starving while we can land on Mars or that there are so many poor people when there is so much money in the world. These types of statements are indicators of the fundamental flaws in perceiving technological practices as neutral.

Since technology is a social construct, it is in the realm of human power to change its flawed nature. Technology has been 'mystified' as something other than human. People even speak of it with reverence. I now further clarify how exactly people have been fooled into accepting technology as neutral. As I argue above, economic reasoning and linear views of neutral development play crucial roles in this misperception. It is thus important to look at the role of definitions, cultural attitudes, and beliefs about resources.

Misperceptions and Ideology Leading to the View that Technology is Neutral

It is important to understand why the general population and experts view technology as neutral. There are various aspects that have led to this view and I will go over the salient ones in order to show how this view came about and how such a belief system can be transformed. I draw on Kuhn (1962) to illustrate how experts become convinced of this notion, making radical change unlikely. Kuhn states that science functions on a set of received theories. When students or future technological experts are being trained, these received theories are engrained in their minds and are vehemently defended by the scientific community as truths. Paradigmatic shifts in scientific assumptions rarely happen, as they are strongly opposed. This type of thinking in the science community reflects the idea that scientific assumptions are neutral and usually do not need reexamination. If people can become critically technically literate and see through this pretense then expert knowledge and actions will be questioned and reevaluated, for example the introduction of computer technology into schools. I hope that in the end experts and students in training will also begin to question the theories they are being schooled with.

I follow Fleming (1990) in arguing that technology can be defined using two different models developed by Kline and Pacey respectively (cited in Fleming, 1990). These models provide guidelines for one to become critically technically literate. Fleming explains that Kline defines technology as a "sociotechnical system of use" (p. 55). With Kline's definition the hardware, the manufacturing process, technical knowledge, and the patterns of use are accounted for. Pacey's definition differs from Kline's in that cultural aspects are

taken into consideration. His broad definition of 'technology practice'

encompasses the end product of technology, the process of manufacturing it, the

knowledge leading to its production (scientific research), and the ideology of

progress behind it. Fleming (1990) advocates using the definition put forth by

Pacey and Kline because both models give insight into every aspect of technology

practice, from the basic hardware and usage to the driving force or ideology

behind technological development. For Fleming, being technically literate is

synonymous with individual empowerment and as such it requires the ability of

an individual to look at the plus and minus of technological development through

a critical examination of the driving force, or ideology, producing the technology.

All other definitions are misleading and do not lead to empowerment or the

potential for social change.

Pacey (1983) gives us more insight into the flaws within technological

definitions. I have been using the term 'technology practice' for a reason.

Technology practice is not a commonly used term as its use connotes the inherent

human aspect involved in it. Traditionally this is not done. However, other

branches of science incorporate it. Medicine distinguishes medical practice from

science. In this sense, they are willing to concede that humans, and as such social

constructs, influence the nature and use of medicine. Another problem source is

that we must understand the difference between 'technical' change and

'technological' change. The former indicates change within known structures or

procedures whereas the latter indicates a new innovation or discovery. Even

economists differentiate between the two. The muddled use of terminology has

contributed to the restricted views on technological practice. Most changes are 'technical' for they are the most economic. However, this focus means that the whole picture is not being assessed and problems are being reduced to fit a limited economic scheme of cost-effective solutions. Technology practice is therefore not taken into consideration. For example, in India an attempt was made to improve water supplies, in the 1960s, by providing water pumps to communities. However, two-thirds of the pumps kept breaking down. It was not an engineering problem; it was due to failing to account for maintenance and management issues. Had the concept of technology accounted for practice then not only would technical aspects be considered but so too would cultural aspects (values, beliefs, goals etc.) and organizational aspects (economic, industrial, users, etc.). This narrow definition of technology does not lead to good, lasting, sustainable improvements and social change. In light of the above argument, one could ask, does computer technology in the classroom respect the cultural and organizational aspects of the students and society at large? I come to this question in the following chapters.

Another factor leading to the misperception of technology as neutral is cultural attitudes. Pacey (1983) traces this, with the help of Francis Bacon's theory of 1620, to Biblical language. According to him, there has been a:

> . . . 'project of conquering nature' . . . taking shape during the scientific revolution of the seventeenth century, inspired by the voyages of discovery made from the time of Columbus onward, inspired by humanist views of man as separate from nature and superior to nature, and using

ideas also from the Biblical creation myth, in which Adam and Eve were told to 'subdue' the earth and 'have dominion…over every living thing that moveth upon the earth' (Pacey, 1983, p. 87).

Thus, we can see the historical context of ideological motivation inherent in technology practice as having begun with power over nature to power over different groups of humans via social and economic stratification.

Another reason for the current state of misperception stems from patriarchical attitudes. I bring this to attention in order to once again highlight why technological change has had so many disastrous consequences on humanity, for example economic stratification, and on the environment, for example the use of chemicals in agriculture. In ancient times, women were properly represented in various industries. However, men became revered for their work in the context of technology. As the centuries went by, and patriarchical prejudices took an even stronger hold, women's roles were dismissed as trivial while anything to do with technology came to be revered as it was in the domain of men. Pacey (1983) states:

> Here, perhaps, we may see two parallel sets of values concerning practical skill and 'technology': one seems rather like the set of values concerning adventure and virtuosity [stemming from Greek myths and legends' portrayal of heroes] . . . while the other is more closely attuned to basic needs and human welfare (p. 98).

These attitudes are reflected within the two main approaches regarding resources, which influence the nature and form of technology that are pursued.

The first is economic and concerns itself with the science of classical mechanics; it views nature as a machine, and is concerned with nature's mastery. The other is a technology-based approach. It incorporates the science of thermo-dynamics in its technical-fix and energy analyses. Both of these approaches are concerned with production and construction, viewing nature as a system or machine. If this reverence for technology and domination of nature can be changed, it will result in more appropriate innovations being done in conjunction with human welfare and long term environmental concerns. What is lacking with the above two approaches is the vision held by women and exemplified by a bio-economic approach. Women have traditionally worked more directly with industries of sustenance on a small scale. There is a higher focus on gardening, healthcare, the care of people and the environment. These occupations, or roles, are more in tune with nature and try to create harmony. The motivation is not economic or a mastery over nature but one based on nature as a process that must be carefully managed. Risk in the former two approaches is seen as a challenge and/or worth taking if the profits and gains are big enough. In the bio-economic approach, risk is to be avoided; we are to behave responsibly.

Thus, the effects of patriarchy, or men's domination over nature and women, have created a technology practice horribly out of tune with the harmony of human nature. The results are disastrous, as short-term technological fixes are deemed more desirable than long-term grass roots efforts of social change. If technical literacy, and at the university level technological literacy, incorporates the bio-economic approach in its understanding of technology the end result will

be more attention paid to citizens' and environmental needs. This would be ideal.

Pacey (1983) also indicates that the way things are graphed and charted also creates delusions. The economic and technology-based approaches chart things on a small time line, distorting actual situations. The bio-economic approach's time perspective is between 100 to 1000 years. There is more of a focus on long-term benefits than short-lived economic and mastery-over-nature gains.

Thus, it is clear that there are many hidden values, assumptions, and biases driving technological practices. If a person opens their eyes to the inherent social and cultural aspects of technology practice, it becomes easier to comprehend issues such as the focus on the armaments industry or why we offer food to third world countries instead of developing self-sustaining systems. It also begins the process of trying to change it. There are still two more important factors to consider. These are the structures of technological systems and the culture of expertise.

The Structure of Technological Systems: Its Inherent Problematics
Hughes (1987) gives a good depiction of the structure of technological systems. They are socially constructed and society shaping consisting of different components or physical artifacts such as 'scientific artifacts' (books, texts), 'legislative artifacts' (the regulatory laws), and systems artifacts (natural resources). All of these interact and sustain each other. If anything disappears or is changed all the components must adapt in some way. The characteristics of these components come from the system and influence its structure; it is a self-

perpetuating system. The most important factor is the system builder or engineer. Their strategies are closely in tune with the needs of the system and meeting profit demands. They not only invent and develop the required technical components but also the organizational forms best suited for creating centralization and coherence. The most ideal is a closed system where all environmental factors are controlled.

Technological systems are inherently hierarchical and have subdivisions. It is easy to disregard the whole system when analyzing a problem. Each division exerts pressures upon another. This gives no creative leeway and most innovations within a system are seen in the context of technical fixes versus technological change. If one cannot perceive the entire scheme of the system (for example automobiles have several co-dependent subsystems working together from oil to road repairmen) then the scope of the technological influence is not properly accounted for. This also means that radical change not is likely to occur, making technology again seem like a linearly developing neutral entity.

Pacey (1983) points to another factor that depoliticizes people and prevents them from taking part in technological change, namely the culture of expertise. Experts are educated with texts and theories that use the economic and technology-based approaches. This makes their vision very narrow. It explains all the poor results in third worlds and the focuses on unimportant issues in the scope of human needs. Pacey (1983) states:

> They learn to examine specialized aspects of problems with a concentrated attention that blinds them to other issues. Food shortages and energy

problems become narrowly technical questions, with many aspects of organization and use forgotten. The technology of a green revolution, for example, may be planned to increase food production without any clear idea of why [this is the case]. Many people have become poorer precisely because of such exports [of increased produce to third world countries] – .
. . [this has] made many of them *more* hungry than before (Pacey, 1983, p. 36, 56).

However, even more importantly experts are deemed neutral professionals and as such are not often questioned. Both government and state officials, as well as the general population, listen to their 'expert' advice.

