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Paulo Freire and Ivan Illich: technology, politics and the reconstruction of education

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ABSTRACT This article examines the theories of education and technology held by two of the most important philosophers of education during the last few decades, Paulo Freire and Ivan Illich. These two related thinkers each charted a unique approach to the questions surrounding modern education and technology, and despite their widely acknowledged brilliance, and in Freire's case the establishment of an entire field of critical pedagogy throughout North America, almost no attention has been paid to examining their views on educational technology. This article fills that important gap and attempts to dialectically mediate their two positions towards a broader critique of media culture and the role of educational technology generally. By utilizing both Freire and Illich, it is argued, a critical pedagogy of technology can be reconstructed that is capable of speaking to today's needs, and this critical pedagogy itself can be reconstructive of the current terrain in education as it works to overcome inequalities through the appropriate use of technology and the establishment of critical consciousness on the issues surrounding technology and society.

In her essay 'The Social Importance of the Modern School', Emma Goldman (1912) considers the importance of history as a subject of education, noting that schools must 'help to develop an appreciation in the child of the struggle of past generations, for progress and liberty, and thereby develop a respect for every truth that aims to emancipate the human race'. With this in mind, we might wonder about the legacy of radical pedagogues like Paulo Freire and Ivan Illich, and whether their struggles still live for the students of standardized curricula, whose schools are littered with corporate advertising and products, and who are themselves either tracked into broken-down buildings lacking adequate textbooks and materials or into a cut-throat competition for admissions' placement that begins with preschool and continues on through college.

Sadly, schools today are not regularly engaged by the emancipatory arguments and social movements sparked by the work of these two great mentors, who are among the late twentieth century's most important figures in the field of education due to their wide-ranging and perceptive theories linking politics and culture, capitalist economics and human ethics to a rigorous critique of schooling. Today, as schools cuddle up to business and replace programs for literacy with a profit-friendly 'computer literacy' (Aronowitz, 1985, p. 13), steadily moving computers from the production line to 'the center of the classroom' (Apple, 1992), those who currently theorize and practice education will find Freire's and Illich's philosophies of education extremely relevant to the wide range of questions that the current proliferation of technology produces for pedagogy.

Routinely, culture everywhere is becoming saturated with media, in which many aspects of myriad people's lives are mediated by technology (Stone, 2001). Technologized media themselves now constitute Western culture through and through, and they have become 'the primary vehicle for the distribution and dissemination of culture' (Kellner, 1995, p. 35). Thus, as the sociologist Manuel Castells has noted: 'Politics that does not exist in the media ... simply does not exist in today's democratic politics' (1999, p. 61). While the North American followers of Paulo Freire

continue to oppose rightist mainstream educational technology policies and practices through the discourse of 'critical pedagogy', it is surprising, then, that few works therein deal at length with Freire's own pedagogical relationship to new technologies. As for Illich, it has been surmised that his gadfly politics and anarchistic sentiments have so terrified educational institutions that academics have responded more or less collusively to 'write him out' of ongoing discourse (Gabbard, 1993), thereby excluding him and rendering his work professionally illegitimate.[1] Consequently, this has resulted in little North American work on Illich altogether, and even less that examines the relevance of his views on technology and education for today's computer and Internet-readied classrooms.

Another reason for a gap in the literature on Freire and Illich may lie in the theoretical and political disputes in which they themselves engaged during the 1970s. Though initially close friends, political allies and colleagues – Illich in fact attempted to free Freire from jail in 1964 and he hosted Freire for two summers at the Center for Intercultural Documentation (CIDOC) in Cuernavaca, Mexico – their collaboration cooled over the ensuing decades. After Freire's *Pedagogy of the Oppressed* (1972) and Illich's *Deschooling Society* (1970) became best-sellers in the early 1970s, both became intellectual superstars and leading spokespersons for a generation of young scholars who sought to combat academic privilege and revolutionize campus life post-May 1968. By the late 1970s, however, when Freire and Illich began to clash openly on ideological issues like the necessity of schooling, the role of 'conscientization' in pedagogy and Freire's connection to the World Council of Churches, respective camp lines between the two became drawn.

As Freire was championed by North American theorists like Henry Giroux, Stanley Aronowitz and Michael Apple in the 1980s, Illich took on the role of outsider critic and maverick, much akin to his friends Paul Goodman and the 'home schooling' movement theorists John Holt and Everett Reimer. More recently, neo-Illichians like John Ohlinger (1995), C.A. Bowers (2000) and Dana Stuchul et al (2002) have attempted to challenge critical pedagogy's iconic status in leftist educational circles by producing strong (sometimes *ad hominem*) critiques of Paulo Freire and those he has influenced. However, these interventions have so far been met with little debate or rebuttal from both mainstream and critical educators. With the death of Freire in 1997, and Illich in 2002, the opportunity was sadly lost for them to break bread once again, to comment jointly upon their important points of agreement and disagreement, and potentially reconstruct what are arguably two of the strongest radical traditions vis-à-vis education and technology.