What is Technical Literacy?
Unlike computer literacy, which simply understands how to use computer applications, technical literacy involves understanding all the factors listed above as they influence technology practice. These factors include values, cultural biases, prejudices, and power relationships including economic social stratification, hegemony, and gendered approaches to technological questions and theory, that as argued earlier result in ambiguous terminology, and a focus on economic profit or capitalism. This must all be accounted for when trying to become technically literate. However, it is absolutely vital that critical thinking be involved in this educational process for it will not only break apart technology myths, it will lead to new visions and social change. Technological literacy is a literacy that I feel should be pursued at the university level, in particular in all branches of science related to it. It should involve technical literacy with a critical

understanding of the structure of technological systems and the mystified role of experts in order to have more technological versus technical changes occurring. It would also lead to more ethical decision-making.

Education as a Cog of Technocracy: the Effects of Capitalism on Education

Apple (1999) draws on Bernstein's neo-Marxist socialist stance on the role of education to argue that education plays a decisive role in maintaining economic stratification due to capitalism. This explanation differs from the original Marxist stance, which was hopeful that a worldwide revolution would automatically occur whereby the working class would protest the unequal power structure created and maintained by capitalism. Marxian thought had an inherent *Automaticity Thesis*, but the revolution never came, at least when and where he predicted. Neo-Marxists, like Marcuse, Horkheimer, and Adorno of the Frankfurt School, have elaborated on Marxist theory by further re-defining capitalism. For Marx it was solely an economic system but now it is defined as both an economic and cultural system. This changes the areas and level of analysis in regards to issues of power. All institutions are viewed as being a part of a system that reproduces unequal power relations in a capitalistic society. These include family, the state, and cultural institutions. Bernstein (1973) has contributed greatly to this type of inquiry in his analysis of how power relations function in school. He maintains that overt and hidden curriculum, pedagogy, and evaluations are evidence of "relations of dominance and exploitation in the larger society" (p. 138). He makes a clear link between culture and power by connecting it to school, economy, and different cultural codes; I do not delve deeply into the matter of cultural codes for

this thesis. For Bernstein, unlike Marx, class is not the only factor involved in

power relations but is only a part of several factors. The relations between class

and culture are a reflection of the allocation of power in society: how different

social groups dominate or exploit others, and how power relations are maintained.

These power relations are, for Bernstein, maintained through language codes. The

harder it is to gain access or understanding of the dominant code the more likely it

is that nothing will change because communication is the reflection of a particular

linguistic code. This also adds to the culture of expertise. If someone has training

in the dominant or high status linguistic code then that person is viewed as more

of an expert. The language code determines the status one has within society and

reflects different power relations, economic or cultural. We can stretch this idea

into the different types of literacies people possess as forms of cultural power. If

we apply this to technical literacy, then possessing it while others do not would

reinforce power relations and economic stratification. It would then seem that

everyone should be technically literate in order for there to be equality in society

but we still have not dealt with aspects of democratic education, which is

discussed in later chapters.

Apple (1999) demonstrates the decisive role people play in the cultural

reproduction of class interactions within school and society. For Marx it was

visibly related to economy but now it is far more subtle. In order to deal with the

problem of economic stratification and the potential for changing it, we must

examine curriculum and those who form it; the middle class. The idea is that by

illuminating how power functions in schools we reveal how power functions in

wider society. Within the middle class, different positions are occupied in respect to the social divisions of labor of "symbolic control" (Apple, 1999, p. 146). The agents of the middle class who are in dominant positions of power/production are divided into two categories: those for whom communication is a means for obtaining physical resources (economic capital) and those for whom it is a means for obtaining discursive resources (cultural capital). This is an immediate example of how class is based on both cultural and economic assets. The upper and working classes are viewed as being classed according to their control over material things. All material things have some type of status. It is the extent of control that determines the resulting power relations that have arisen from a social division of labor. One must never forget that for Bernstein (1973), both material and symbolic things are cultural.

Now we must look at how societal or class change occurs. Bernstein (as cited in Apple, 1999) gives a brief account of how class positions change. Apple states that for Bernstein, change occurs when there is a transformation in production methods, which "'automatically' generates new classes and class fractions with identifiable cultures that are linked directly to their experiences of paid work" (Apple, 1999, p. 150). These changes will most likely occur due to conflicts within the middle class. The two factions of the middle class are conflicted over visible and invisible pedagogy. Visible pedagogy sees employment in direct relation to the economic field whereas invisible pedagogy views it in relation to symbolic control in particular agencies, usually of the public sector. Therefore, for both sectors, education can be converted to both economic

and cultural capital, but visible pedagogy is more openly concerned with economy. This means that computer technology would be a part of visible pedagogy and technical literacy would be a part of invisible pedagogy. Consequently, if there were a change in technological production new classes would be generated, as would be the case if the form of technical literacy were changed (invisible pedagogy) for I feel it plays into symbolic control or economic stratification.

Apple's (1999) position is rooted in a neo-Gramscian, radical democratic perspective. He elaborates on Bernstein's theory. First, he adds to Bernstein's definition of class and historical change by explaining that it is not only production changes that foster transformation. There are also the outcomes of creativity inherent in all cultural structures and agents to be considered. Bernstein (1973) focuses on cultural/economic reproduction, not production. Therefore, no attention is paid to the power of social movements. Apple (1999) points out that change within economic stratification is not simply a result of transformations within the social divisions of labor; it may result from struggle and change created by a social movement in the lower or middle class. It might not simply be the result of new technology. This is basically what I have noted above regarding change occurring when invisible pedagogy or ideology changes. Bernstein's definition of 'class' is also too simplistic. When he discusses the effects of labor restratification, he talks about it in terms of homogeneous groups (Barakett & Cleghorn, 2000, p. 31); race and gender are not accounted for. It is race and gender that are creating ever more class-like divisions of stratification. Thus,

social divisions must not only be perceived as a consequence of economic class status but also in terms of race and gender.

Apple (1999) also looks at Bernstein's conception of the role of the state. For Bernstein, curriculum and pedagogy are formulated for and by the middle class. Since education is an extension of the state it makes sense that it would sponsor "market-oriented" (p. 154) programs. Bernstein (as cited in Apple, 1999) perceives the results of this as being due to the interests of the middle class, who concern themselves with visible pedagogy, linked directly to economy. However, the state represents capitalism, is in itself relatively autonomous, and serves its own needs of legitimacy and control. This means that the role of the state must be incorporated into Bernstein's accounts of cultural reproduction, as must be the role of social movements who are in conflict with state interests. This is essential for understanding how power and control function.

The Role of the State in Education

According to Freire (1998), the levels of consciousness in a given society are determined by the type of historical and cultural conditioning, as mentioned before. Torres (1998) states that this conditioning also affects one's theory of state and public policy, which in turn affects what is viewed as social problems. If the perception of social problems and realities is not arrived at through conscientization, any problem assessment will not be authentic and potentially liberating. These false perceptions affect the way people view education, citizenship, multiculturalism, and the welfare state.

Torres (1998) draws on Weber's definition of the State as one based on

legalized, monopolized force. Its citizens are formed through pedagogy.

Therefore, education is responsible for the masses' state of consciousness.

Regrettably, nothing beyond a *semi-transitive consciousness* is taught. A semi-transitive consciousness is, as stated by Freire, like a dream state of awareness in which societal truths are covered over by myths or ideology. There is be no protest with a semi-transitive consciousness. The fact that I am writing about it means that I am beginning to see through this veiled reality and am on the brink of a *naïve consciousness*. Torres uses Freire's (1998) nourishment theory to describe educational practices; it is not based on ideal democracy. History is used as a rationalization for this, creating a sense that the future is unalterable, alienating the subject from dialogue and change.

Torres (1998) reveals that the form and functions of the state are the source of these problems. The state, which includes administrative, policing, and military institutes, has the mandate to "extract(s) resources from society" (p. 17). It is this that is at odds, and a paradox, within the democratic system. Torres uses Weber's scheme of analysis to unveil the state. According to him, one should study the ". . . institutional mechanisms of the operation of the state, and especially on the exercise of authority of the state and the relationship among nation states" (Torres, 1998, p. 24).

Torres then goes on to explain that the state is the concentration of force and power, which it exercises in mediation between different elite interest groups to retain control and authority. With capitalism at the core of most power relationships, the state must find a way to balance profit making within

democratic principles. This paradox creates the frictions that must be pacified and veiled. The results are that ". . . political life is not divorced from the basic determinants of social and economic life. Therefore, domination, exploitation, and discrimination are an intrinsic part of state activities, reverberating in the constitution and exercise of state power" (Torres, 1998, p. 26).

The capitalist state covers this up by talking in terms of history and economy. Privatization and the "socialization of production" (p. 29), or human capital theory, are implemented to convince and deceive people to go along with this as though it were the way things should be. The resulting class system is deemed acceptable. This affects the type of education provided because the state does not directly control production and because it is hard to see it for what it truly is, it creates a system that perpetuates the capitalistic system while pacifying the population. Even when basic human rights are diminished, for example the welfare state, the state calls upon scientific and expert knowledge to support it. In other words, the state manipulates people by using mystified expertise that appeals to a semi-transitive consciousness.

Education never addresses issues of state and politics, of which it is a product! Torres (1998) points to Gramsci's description of education as the state's means for "social conformism" and is "an integral process of indoctrination, ideological perpetuation, and/or the perpetuation of a 'common sense'" (p. 13). The demand for economic outcome is thus justified. This creates in Torres' words "a system of legitimizing beliefs that will assure loyalty" (p. 31). Essentially, public policy and state expenditure are responsible for pedagogy and economic

growth.