For this reason, we feel that one component of a contemporary critical theory of education and technology requires a less polemical, dialectical critique, in which both the positives and negatives of Freire's and Illich's theories are contextualized by present-day needs, even as the two theorists are themselves compared and contrasted for affinities and differences.[2] Thus, in this article we will undertake a 'diagnostic critique' – a dialectics of the present that 'uses history to read texts and texts to read history' – with the end goal of grasping alternative pedagogical practices and utopian yearnings for a reconstruction of education in the future, such that progressives will be challenged to develop pedagogies and political movements which address these challenges (Kellner, 1995, pp. 116-117), while developing radical critiques of education proposed by Freire, Illich, and John Dewey.[3]

Against one-sided critiques of present educational technology that are overly technophilic or technophobic, we seek to understand the present moment in education and society as marked by 'objective ambiguity' (Marcuse, 1964, p. 225). Reality should be seen as complex and contested by a variety of forces, rich with alternatives that are immediately present and yet ideologically, normatively, or otherwise blocked from achieving their full realization in their service to society (Marcuse, 1972, p. 13). It is therefore the utopian challenge to radicalize social practices and institutions through the application of new diagnostic critical theories and alternative pedagogies such that oppressive cultural and political features are negated, even as progressive tendencies within everyday life are articulated and reaffirmed. Notably, this process has been conceptualized as 'reconstruction' by progressive educators like John Dewey (1897) and revolutionaries like Antonio Gramsci, who importantly noted that 'every crisis is also a moment of reconstruction', in which 'the normal functioning of the old economic, social, cultural order provides the opportunity to reorganize it in new ways' (Hall, 1987).[4] To speak of technology, politics and the reconstruction of education, then, is to historicize and critically challenge current trends in

education towards using the tools at hand to create further openings for transformative and liberatory praxis.

The Politics of Information, Infotainment and Technocapital

Humanity begins the twenty-first century by undergoing one of the most, if not the most, dramatic technological revolutions in history. As it is centered on computer, information, communication and multimedia technologies, the resulting product of this revolution is often hailed as the beginning of a 'network' or 'information society' (Castells, 1996, 1999; Kellner, 2002). In the hands of its many boosters, the information society has often been represented as a sort of cyber-ecumene, capable of bridging differences, weaving communion and welcoming underdeveloped regions into a form of 'global village' political economy. But through the information society's impetus towards modernization and development practices, traditional forms of social organization, culture and politics are routinely being outmoded, imploded into and hybridized with novel cultural and political modes to create a highly mediated realm of 'technocapitalism' (Kellner, 1989; 2000, p. 300; Best & Kellner, 2001). In this respect, then, it is now clear that the digitized 'one world' (Cosgrove, 2001, p. 263) of harmonious planetary communication brought about by the exchange of information is in many ways a myth that cloaks the seductive inequalities of what is better characterized as an 'infotainment society' (Kellner, 2003a, pp. 11-15), a globally networked economy driven by corporate forces of science, technology and a new Internet technocultural complex.

Over the last few decades, the culture industries beholden to technocapital have multiplied media spectacles [5] throughout all manner of colonized public spheres, and spectacle itself is becoming one of the organizing principles of the economy, polity, society and everyday life. The Internet-based economy deploys spectacle as a means of promotion, reproduction, and the circulation and selling of commodities. Media culture itself proliferates ever more technologically sophisticated spectacles to seize audiences and increase its power and profit. The forms of entertainment permeate news and information, and a tabloidized infotainment culture is increasingly popular. New multimedia that synthesize forms of radio, film, television news and entertainment, and the mushrooming domain of cyberspace become spectacles of technoculture, generating expanding sites of information and entertainment, while intensifying the spectacle form of media culture.

In the United States, the nation of megaspectacle, schools have been forced to transform under the pressures wrought by ubiquitous media, technoculture and a computer industry that seeks to place a computer in every child's hands (Trend, 2001). A recent government study, *A Nation Online: how Americans are expanding their use of the Internet* (National Telecommunications and Information Administration, 2002), reveals that 90% of children between the ages of 5 and 17 (48 million) now use computers, and that Internet use is increasing for people regardless of income, education, age, race, ethnicity or gender. Additionally, a 2006 US Department of Education report cites figures that as of 2005 100% of public schools in the United States had computers that connect to the Internet and that only 3% of those schools failed to have a broadband connection (Wells & Lewis, 2006).