Neo-conservatives states, contends Torres (1998), epitomize the worst of
this situation. They separate the welfare state from politics and economy. The
result is that those burdening the system are viewed as lazy, not living up to their
cognitive capabilities because schools produce workers and economic growth!
This assumption pushes forth privatization and market-oriented reform as a
logical means of equal opportunity without addressing social issues and varying
levels of discrimination. It also has the effect of depoliticizing policymaking, thus
further reducing the chance of unveiling the actual workings of our social reality.
The welfare state is thus seen as a financial burden for the benefit of lazy people
with the 'War on Poverty' conveying this sentiment.

Torres (1998) further contends that due to fiscal crisis, neo-liberals are
guilty of falling in line with neo-conservative beliefs and have also begun
advocating privatization and reduction of the welfare state. I would push this
further by going back to my original definitions of neo-conservatives and neo-
liberals; both are inherently flawed due to the principle of autonomy. At some
point in both of their histories, there has been some focus on social issues but
both, in the end, have shifted their focus to profit.

Torres (1998) points to classical philosophy, which says that the state
should be the "the personification and guarantor of collective wishes" (p. 10). In
order for this to come to fruition, people must be politicized, awakened, or
conscientized to play an active role in the state. Schooling must be an integral part
of it, for as we have seen, it plays a crucial role in the formation of citizens.

Pedagogy must be critical in order to see social reality for what it is and transform it to its ideal state. There must be a "desacrelization of grand narratives [and] seek(s) to establish new moral and political frontiers of emancipatory and collective struggle" (p. 22). In a world geared towards globalization, international markets, and hegemony, it becomes even more critical to begin this undertaking as "the stakes for emancipatory politics in education" (p. 63) have risen. Even the neutrally regarded civil and public spheres run rampant with unchecked ideology, with the media and individuals further personifying the consumer culture created for the sake of capitalistic profit. All becomes intellectualized, not reflected and acted upon for transformation.

The current form of state does not allow for critical, dialogical reflection and action based on communication with the people. Yet, since the state is constructed around liberal democratic principles of autonomy, this means that the balancing act of democratic principles is carried out with full recognition of the inequality resulting from an extraction of resources. According to Torres (1998), resorting to functionalist theory does not account the wide disparity between the haves and the have-nots. Thus, the state should be held responsible. This is only possible through a "historical-structural analysis of educational processes in capitalistic societies" (p. 37). An analysis of power structures, through a dialectical approach, must also be done. The functions of the state and power relationships are so multi-layered and complex that microanalyses are required to come to a macro-analysis of our social reality. For this reason, an analysis of the reasoning for technical literacy and computer technology in schools may show the

underlying technocratic ideology and capitalistic motivations driving them.

Summary

In the preceding sections, I presented a brief overview highlighting the fundamental problems that exist in our society and educational system in relation to capitalism and technocracy. The purpose is to show why people, the state, education, and technological change function as they do. The sections on historical and cultural conditioning: why the masses remain passive, misperceptions and ideology leading to the 'technology' as neutral view, technology is not a neutral entity, and the role of the state in education help to answer the research question of what are the motivations for introducing computer technology into classrooms? The motivations are located in state interests, the beliefs regarding technology, how experts are trained, and technocratic motivations. As to assessing the drawbacks for students/society in having classroom access to computer technology and not having an adequate technical literacy, the sections on the impact of technical illiteracy and education as a cog of technocracy; the effects of capitalism on education clearly show that economic stratification is maintained and added to with this aim and that ideal democratic citizen formation takes a back seat to economic interests. This also helps to answer the question does technical literacy promote responsible citizenship? The answer is no and will be discussed in the conclusion chapter in further detail.

Capitalism is widely seen, as a way for people to prosper but profit that does not take into account basic human rights and needs becomes a part of a

mechanism of economic stratification. Economic stratification must then be justified as necessary and inevitable, further disempowering the people who most need help. It is within this context of critical theory that I examine the impacts of introducing computer technology into the primary and secondary classroom as well as analysing how technical literacy is defined in the following chapters.

Chapter 4

How and Why Computer Technology and Technical Literacy is Being Promoted
for Classrooms and its Ramifications

In this chapter, I present the arguments forwarded by techno-advocates for

the computerization of schools and libraries and the counter-arguments of techno-

critics. These arguments are analyzed in the final chapter in order to evaluate

them in context of responsible citizenship and to come up with the most ideal

version of computer technology use and form of technical literacy.

The Rationalization

I begin with a description of the justification used to introduce computers

into classrooms and for the electronization of library databases in order to

demonstrate some commonly held views used for justifying this endeavor. The

United Nations report (1994) cited earlier states that people have a propensity to

view new technologies with veneration and accept them without thought to the

past and as an inevitable road to the future. Evidently, reverence is being given to

new technology. This reverence is evidenced when looking back over the history

of technological change. Toffler (1970), Cleveland (1985), and Stoll (1995) all

point out analogies with past circumstances on the lack of forward thinking and

critical analysis of consequences with the building of highways and the atom

bomb. This lack of forward thinking may stem from the results of immediate

capital gains and also from the excitement of the expected technological change.

In education, the most appealing arguments driving educational reforms from

market-based curriculum to computer technology are capitalistic motivations and

reasoning. A concrete example is given by Dei & Karumnachery (2001) who

discuss how neo-liberal and capitalistic rhetoric (an individual's freedom to pursue economic gains) in Ontario has been a successful way of gaining public consensus to reform education around market-oriented goals. Not only must students be good workers; they will become such with the aid of computers.

Techno-critic Stoll (1995) provides us with some typical views and predictions that go hand in hand with the positive outlook on technology. The Internet is seen as being a vital asset for the infrastructure of commerce and education. Commerce-wise it is projected to add $100 billion to the GDP with the creation of 500000 new technology based jobs and increased consumerism via the Internet. Education-wise, it is to prepare children for an increasingly computerized world. This is also supposed to happen on a global scale.

The claims go further as techno-critic Stoll (1995) continues deeper into his analysis of why computerized education is winning over so many minds. Computer networks are purported to "bring diversity, culture, and novelty into our classrooms" (p. 21), build a global sense of community, or *e-community*. This is, however, dependent upon every sector of society on a global level having access to the Internet and having everyone using computer technology in classrooms in the same.

Furthermore, they are considered to be "tools for thinking" (Stoll, 1995, p. 44) or tools to make us think better. This is in regards to the reordering of learning priorities. Time would no longer be wasted on rote memorization; instead, students could focus their attentions on more important learning priorities such as applying the end results of previously memorized facts to other situations.

According to Cunningham (1997), people claim that computers will be available for all that information that traditionally had to be memorized through rote memory and will allow us to reorder the 'priorities' of learning. For example, not having to delve into a particular country's history but using previously gathered facts to come up with a hypothesis. All of the above are very alluring ideas. Of course, people would want to be able to think better, work faster and be more multi-cultural. The word 'tool' itself is very attractive as well for theories of human evolution seem to depend on the inventions of tools. It is a commonly held belief that the first steps forward in human evolution were due to the inventions of tools; tools for hunting enabled humans to eat meat and store more energy for use in new 'mental' activities. As such, the invention of new tools are deemed evidence of further evolution and perhaps even seen as inevitable. Moreover, there is "a technocratic belief that computers and networks will make a better society" (Stoll, 1995, p. 50) because it will bring humans closer together and help us to develop a better understanding of each other.

Not only is there a trend to see computers as tools for improving education, but there is also a push to completely computerize libraries and make them available online. The suggestion is that this will lead to greater access to information worldwide. There is also a prevalent belief, as explained by techno-critic Stoll (1995), that eventually everything will be free. If this were to happen, then everybody would have access to the same information and become empowered. Countries that may not have developed their information base as rapidly or extensively, or have restricted access compared to other countries, can

benefit from such advancement. Furthermore, it would also allow those who live on the margins of society to retrieve information that may have been unattainable due to financial or physical reasons.

Rosenberg (1991) says most computer promoters feel that "Computer literacy will transform students into productive workers, informed citizens, and wise decision makers in the 'information society'" (p. 59). In regards to the productive worker, it is felt that technical literacy courses in school will lead to high technology job placement and that this is essential for any country's economy on an international level. The 'jobs' argument suggests that there are and will continue to be a lot of high technology job opportunities that students should be well prepared for. Next is the intellectual training factor. He states that some people feel that computer skills translate to the increase of other mental skills because it " . . . provides logical systematic framework for problem solving" (p. 61). Lastly, the proponents of the informed-citizen-creation argument contend that those lacking technical literacy will be left behind because computer technology is omnipresent and unavoidable in everyday living. Without technical literacy, people will be lacking the appropriate literacy to function in society. Rosenberg, like Stoll (1995), indicates that this push for technical literacy is a part of human's long-standing fascination with technology in general and belief that technology is a solution to the problematic human condition.

A new trend occurring in some schools, and used for the push for school computerization and technical literacy courses, is what is termed as the *intranet* (Clyde, 1998). An intranet is, according to Preston Gralla (cited in Clyde, 1998),

"When Internet technology is applied and used inside a corporation, and open only to its employees" (para. 3). The same system is being used in schools where teachers and the school's administration can access and have control of all of the school's databases. This can also be extended to the library catalogue. Through the intranet, students can circulate their work within their own school community. The result would be greater dissemination of information and more colleague input. Students will also have access to online material, which has been approved by the teachers and administration as being content and age appropriate. It could also be used as a means for providing extra course materials or an online course that may not be available within a particular school.

Fred D'Ignazio (in Clyde, 1998) states that the school intranet can be "a magnet for collaboration" (para. 6). It will enable students of different grade levels or from different courses to work together, making learning more collaborative and multi-disciplinary, all of this being done without the hazards connected with the Internet. This working model has been taken from the business setting. By the late 1990s, 90 % of the top 500 companies in the United States had intranets in use for the main purpose of having people collaborating with each other. Thus, it is argued that another result of having a school intranet is that it better prepares students for the business world as it "expose[s] students to practices and styles of working that are becoming more common and more valued in the corporate world" (para. 6).

In a doctoral dissertation study, Hounsell (2000) provides some insights into how computer technology is being used in schools to help at-risk students.

She draws on Means (1997) who claims that it is essential for students to learn how to correspond with e-mail. By doing so students would be engaging with genuine life situations but more importantly it "develop[s] higher order thinking skills and involve[s] them in authentic learning tasks. . . . technology could do this while raising student motivation and involvement" (in Hounsell, 2000, p. 42). Technological savvy is not the sole focus of technical literacy for Means; it is also a vehicle for students to become involved in what is happening in the world. It is viewed as a necessary and unavoidable tool for communication and also for raising the knowledge of course content. These are some of the driving beliefs behind the policies being enacted to introduce more and more computers into classrooms and libraries (or replacement thereof).

Techno-critic Stoll (1995) shows that the most surprising claim is that the computerization of schools and the promotion of the Internet and library databases will result in the greatest form of democracy. The conception is that the Internet is unprejudiced and anti-racist or neutral, and a medium for a diversity of voices. Once the government is fully online, like our schools, people will be able to interact with officials more openly and immediately as issues arise. This will then translate to a change in elections because politicians will no longer rely on expensive advertisements and sponsors; they will send their messages freely over the Internet. It could mean an end to corporate controlled state interests of policymaking. This would all eventually lead to online voting, polling, and a more open government. It would be more open, advocates claim, because policies and regulations would be available on a downloadable archive and issues could be

voted upon as they come up resulting in more frequent change; hence more democracy in action

The Fallacy of pro-Technical Literacy Arguments in Primary and Secondary Schools

If the arguments of techno-advocates presented are accurate, then the benefits of having computer technology in classrooms are/will be enormous. There are several appealing arguments for the computerization of schools. The first is the argument for jobs training. This claims that students being trained with computer technology will be better equipped for the job market when they graduate as there are supposed to be many high-technology jobs awaiting graduates today. The second argument is for intellectual training and argues that computer training in classrooms will also allow students to skip over meaningless rote memory drills and allow them to focus their learning on higher priority issues. It will also allow students to 'think better'. The third argument is for societal training; whether or not a student intends to go into the technology based job market. It is argued that they should be schooled with computer technology in order to be prepared for the computerized world at large. The fourth argument is for the creation of an e-culture and improvement of democracy. By having access to the Internet in classrooms students will have more contact with a different cultures resulting in more multi-culturalism. It is argued that this will result in a more democratic society as students mature into decision wielding adults who are informed and empathetic with a global perspective.

It is crucial to critically examine the benefits put forth by techno-advocates for the use of computer technology and technical literacy in classrooms

59

at the primary and secondary levels. If they do not hold weight then it is necessary

to come up with viable, democratic alternatives that will meet the needs of

citizens, not solely capitalistic production.

The first argument is capitalistic motivations and reasoning. The reality of

technological projections and assumptions are quite different from what is being

said by advocates. To begin with, the economic projections, as related by Stoll

(1995) and the UN (1994), miss the mark of future technological projections. Job

creation resulting from computer and technological advances is hard to predict.

Just as many, if not more, jobs are lost through the deskillment of labor as they

are created. Also predicting what jobs to be trained for is extremely unreliable.

Bouchard (1998) states that today the "largest growth in job opportunities has

been in the service sector" (p. 133), many of which are unskilled, requiring little,

if any, education. One must question why so many regard the contrary to be true.

Stoll (1995) echoes Bouchard's view citing the need for more cooks and plumbers

and wondering why parents and policy makers push for computer-based skills

instead. As for the increase in consumerism, Stoll (1995) argues that not even this

projection is credible as most people still prefer to shop in actual stores. The

justification for using computers in schools for future job training is therefore

unwarranted. Therefore, it is imperative that we ask what education is being

overlooked or dismissed in place of computer technology classes.

Next is the argument for the reordering of learning priorities. Techno-

critic Stoll (1995) cites some arguments as claiming that computers are "tools for

thinking" (p. 44) or tools to make us better thinkers and will reorder learning

60

priorities. Rosenberg (1991) states that most computer promoters feel that computer literacy will create productive workers and informed citizens in our "information society" (p. 59). There are some potentially negative consequences to this assumption. First, there is the idea that computers can take over the memorization of facts that has supposedly wasted so much of students' time. Stoll (1995), for instance, argues, "calculations seldom give deep insight" (p. 103) and by simply relying on computer generated facts and charts a person might not give as much weight to qualitative analysis as to quantitative data. By not thinking about what data to get and why, we may be skipping an invaluable step in the process of critical thinking. When we are simply given the end result of research, thinking is not really required. Armstrong and Casement (as cited in Kettner, 2000) also bring up the fact that the end result of research being put into electronic versions, such as encyclopedias with excellent reputations, contain less text than their hard copy counterparts so that complete coverage of subject matters is missing. In addition, continues Stoll (1995), the type of 'knowledge' being transmitted by a computer is factual versus qualitative. You would never get an exact answer to why people believe in God from a computer; you would get statistics on how many people believe in God. The nature of reflection involved in both types of data will be different.

Without proper thinking skills, a person may simply become an 'automaton'. Stoll (1995) argues, "computers punish the imaginative and inventive by constraining them to prescribed channels of thought and action" (p. 46). We must be wary of regarding computers as simply as a 'tool' because often

the resulting behavior of a person using it is described as being a "reactive

zombie(s)" (p. 45). No thorough meaning is gained from computer-generated

facts, which simply reflect one person's limited understanding. People are being

supplied with someone else's perspective without being given a chance to develop

one's own. Computers, Armstrong and Casement (cited in Kettner, 2000) claim,

"present us with an artificial world that undermines our ability to experience the

real one" (para. 2)

Another consequence of using computer-generated data is a lack of hands-

on learning. Armstrong and Casement (in Kettner, 2000) analyze studies that

show how computers effect the thinking skills of young children. The studies

show that when children use computers to perform learning tasks fewer areas of

the brain are activated then when the same task is performed manually, for

example sorting colored blocks. The same holds true for children at the writing

stage; writing on a keyboard fired fewer areas of the brain then using an actual

pencil. The only advantage, they conclude, is that the student's work looks neater.

The results are that young children do not develop and learn as they should

because vital areas of the brain are not being triggered or the brain starts to

deteriorate. This is in stark contrast to what is promoted by early childhood

education philosophers, such as Dewey (1986), who promoted constructive

learning as a method for real understanding and learning. Stoll (1995) also attacks

the loss of hands-on learning as a loss of creativity and curiosity saying, "Indeed,

it's a rare hobbyist that wires PCs into an experiment" (p. 75). I would go further

to say that a loss of creativity and imagination means there is a decreased

likelihood for social change because radical change comes from imagining possible alternate circumstances.

Researchers and students are at risk of becoming lazy, misinformed, and less insightful when research is done on the Internet. The quality of the data being gathered from the Internet is questionable. Stoll (1995) argues that because most editors and writers want to be paid for their efforts, good-quality research is often hard to find on the Internet. This type of research will most likely be of a mediocre quality. As for libraries becoming computerized, he points out that researching a topic via an electronic database versus a card catalogue will not be as good because the links between various topics are not be meticulously inputted. Not only that, not everything has been scanned for online use. Stoll states:

> The cool stuff seems to predate computers. Dusty newspapers and magazines tell me where we've been. . . . None of these shows up online; they've never been scanned into a computer. The researcher using online resources has a fifteen-year horizon....nothing's been digitized before 1980 (p. 175).

Basically, virtual electronic libraries of the same caliber as actual libraries simply do not exist! In addition to Stoll's (1995) view, Stapleton-Watson's (2001) two-and-a- half-year study on the insights of some eighth graders' experiences with computer technology and Internet skills found that the general self-confidence in using the World Wide Web for pleasure was not carried over to its use for school research. The students stated that they were not taught how to go about online researching and that when they tried there was too much conflicting information

on the Internet from unreliable sources. Armstrong and Casement (in Kettner, 2000) also find many problems with online learning. Not only is the endless information found online inaccurate and a waste of time, but students are also inundated with relentless commercialism. Online learning should be about retrieving good and accurate knowledge at fast rates; it should not be another opportunity for advertisers to target students.

As stated in previously, a number of scholars contend that computer training and online access are worthwhile endeavors for the medium of voices that will be heard through an increasingly computerized world. It is argued that everyone will eventually be 'online' and a greater sense off community or e-community on a global level will be achieved. Cunningham (1997) calls this a 'technocratic belief' and for Stoll (1995) it is the myth of 'techno-Marxism' (p. 208). For Stoll (1995) worldwide access to library databases and to the Internet in general is a far-fetched reality. It is unlikely that capitalism, which is a money driven ideology, would suddenly become altruistic. Access to computer technology and the World Wide Web is determined by economic factors. One must own a computer to use the Internet and schools themselves must be properly funded to buy the technology, which is ever changing. According to the UN (1994), "Since change is rapid, all forms of technology can be adopted only where investment is high. For the same reason it is necessary to train workers continually. . . . The spread of the technology will be mainly limited to developed countries that have the . . . investment potential" (p. 14).

The seeming neutrality of technology keeps people from questioning its

motivations and ideology, which facilitates the technocratic maintenance of

economic stratification at all levels of society throughout the world. This means

that technology is present where there is money and also because it is seen as a

form of social capital. As well, Stoll (1995) argues that schools which have

funding for computers have a higher level of prestige. Some schools are even

making computer ownership a prerequisite for entry, thereby upping the social

capital requirement and keeping many disenfranchised. This also affects the

informed-citizen-creation argument; promoters assert that those lacking technical

literacy are missing the appropriate, pervasive literacy needed to function in

society. Evidently, computer technology is not omnipresent due to economic

factors. Therefore, the informed- citizen-argument is left wanting unless it is

brought down to specific community statistics.