However, despite trends charting an increase of use by every demographic, Internet access in the United States remains largely stratified along lines of race, class and level of educational attainment (Lenhart et al, 2003, pp. 6-8). Schools now serve, then, as the primary places in which all manner of youth have the ability to interact with the global Internet, develop creative and technical skills like web-page design, and so acquire the necessary cultural capital to survive in a post-Fordist economy.

The Freirean educator Antonia Darder is undoubtedly correct when she calls attention to the fact that wealthy schools and districts often have greater access to computer technology and the Internet, and that the minority cultures that tend to comprise poorer schools and districts are placed in a role of having always to compete on an unequal playing field (Darder, 2002, p. 78). However, this critique can be overly totalizing when it downplays the opportunities for student and community agency that can also arise from newly infused technology in schools and community centers. Further, it can miss a more complex level of analysis if such critique fails to account for the way in which poor school districts sometimes capitalize upon their underserved

and minority status to apply for and win state, federal and corporate technology grants. For example, the Lennox School District (in Los Angeles County) – a district in which median household incomes are below the national average, unemployment is above the national average, and Spanish is the primary language spoken amongst a 97% Latino/Chicano population – has been awarded hundreds of thousands of dollars in development grants through applications to the state and federal governments. Further, Lennox has 'teamed' with the Apple Corporation as a partner in the company's PowerSchool information system initiative that wired the district and now provides a system in which teachers, students, administrators and parents can all have real-time access to information about student, class and school progress.[6] We cite this example to point out the need for critical educators to integrate their theories and practices with the often contradictory and multifaceted realities at work today in the lives of oppressed peoples. Lennox's technology initiative has unquestionably transformed its schools, providing a level of technological infusion unmatched by even the wealthy Beverly Hills School District to its north, and it has used its status as a poor, minority district toward achieving this end. Yet, the question remains as to how this technology is affecting the lives of students and families in the area for both good and ill. That Lennox's PowerSchool seeks to monitor students' work and lives more closely might trigger cause for alarm, as a post-Columbine paradigm in education points towards the use of information technologies and the psychological profiling of students to create sophisticated tools of administrative surveillance and discipline that function freely under the general claim of 'security' (Lewis, 2003). As schools in Lennox have historically suffered from gang-related violence, resulting in policy emphases upon a disciplinary focus and increased safety measures, suspicion and a closer examination of the school district's corporate-fed information system are warranted.

In a non-formal educational context, our own work (Kahn & Kellner, 2003, 2005) has demonstrated the manner in which changes in global society and technoculture are combining to mobilize transformative alternatives to mainstream media, politics, economics and formal education itself. While also used for hegemonic ends, as well as 'technological terror' and cyberwar (Kellner, 2003b), people have deployed new media technology – encompassing the Internet, computers, cell phones, digital cameras and recorders, and GPS (global positioning system) devices – to orchestrate the anti-globalization and anti-war movements, new political organizations and protests, along with novel forms of Situationist-inspired culture like 'flash mobs' (Delio, 2004). Thus, we wish to underscore the important role technology has had in developing contemporary praxis. Emergent forms of Internet culture utilizing 'blogs' and 'wikis' [7] are potentially involved in a radically democratic social and educational project that amounts to the mass circulation and politicization of information and culture. So-called 'bloggers' have reinvigorated journalism and politics through the manifestation of an efficient grass-roots media force and, in their hands, computing technology appears to be a vehicle for citizens to (at least on occasion) demonstrate directly both meaningful voice and agency in society. Thus, it is our belief that many online political and cultural projects today have an educational component as well, and are beginning to reaffirm and reconfigure what participatory and democratic global citizenship will look like in the global/local future.

Paulo Freire: Promethean pedagogy

While a plethora of work in English exists that looks to Paulo Freire's work for guidance on issues of literacy, radical democracy and critical consciousness, there has arguably been less interest in the fourth major platform of the Freirean program – economic development through technological modernization processes. Though significant divides clearly exist between rich and poor within the advanced developed nations of the North as well, this gap in the literature of critical pedagogy undoubtedly results from the differing political and economic needs of the Southern countries in Latin America and Africa, developmental needs which Freire sought first and foremost to address. But the present age of media spectacle increasingly requires a dialectical understanding of how new technologies are affecting the political economy in both over- and underdeveloped regions as part of a conjoined process. As Manuel Castells emphasizes, we need a critical theory that can 'account for the structure of dependent societies and for the interactive effects between social structures

asymmetrically located along the networks of the global economy' (1999, p. 55). Therefore, as Peter McLaren has noted:

> The globalization of capital, the move toward post-Fordist economic arrangements of flexible specialization, and the consolidation of neoliberal educational policies demand not only a vigorous and ongoing engagement with Freire's work, but also a reinvention of Freire in the context of current debates over information technologies and learning, global economic restructuring, and the effort to develop new modes of revolutionary struggle. (2000, p. 15)

Notably, Freire himself echoed this sentiment in *Pedagogy of the Heart*, declaring that '[t]oday's permanent and increasingly accelerated revolution of technology, the main bastion of capitalism against socialism, alters socioeconomic reality and requires a new comprehension of the facts upon which new political action must be founded' (1997, p. 56).