The information regarding school intranets has some credence in that it

builds up a collaborative network for students, according to Fred D'Ignazio (in

Clyde, 1998). However, one must question why this type of collaboration cannot

be done on a more personal and physical level in classrooms. The question it

begets is how students can find the time to do extra curricular hours on the

school's intranet and critique other students' work. The argument that it

"expose[s] students to practices and styles of working that are becoming more

common and more valued in the corporate world" (para. 6) is also not compelling

enough to use for pushing intranets in schools. As already discussed, many jobs

will be in the service sector and a corporate model of training might not be

necessary for all students.

Hounsell (2000) discusses using computer technology to help at-risk students. She alleges that it is essential for students to learn how to correspond with e-mail because it is one of the most current forms of communication today. Not only would students be learning a current usage for computer technology, it would also be a "meaningful real life situation" (p. 42). This point could be challenged in two ways. Perhaps it is true of students here in Canada and the United States yet even so only 53 % of households in the United States owned computers in 1998 (Tapscott, 1998) and 68.7 % in Canada in 2004 (Statistics Canada). One can most likely assume that these numbers have increased as there has been a steady increase in both sources tables. This argument cannot be made on a global level as the statistics do not transfer to developing countries. Another point to consider is whether or not these skills have to be taught at all. Sending an e-mail is not complicated. A friend taught me within half an hour to set up an e-mail account and to send and receive messages. Perhaps it would be better argued that students become more motivated when technology is involved.

This leads us to the next problem: the idea that computer networks can bring about a rich online community and consequently help improve democratic dialogue with a plurality of voices. First of all, it has been argued that only a sector of the world will have access to computers. Secondly, Stoll (1995) states that the nature of online interaction works to ". . . isolate us from one another, rather than bring us together. . . . It's [online interaction] the same intolerance found on the highway. . . It encourages a divorce from parental values and the

dominance of peer culture" (pp. 58-9). Basically it is driving society to behave continuously more undemocratically.

Now we must contend with the claim that it will lead to a more democratic and open government, as discussed previously. According to Sherman (1985) and Roszak (1969), computer technology inevitably influences how we view politics. This is because online polling will lead to online dissemination of information intended to persuade people. The type of questions, answers, and facts we receive online are filled with hurried opinions because most things that are typed, especially in real time chat rooms etc., are not thought through, may be filled with hearsay and misinformation, and "Democracy is too delicate a matter to be the subject of trendy, populist techniques, and moreover ones that lend themselves to manipulation and corruption, e.g. the notion of instant decision-making" (Roszak, 1969, p. 347). Roszak (1969) continues that the very way we are being convinced to employ technology in our lives is undemocratic; it could not possibly lead to more democracy! He also states that the greatest threat to democracy is when "some force other than reason shapes reality" (p. 12). In this case, that force is capitalism and technocracy.

Rosenberg (1991) goes on the attack with the arguments he cited promoting technical literacy education. First we start with the jobs training argument. Rosenberg begins with a focus on the actual type of jobs training that would be required for most high technology jobs. The typical technical literacy class involves nothing more than a basic knowledge of computing. He even cites that the knowledge gained in a technical literacy class does not change much from

kindergarten to secondary school. One could thus argue that technical literacy

class could be limited to one year in primary school. He goes on to state that

programming is a major job training component but that the programming that is

taught is very minimal and usually done by way of "intuitive fiddling" (p. 60) and

represents the type that was in use some twenty-five years ago. He quotes a

Harvard professor as saying "Secondary school education is doing nothing for

these people. They don't know anything about computing. It's a waste of time."

(p. 60). Teachers are not properly trained to teach adequate technical literacy and

students are not aware that what they are being taught is quite meaningless.

Rosenberg then goes on to cite the same misperception of the high technology job

market as Bouchard (1998) does seven years later. He points to major lay-offs in

the industry in Massachusetts and that jobs which need computer training are

typically in the service industry, requiring very minimal training or none at all.

Most managers who talk about the need for high skilled labourers do not mean the

need in relation to computer skills but rather that employees can read, write, are

mathematically adept, and work well with others. The fact they call these 'high

skills' may be a reflection of the general lack of them, which brings into question

once again what we may be sacrificing in our education when we focus on

technical literacy skills.

Next Rosenberg (1991) explores the intellectual training argument,

especially the assumption that using a computer develops higher order reasoning

skills that are transferable to other areas of study. This type of reasoning is not

justifiable. Rosenberg uses evidence from psychologists to show that such an

assumption cannot be supported with conclusive evidence. A study conducted by

the Bank Street College of Education in New York compared students with 30

hours of computer training with students who had none. The results showed that

there was no measurable difference between the two test groups' cognitive skill

transfer to other domains. A more concerning result, however, was that those in

the computer programming course had problems with solving simple algorithms

which are "the intellectual basis of all programs, and some students failed to

understand even programs they created" (p. 61). This shows that students are

good at regurgitating what their teachers ask of them without having to apply any

real critical thinking skills to achieve their goals.

In examining the informed-citizen-argument, Rosenberg (1991) contends

that even though computers may be all pervasive, it does not mean that we have to

understand how they work. He makes an analogy with all the different

technologies in our lives. One can drive a car without understanding combustion

or use a television without full knowledge of how electricity and images are

transferred. Most computer programming or technical literacy classes would not

even begin to explain the evolution or workings of a computer. One could

question whether most computer engineers or programmer from the university

level even knows this information. He claims that computer courses may cause

harm to those who feel that they have been well educated in computer technology,

leaving them with a false sense of security. He says 'dangerous' because the small

programs used in schools are not comparable to those used in large corporations

where one error could have considerable repercussions. Although I can see where

Rosenberg is coming from on his counter attack on the informed-citizen's-argument, I think he misses the mark slightly. As mentioned earlier, I think it is necessary to define 'all pervasive' to particular communities. I think a higher income community has higher levels of distribution as compared to lower income communities. Grand statements cannot be made as distribution is directly related to economic factors. Also, the idea of being an 'informed citizen' is not about understanding the workings of a computer; it would be more about knowing how to use a computer as the general population is able to, or one's particular community.

The Drawbacks for Students, Teachers, and Society in Having Classroom Access to Computer Technology

There is a lot to be concerned about after dissecting the arguments for the promotion of technical literacy and computer technology in schools. According to Rosenberg (1991), many people feel that it is necessary to have technical literacy and computer technology in schools as technology is often seen as a universal remedy for human problems. This echoes Stoll's (1995) view that there is "'a technocratic belief' that [technology] computers and networks will make a better society" (p. 50). These are the effects of technocracy and capitalism, as discussed in chapter 3. In light of all of the above flaws in the arguments for the push for computer technology and technical literacy in primary and secondary schools, it is important that we understand why people are convinced that it is a positive and necessary mode of learning and researching. Failing to comprehend this adds to the potential negative consequences of blindly going along with this technological vision of the future. This issue is complex and must be understood in terms of

70

political rhetoric and notions of expertise.

The language often associated, says Stoll (1995), with those who are computer experts are *"wizard, guru, and swami . . . [due to]... the exclusionary nature of technocratic culture"* (p. 60). This has the effect of rhetorical pacification in that people rarely question what a computer expert says. Experts are so called because many assume that they have a thorough understanding of every aspect of the subject they have studied. The startling reality is that experts are educated with texts and theories, which have a very narrow point of view. This means that expertise is directed at minor concerns when considering the urgency of certain human needs such as poverty. In the end, it is the various power structures/monopolies, motivated by capitalistic gains, that determine where and how expertise is utilized. This means that the experts who are determining what form our education should take are themselves part of an elaborate system looking to justify and further expand itself. They in turn are controlled by other experts. A narrowed expertise, whether in politics, education, or technology, is uncritical and may ignore or fail to address important issues, such as the negative effects and unwarranted push for computer technology in the realm of education. No real forethought seems to go into the consequences of technologies or policies, which in the case of education impacts job placement and issues of democracy including democratic participation and global economic stratification.

Dewey (1986) discusses technology and expertise as the result of the state overseeing capitalism, which leads to more hierarchy and less democracy.

Problems become complicated with a system striving to balance the needs of its citizens and capitalistic freedom so technical solutions are resorted to and implemented by experts. He views this type of meaningless expertise as being a form of slavery/subordination. It is meaningless because it is not done for the advancement of humans; it is done as an extension and maintenance of the state. All of this expertise makes an ordinary citizen disorientated by and therefore passive about what they see, like educational policy, as being in the realm of 'experts'. This leads to another one of the drawbacks in the implementation of computer technology in classrooms. The public mindset on this issue has been developed through effective media saturation in a technocracy and as such has put pressure on teachers to jump on the bandwagon, states Rosenberg (1991). One of the negative aspects of this is that the introduction of technical literacy courses and computer technology are often rushed into without much forethought as to teacher training, educational needs, and curriculum development. In the end, technical literacy courses simply support technocracy. Rosenberg goes on to state that there is often a problem with the software due to the fact that there is so much demand for educational technology and programming, making education an easy market to flood with poorly developed software. There is not much thought given to the long-term benefits of the software for the students and teachers. Thus, it is often not age appropriate, field-tested and is based on a poor knowledge of pedagogy. Whether or not it is done for the purpose of citizens' or economic needs is also questionable.

Education is political. This is the central argument in chapter three that

leads me to conclude that a technocratic agenda infiltrates educational institutions. Education is a part of a political structure. Because of this we must be culturally or ideologically in tune with the form of society the state is trying to sustain. It is through this lens that I argue how computer technology may be just another instrument in the maintenance of power structures.

Bernstein (1973) discusses how power relations function in schools. Curriculum reproduces cultural capital and education serves the needs of capitalistic power structures, which are maintained by technocracy. People are being persuaded that the structure and role of education should serve the needs of 'supposed' economic demand, as discussed earlier in regards to the Ontario Tory reforms, and many economic demands are framed around technology. The notion that education should be directly linked to economic success is a compelling idea for many people. However, if computer training is not leading to better jobs or better ways of thinking, we must ask what the intended results are supposed to be. As argued earlier, it is in fact leading to less critical thinking, poor research, a false reverence for a technology that is not politically neutral, and pacification. It is thus not too far fetched to say that we are being convinced to learn a technology that is somewhat meaningless while at the same time supporting a curriculum that makes people less critical. The end result is a population that is passive and does not try to change the status quo; hence, political inactivity.

Yet another drawback of the computerization of schools is what is being replaced by the technical literacy courses or in the integration of computers in a classroom. People often say that it seems that every generation learns less and less

and now, according to Black (2005), there is a trend with neo-conservatist policy to reduce or eliminate religious education. I would argue that having moral religious instruction could only add to a student's worldview and help to foster more empathy in a multi-cultural and global society. Armstrong and Casement (cited in Kettner, 2000) also state that school funding should not be spent on computer technology because it does not raise levels of student achievement and crucial curricular subjects, such as they the arts, are suffering due to these expenditures. I would also contend from my own educational experience that even geography and history were brushed over with more attention paid to the sciences. Let us now imagine there had been a computer in my history class. I would have to question whether or not the computer would have been used to look into whatever history has actually been accurately documented on the World Wide Web or if the time would have been mismanaged with inadequate searches or other various technical difficulties. A liberal arts style of pedagogy is constantly being downplayed in favour of market oriented courses. It is hard to imagine that any type of true critical thinking can take place without a proper grasp of all fields of knowledge. For example, if a student is not properly educated in history they will not be able properly assess, reflect and act on world events. As mentioned in chapter four, Toffler (1970), Cleveland (1985), and Stoll (1995) use historical events of technological change, such as the building of highways and the atom bomb, to make analogies to present day circumstances to show how a lack of forward thinking and critical analysis of consequences has been met with disastrous results. A market oriented education in effect depoliticizes students by

not giving them the knowledge they need to understand the world and take appropriate action.

According to Blatter (2002), Ellen Rose demonstrates that "the digital content, use, and production of computer based education - is wrapped in a discourse that is permeated by social, ideological, and political structures and values" (p. 262). Because of this, there is nothing truly socially transformational about computer technology and technical literacy classes. In addition to the arguments on the way rhetoric is used to convince the population of the benefits of computer technology in classrooms, Rose delves deeper into the type of language that is used in "teaching 'colonizing' values and practices that are frequently hidden or masked in the discourse around assessment and evaluation" (p. 263). The classroom is a reflection of society at large and the perfect grounds for the dissemination of sociopolitical values. She looks into the research and proposals made by Papert, Minsky, Tapscott, and Negroponte. Through her analysis, she comes to conclude that there is a cultural bias favouring 'technological determinism' and scientific progress. This is a result and reflection of technocracy and a new version of colonialism. Her analysis makes sense. Apple (1999) says the state represents capitalism and is relatively autonomous and unquestioned, serving its own need for legitimacy and control. The technocracy resulting from this type of state and government is a form of cultural reproduction, which is sustained through education. There is an emphasis on 'market values' and 'traditional values' which translate to privatization and control over curricula formation. The result is a 'new hegemonic alliance'

supported by technocracy, which includes:

> dominant neo-liberal economic and political elites intent on modernizing
> the economy and institutions connected to it [and] a fraction of the new
> middle class who may not totally agree with these other groups, but whose
> own professional interests and advancement depend on the expanded uses
> of accountability, efficiency, and management procedures that are their
> own cultural capital (Apple, 1999, pp. 114-15).

This is a more subtle version of colonialism. It is a form of cultural assimilation that is taking place through propagated myths of dependency, notions of expertise, and the belief that technology is neutral.

The drawbacks in the implementation of computer technology and technical literacy courses in the primary and secondary school have centered around unsound arguments in its promotion, a false sense of security in the language of expertise, the development of inadequate software, the idea that technology is neutral, and the loss of other more valuable course or course content to make room for it. However, the biggest drawback undoubtedly is the loss of democracy.

In chapter two, I defined democracy as it should be; a political system that does not allow the state to allow capitalist production and policy to be at the expense of the social welfare of human beings. The implementation of computer technology and technical literacy into classrooms may well be at the expense of human social welfare and very much undemocratic. It is unwarranted economically and serves the needs of power structures by increasing the type of

social capital one requires to get ahead in life, which helps to maintain economic stratification. An emphasis on market and traditional values in curriculum that encourages the use of computer technology as an educational tool is undemocratic because it serves to decrease people's critical thinking skills that help them question reality.

The absence of critical thinking skills is one of the greatest threats to democracy. Without critical thinking, it is hard to imagine how any serious social or political activism will take place. Education is the key to ensuring proper thinking skills.

Not only is technocratic planning leading to diminishing critical thinking skills that foster democratic activity in citizens, its ideology is, according to Toffler (1970), "premised on hierarchy [and is] econocentric" (p. 397). There is no concern for communitarian needs; it is undemocratic. Freire (1998) argues that the reverence given to technology and science (and in the end to economic efficiency) is one of the most influential factors in maintaining social inequality and dependency. Expertise becomes 'specialized' when it lacks dialogue with people and becomes mythologized as an area that people cannot interact with. It becomes a sort of "technological worship" (p. 88) which pacifies people from taking a critical role in change and revolution. Not only are people distanced from engaging in the structure of society and its problems because of views on expertise and the resulting thinking skills from computer usage; experts themselves also lack autonomy from power structures leaving them powerless to implement, maybe even to consider, revolutionary technological changes. Thus, it

becomes a vicious circle.

Summary

There are many negative consequences in the arguments put forward by techno-advocates for the computerization of schools and libraries. These consequences are: first, there may be loss of important subject matters or course content due to the introduction of technical literacy. Second, there is inadequate software that it is often not age appropriate nor field-tested and based on a poor knowledge of pedagogy. Third, learning a technology that is somewhat meaningless also supports a curriculum that makes people less critical. Fourth, it limits the imaginative and inventive and constrains people to set ways of thinking. Fifth, limiting the imaginative may decrease the chances for social change. Sixth, young children's brains do not develop as well as they should when computer technology is involved. Seventh, online learning does not offer accurate knowledge. Eighth, online learning makes students a target for consumerism. Ninth, teachers' technical literacy skills are lacking and tenth, computer technology does not lead to more democracy.

The following chapter examines one of the most significant drawbacks of the promotion of computer technology, the loss of democracy and the lack of the development of responsible citizenship.

Chapter 5

Conclusion:

The Relationship between Technical Literacy and Responsible Citizenship

We must start by examining what responsible citizenship is in order to answer the above question. In chapter two, citizen in the traditional sense was defined as someone owing loyalty to a nation, having voting rights and other constitutional rights due to birth or immigration to that particular nation. Marshall (in Oxhorn in process) defined it through its development in conjunction with civil rights, which were conditioned by the economic structure of capitalism. I extend this definition to behaving in a 'democratic' fashion in order to be a responsible or democratic citizen. A democratic citizen would be one who behaves according to the same content and method as a truly democratic government (Torres, 1998). This would result in the state (the administrative, policing, and military institutes) and government both being subject to the same policies of liberty and equality and in effect would put an end to capitalism's disharmony with democratic policy. This is because people in all sectors of society would behave in a democratic fashion resulting in corporations and individuals being subject to the same definition and obligations as a truly democratic government. A responsible citizen is one who behaves ethically and morally according to the true definition of democracy.

This type of behaviour is not promoted by computer technology or technical literacy. Their very presence in classrooms is problematic due to issues

79

of economic stratification on a communal, national, and global level. The push for

technical literacy as a key element in education is a driving force of economic

stratification and is an indicator of the type of ideology in society at large. When

one examines pedagogy, one is inadvertently examining the larger society and

power relationships. Someone's ideology is being pursued in pedagological

content, whether a single person or a collective of people, and it is important to

determine whether it is at someone else's expense. With issues of computer

technology and technical literacy, it is at the expense of society's most

economically oppressed.

The above is most definitely not in keeping with my stated definition of

responsible citizenship. According to Apple (1999) and Bernstein (1973),

education plays a fundamental role in sustaining the economic stratification

resulting from unchecked capitalism. This is evidenced in invisible pedagogy.

Bernstein's (1973) analysis of curriculum formation shows that it is formulated

for and by the middle class to secure their class position and is supported by the

state through its sponsorship of 'market-oriented' programs. This has been

further exacerbated by a culture of expertise, an ideology that is helping to widen

the economic gap on a global level. Power positions on local, national, and global

levels are maintained by reproducing economic stratification through pedagogy

and curriculum in schools. If pedagogy is formed by the middle class to maintain

class positions, then everyone in a system that is 'middle class' is educated with

the right tools to maintain this class position. If the consensus nationally and

globally is that it is vital to have computer technology and technical literacy

courses available at the primary and secondary level, then those who have the money to implement this idea will do so, but it is all about economic feasibility, which exacerbates economic stratification. The irony is that if everyone had access to this technology, it would no longer be viewed as an asset and could not be converted into social or economic capital. Since it is not due to actual job requirements that this is being promoted, it is the aspect of social capital that we are dealing with. Stoll (1995) discusses this by showing that schools with computer technology funding have more prestige and that some are also making computer ownership a prerequisite for entry. This increases the social and economic capital requirements to enter schools and universities and also to obtain well paid jobs that do not necessarily require computer training, especially the substandard type being offered in schools, and in the end it keeps many disenfranchised; if only to maintain undemocratic capitalism.

There are several reasons why introducing computers into classrooms is undemocratic and does not promote responsible citizenship formation. It is unwarranted economically and serves the needs of power structures by increasing the type of social capital one requires to get ahead in life, which helps to maintain economic stratification. Next, an emphasis on market and traditional values in curriculum that encourages the use of computer technology as an educational tool is undemocratic because it serves to decrease people's critical thinking skills. Memory is a powerful tool for making qualitative analyses; without it, concrete examples and analogies are lacking for a proper evaluation of circumstances. The loss of valuable learning is also be exacerbated by having students focusing their

attention on a computer screen instead of engaging in dialogue with a teacher, Stoll (1995) points out. Third, the absence of critical thinking skills is one of the greatest threats to democracy. Without them, it is hard to imagine how any serious social or political activism will take place. Fourth, technocratic planning leads to a diminishment of critical thinking skills that foster democratic activity in citizens. Lastly, computer networks are not presently bringing about a rich online community as the literature has shown that only a sector of the world will ever have access to the most current computer technology.

In the next section, I look into how to make computer based education democratic since it will inevitably be a key part of our educational system.

How to Make Computer Based Education Democratic

The theoretical framework for this thesis is critical theory and pedagogy. This framework aims at the social transformation of society through revealing the hidden ideology that helps to maintain economic stratification through education. It is not as cut and dry as this; ideology is socially pervasive and trickles down into policy- making and public acceptance. I have shown that the arguments used for promoting computer technology and technical literacy in primary and secondary classrooms have been flawed in their economic, cultural, and democratic reasoning. By looking closer at these arguments, it is evident that possessing computer technology and being technically literate is just another form of social capital. The entire history of technological innovation has been based on this assertion. It is not shocking that this is the case as our entire human history has been based on power struggles over nature and over each other. Many great

technological advances have been made without anticipation of future consequences and this must stop. Toffler (1970) contends that in order to "'transcend technocracy', we need not only to reach beyond our economic philistinism, but to be open our minds to more distant futures, both probable and possible" (p. 426).

This is what I, following the thinkers I have drawn from, am attempting to do. We must understand that a blind acceptance of computers in classrooms and an inadequate version of 'technical literacy' have extensive effects on economic stratification.

In order for computers to be democratic, everyone should have access to them in some form, regardless of socio-economic factors, so that technology does not become another form of social capital. This would also lead to a more vibrant e-community. This is not an easy task, nor is it necessarily possible. In the meantime, it is important to focus on educating students to become democratic, responsible citizens. At least in this way they may become future leaders with more sense of responsibility for their fellow humans, more empathy, and more critical awareness of global economic stratification.

It is not insisted that there should be no computers in classrooms at all. According to the UN, report (1994) "An important task then would be to influence this most plastic of technologies so that it can reflect the best social aspirations and knowledge systems of the world's different cultures" (p. 303).This is not an easy task. It must begin with an adequate technical literacy on the part of educators and students. Any literacy and all education, for Fleming (1990), should

be a combination of Emig's (1983) definition of being able to identify what is new

and good information in a given text and Habermas' (1972) disposition to act on

that information. It is a mental and physical activity, which requires critical

thinking. Essentially everything must be constantly challenged. Freire (1998)

asserts that if critical thinking is an innate part of literacy, the end result will be

"the critical insertion of the conscientized person into a demythologized reality"

(p. 85). Technical literacy will end technocratic reverence and technology can

then be used as a tool with caution.

There are two kinds of technological literacies that should be a part of

course content. The first type of literacy is a basic computer literacy and is

concerned with knowing how to use computer applications. The second type is

technical literacy. Students, and especially teachers, should be educated with an

understanding of our history, politics, technological developments, technical

terminology, myths of dependency, notions of expertise, and curricula formation.

These should be considered a part of technical literacy. I also contend that all

people should be aware of how computer ownership and technical literacy act as a

form of social capital and are not necessarily needed to succeed in life. This type

of knowledge would help to develop responsible citizens.

There is ample literature that suggests that technical literacy must start

with the teachers. Hounsell (2000) draws on Means (1997) who notes that one of

the major hurdles that must be overcome in the implementation of computer

technology and technical literacy in the classroom is the development of programs

aimed at instructing teachers on the possible usages of computer technology in the

classroom. There should be some "real world relevancy" (p. 43). Rosenberg (1991) also states that computer training must be one of the key issues to be dealt with immediately as teachers frequently declare that they have been inadequately trained. Only 66% of primary and secondary school teachers receive less than ten hours of minimal mechanical training and usually by people not in touch with educational needs. This inadequate training also means that teachers have not been consulted about classroom needs, which translates to a lack of sufficient curriculum development and therefore software development. This is just the beginning. Teachers must not only be trained in all the mechanics of computers, they must also be trained to be critically aware of how they are used. It would not be sufficient to train teachers on how to access the Internet and which web sites to visit for particular course; it is of vital importance that they know how to assess the content of the websites in order to train their students to do the same. This is true technical literacy. We have to start in the classroom. Teachers, students, and the public should never rely on information or opinions coming from the Internet unless it is verifiable.

Dialogue must also be a key component of technical literacy. This is advocated by Freire (1998), so that students will engage critically with reality. We must not allow computers to socialize children. In other words, as said by Cunningham (1997), computers must be used sparingly, selectively, and reflectively; and in the end, they must be turned off for proper reasoning, reflecting, and discussion. In this way, we can try to ensure the survival of democracy through critical thinking and active engagement in society/reality. Any

course that intends to merge computer technology into its classroom or a course purely on technical literacy must have dialogue involved. The dialogue should not be a regurgitation of what was found on the Internet. It should involve more meaningful insights on where the information was found, the comparison of several websites, and comparing information with what is found in the library. People must rely on their reasoning skills and informed dialogue with real people offline. It is essential that teachers and students are trained to be able to discern what good or misinformed content in a web site is.

Teachers need proper critical technical literacy so that they can pass this on to their students. Another thing that must be done is a needs-analysis on a local or community level in order to develop appropriate software and curricula. Education is at present an easy market for software developers because this step is often avoided or perhaps not even considered. Yet it is very important that it is done in a critical fashion in order for it to be democratic. Bonnett (1997) gives a set of questions to be used in deciding whether or not the information technology present in a classroom is disrupting class and community values, and whether it is simply acting as a form of cultural reproduction. This includes questions such as: What are the teachers', students' and communities' cultural values and beliefs and what are they based on? What values are implicit in certain subject matters that are considered to be of fundamental importance, especially in democratic terms? How does the software being used reflect or come into conflict with these cultural values? If there is a clash with any of these questions, the software should not be used. We must always remember that technology is not neutral. It always reflects

someone's version of reality, or promotion of, and we must always be uncovering what this is.

There is a lot to consider and deal with when it comes to developing responsible citizens through critical pedagogy. Teachers must be trained critically regarding technology, history, computers, and technical literacy so that students may become critical users of this new form of social capital. Education must promote responsible citizenship formation and critical thinkers; this should be the purpose of education. Teachers need to be consulted with, communitarian needs must be assessed, librarians should play a role in teaching information retrieval skills, and students should become empowered by this technology, not further disenfranchised through shoddy research skills, inaccurate information. On a broader level, there should be no lack of access to this technology making it a form of social capital.

The issue of computer-based education is very complex. There are multiple overlapping and interconnecting factors, mainly economic, which must be understood in a critical fashion in order to see how technology or technocracy puts democracy at risk. Education is a primary site of social reproduction and teachers and students must be educated critically in order for education and society to be truly democratic. We must take charge of what is being reproduced. False technical worship and capitalistic motivations must be uncovered for what they are; a means for continuing economic stratification. Computers and technology will not bring about more and better jobs, make our government and states more democratic, or make us better thinkers; they are simply a tool to be

used with extreme caution. There are some advantages in sending a quick e-mail, but will happen to the art of handwriting? Of course, something can be said for using the Internet to initiate research, but we must remember that not all perspectives are available online. We must be wary of letting students turn into automatons, we must encourage constructive hands-on and critical learning, and we must not be lured in by false promises. We must question the cultural values and motivations behind everything and never stop engaging in critical dialogue with those around us. Democracy is not a stagnant concept and as such neither are any of the theories or policies being put into practice which effect our institutions, especially education. Everything must be constantly reevaluated and reformulated with our changing social reality. Democracy, according to Osborne (2001), must involve a dialogue of constant deliberation in order for it to be democratic and education must be responsible for teaching these skills to citizens. I conclude with a quote from Dewey (1986):

> All culture begins with private men and spreads outward from them. Simply through the efforts of persons of enlarged inclinations, who are capable of grasping the ideal of a future better condition, is the gradual approximation of human nature to its end possible (p. 95).

References

Aikenhead, G. (1990).Technological literacy, critical reasoning, and classroom

    practice. In Norris & Phillips (Eds.), *Foundations of literacy policy in*

    Canada. (pp. 127-143). Calgary: Detselig Enterprises Ltd.

Albert, M. & Chomsky, N. (2001, January). Extending U.S. dominance by any

    means possible: Michael Albert interviews Noam Chomsky. *Z Magazine.*

    Retrieved on April 4th, 2001 from http://www.zmag.org/

    chomskyarticles.htm.

Apple, M. (1999). *Power, meaning, and identity: Essays in critical educational*

    studies. New York: Peter Lang Publishing, Inc.

Bailey, R. (2001). The Voice of neo-conservatism: "We in America fought a

    culture war, and we lost". *Reasononline: free minds and free markets.*

    Retrieved on   January 22nd, 2006 from http://reason. com/rb /rb101701.

    shtml

Barakett, J. & Cleghorn, A. (2000). *Sociology of education: An introductory view*

    from Canada. Scarborough: Prentice-Hall Canada Inc.

Bernstein, B. (1973). Social class, language and socialization. In Abramson, A.S.

    et al (Eds.), *Current trends in linguistics.* (Vol.12). Mouton.

Black, P. (2005, Feb.11).Decision looming on religious instruction in public

    schools. *Kingston whig - standard,* 5.

Blatter, J. (2002, Spring) Review of the book HyperTexts: The language and

culture of educational computing by Ellen Rose. *McGill journal of*

education, Vol. 37, Iss. 2, 262-266.

Bonnett. M. (1997). Computers in the classroom: Some value issues. In Angela

McFarland (Ed.), *Information technology and authentic learning.* (Chap.

10) New York: Routledge.

Bouchard, P. (1998). Training and work: Myths about human capital. In Scott,

Sue M., Spencer, Bruce, & Thomas, Alan M. (Eds.), *Learning for life.*

Toronto: Thompson Educational Publishing, Inc.

Bourdieu, P. (1998). Utopia of endless exploitation: The essence of neoliberalism.

Le Monde diplomatique. Shapiro, Jeremy J. (trans.). Retrieved on January

22nd, 2006 from http://www.aidc.org.za/?q=book/view/95

Bowles, S. & Gintis, H. (1976). *Schooling in capitalist America: educational*

reform and the contradictions of economic life. New York: Basic Books.

Chomsky, N. (1997). *Language and problems of knowledge: The Managua*

lectures (9th ed.). Cambridge: MIT Press.

Chomsky, N. (2001, January 14th). How US democracy triumphed again. *The*

Independent. Retrieved on Nov.1st, 2003 from www.chomsky.info

/articles /200010114.htm

Chomsky, N. (2001, July 4th). Hegemony or survival part two. *Z magazine*

Retrieved on November 1st, 2003 from www. Zmag.org/

Chomskyarticles.htm.

Clayton, T. (2004). Competing conceptions of globalization: Revisited:

Relocating the tension between world-systems analysis and globalization

analysis. In Ginsburg, Mark & Post, David (Eds.), *Comparative education*

review, Vol.48, no.3.

Cleveland, H. (1985). The twilight of hierarchy: Speculations on the global

information society. In Bruce R. Guile (Ed.), *Information technologies*

and social transformation. Washington, D.C.: National Academy Press.

Clyde, A. (1998). The school intranet: An opportunity.... (). *Emergency librarian,*

Vol. 25, Iss. 3, 36-39.

Cross, N. (1970). *Socrates: The man and his mission.* New York: Freeport.

Cunningham, P. (1997). IT and thinking skills in humanities. In Angela

McFarland (Ed.), *Information technology and authentic learning.* (Chap.

5) New York: Routledge.

Dei, G. & Karumnachery, L. (2001). School reforms in Ontario: The

'marketization of education' and the resulting silence on equity. In J.

Portelli and R. Solomon (Eds.), *The erosion of democracy in education:*

From critique to possibilities. (pp.189-216). Calgary: Detselig Enterprises.

Democracy. (1983). In *The Concise oxford dictionary.* (p. 254). Oxford:

Clarendon Press.

Dewey, J. (1986). The Democratic conception in education. In *Democracy and*

education: An introduction to the philosophy of education. (pp. 81-91).

New York: Telegraph Books.

Emig, J. (1983). *The web of meaning.* Upper Montclair, NJ: Boynton/Cook.

End the arms race. (2000, February 29). Retrieved on October 31st, 2005 from

    http://www.peacewire.org

Fleming, R. (1990). The artefact as text: Being literate in a technological society.

    In Norris & Phillips (Eds.), *Foundations of literacy policy in Canada.*

    (Chap. 5) Calgary: Detselig Enterprises Ltd.

Freire, P. (1974). *The Pedagogy of the oppressed.* Ramos, Myra Bergman. (trans).

    New York: The Seabury Press.

Freire, P. (1998). Cultural action and conscientization. (pp. 67-98). In *The politics*

    of education. New York: Bergin and Garvey.

Freire, P. (1998). The process of political literacy. (pp. 99-108). In *The politics of*

    education. New York: Bergin and Garvey.

Freire, P, & Shor, I. (1987). What is the "dialogical method" of teaching?

    Journal of education, Vol. 169, No.3.

George, S. (1999). *A Short history of neo-liberalism: Twenty years of elite*

    economics and emerging opportunities for structural change. Conference

    on Economic Sovereignty in a Globalising World. Bangkok. Retrieved on

    January 22nd, 2006 from http://www.globalexchange.org /campaigns

    /econ101 /neoliberalism.html

Giroux, H. (2003). Critical theory and educational practice. In M. Baltodano. A.

    Darder, & R.D. Torres (Eds.), *The critical pedagogy reader.* (pp. 27-56).

    New York: RoutledgeFalmer.

Giroux, H. (1999). Rage and Hope. In Laura Williams (Ed.), *Critical Pedagogy.*

    Retrieved on January 18th from http://www.perfectfit.org/CT/giroux2.html

Habermas, J. (1971). *Toward a rational society.* London: Heinemann.

Hounsell, J. (2000, November). *A Study of a club for academic and technological support to help at-risk students in a middle school improve their academic performance and assist their technological literacy.* Doctoral Dissertation. (UMI Number: 9995009). Wilmington College

Hughes, T. (1987). The evolution of large technological systems. In W.E. Bijker, T.P. Hughes, & T. Pinch (Eds.), *The social construction of technological systems.* (pp.51-82). Cambridge: Cambridge University press.

Kettner, C. (2000, Winter). Book review of the Child and the machine: why computers may put our children's education at risk. *Green teacher.* Iss. 60, 45.

Kuhn, T. (1962). *The Structure of scientific revolutions.* Chicago: University of Chicago Press.

Marshall, T. (1950). *Citizenship and social class, and other essays.* Cambridge: Cambridge University Press.

McLaren, P. & Farahmandpur, R. (2005). *Teaching against global capitalism and the new imperialism: a critical pedagogy.* New York: Rowman & Littlefield Publishers, Inc.

Means, B. (1997). *Using technology to enhance engaged learning for at-risk students.* Retrieved on November 20th, 1998 from http://www.ncrel. org/sdrs /areas/ issues/students/atrisk/at41kl.htm

Mezirow, J. (1990). Understanding transformative theory. *Adult education quarterly,* 44 (4), 222-244.

Morrow, R. & Torres, C. (2002). *Reading Freire and Habermas: Critical pedagogy and transformative social change*. New York: Teachers College Press.

Osborne, K. (2001). Democracy, democratic citizenship, and education. In J. Portelli & R.P. Solomon (Eds.), *The Erosion of democracy in education: from critique to possibilities*. (pp. 29-61) Calgary: Detselig Enterprises.

Oxhorn, P. (In process). Social inequality, civil society, and the limits of citizenship in Latin America. Forthcoming in Susan Eckstein and Timothy Wickham-Crawley (Eds.), *Social justice: Latin American past experiences and future prospects*.

Pacey, A. (1983). *The culture of technology*. Cambridge, MA: The MIT Press.

Rattray, D. (Ed.). (1990). Citizen. *The Tormont Webster's Illustrated Encyclopedic Dictionary*. (p.325). Montreal: Tormont Publications Inc.

Rosenberg, R. (1991, January). Debunking computer literacy. *Technology review, 94*, 1; ABI/INFROM Global, 58.

Roszak, T. (1969). *The Making of a counter culture: reflections on the technocratic society and its youthful opposition*. Garden City: Doubleday & Company, Inc.

Sarup, M. (1993). *An Introductory guide to post-structuralism and postmodernism*. Athens: The University of Georgia Press.

Sherman, B. (1985). *The New revolution: The impact of computers on society*. New York: John Wiley and Sons.

Stapleton-Watson, J. (2001, October). Students and the World Wide Web. *Teacher librarian*, Vol. 29, Iss. 1, 15-20.

Statistics Canada (2004). Selected dwelling characteristics and household equipment. Retrieved on July 14, 2006 from http://www40.statcan.ca/l01/ cst01/ famil09c.htm?sdi=computer

Stoll, C. (1995). *Silicon snake oil.* New York: Double Day.

Tapscott, D. (1998). *Growing up digital: The rise of the net generation.* New York: McGraw Hill.

Taylor, C. (2000). *Socrates: A very short introduction.* Oxford: University Press.

Thring, M. (1980). *The Engineer's conscience.* London: Northgate Publishing Company Ltd.

Toffler, A. (1970). *Future shock.* New York: Random House.

Torres, C. (1998). The state and education. In *Democracy, education, and multiculturalism.* (pp. 9- 60). New York: Rowen and Littlefield.

Torres, C. (1998). Democracy. In *Democracy, education, and multiculturalism: Dilemmas of citizenship in a global world.* (pp. 145-174). Lanham, MD: Rowman & Little field,

Wikipedia (2005). Critical theory. In *Wikipedia: The free encyclopedia.* Retrieved on January 18th, 2006 from http://en.wikipedia.org /wiki/Critical theory

Wikipedia (2005). Neo-Conservatism. In *Wikipedia: The free encyclopedia.* Retrieved on January 22nd, 2006 from http://en.wikipedia.org/wiki/ /Neoconservatism_(United States)