A self-professed 'man of television' and 'man of radio' (Gadotti, 1994, p. 79), Freire also believed in the 'powerful role that electronically mediated culture plays in shaping identities, and the importance of the changing nature of the production of knowledge in the age of computer-based technologies' (Giroux, 2000, p. 153). Stating that '[i]t is not the media themselves which I criticize, but the way they are used' (Freire, 1972, p. 136), he should be considered a forerunner of the continually growing transdisciplinary field of critical media literacy. As early as *Pedagogy of the Oppressed*, Freire argued for the importance of teaching media literacy to empower individuals against manipulation and oppression, and of using the most appropriate media to help teach the subject matter in question (Freire, 1972, pp. 114-116; 1998a, p. 123; Gadotti, 1994, p. 79). Hence, a re-examination of Freire's theory of education and technology is required in the context of the contemporary politics of mass and alternative media.

While Freire never developed a lengthy treatment of his views on computers and education, his work does contain a surprising degree of commentary related to the topic. Freire often employed cutting-edge media technologies as part of his system, even during his formative days as an educator in the early 1960s, and articulated his views on the politics of technology in a number of texts. Working in the tradition of Karl Marx, Freire propounded a dialectical view of technology (Freire, 1972, p. 157; 1997, p. 35; 1998a, pp. 38, 92; Gadotti, 1994, p. 78), in which he was always cautious of technology's potential to work as an apparatus of domination and oppression (Gadotti, 1994, p. 79; Freire, in Darder, 2002, p. xi), yet hopeful that it could also liberate people from the drudgery of existence, powerlessness and inequality (Freire, 1993, p. 93; 1998a, p. 82). Thus, he notes in *Education for Critical Consciousness*: 'The answer does not lie in the rejection of the machine but in the humanization of man' (Freire, 1973, p. 35). In this way, Freire hoped to politicize the forces of science and technology (1996, p. 113), and thereby tether their popularization and democratization to a larger project of radical humanism.[8]

Prior to the release of *Pedagogy of the Oppressed* in the United States, Paulo Freire was already famous in Latin America for being a radical educator whose innovative adult literacy programs made him first a Brazilian hero in 1962 and, soon thereafter, an enemy of the state who was jailed for a period and then exiled by military leaders after they took power via a coup d'état in 1964. His infamy resulted from his coordination of 'cultural circles' – two-month-long literacy programs that were pronouncedly successful by combining training in reading and writing with lessons in self-reflection, cultural identity and political agency. As director of the National Literacy Program, Freire sought to deliver rapid literacy to millions of indigent people as part of a populist turn in Brazil's governing structure, which in turn threatened elite classes (and helped cement the coup) because Brazil's constitution then barred illiterate people from participating in the political process as voters. Freire's campaign, then, was an educational venture designed to transform peasants into citizens, significantly broadening the electoral base of the jobless, landless and working poor, while empowering them to begin to speak and demand attention for their issues.

Importantly, the Freirean cultural circle made use of slide projectors – imported from Poland at US$13 per unit (Freire, 1973, p. 53) [9] – which were used to display film slides that were the centerpiece of Freire's literacy training because of their ability to foster a collective learning environment and amplify reflective distancing (Sayers & Brown, 1993, pp. 32-33). For the slides, Freire enlisted the well-known artist Francisco Brenand to create 'codified pictures' (Freire, 1973, p. 47) that were designed to help peasants semantically visualize the 'culture making capacities of

people and their communicative capacities' (Bee, 1981, p. 41). Composed of 10 situations that intended to reveal how peasant life is cultural (and not natural) and thus human (and not animal) [10], Freire's film slides were displayed on the walls of peasants' homes, whereupon dialogues were conducted that analyzed the slides' various pictorial elements. The pictures themselves depicted a range of premodern and modern technologies, as well as other cultural artifacts, and the final slide ended on a metacognitive note by depicting a cultural circle session in progress.

Central to Freire's method was that once individual objects had been visually identified within the pictures, the words referring to them would themselves be projected in turn, then broken down syllabically and, finally, the phonemic families of the syllables would be revealed as 'pieces' (Freire, 1973, p. 53) by which participants could construct new terms. In this way, after members of a cultural circle realized their ability to manipulate and create modern technologies through Brenand's pictures, they could transfer this knowledge to language itself and thereby recognize it as yet another technology available for their empowerment. Freire's intention, therefore, was to adopt technology pedagogically to demonstrate people's inherent productive and communicative abilities, as well as the possibility of their utilizing modern technologies critically and as part of a means to rehumanized ends.

Despite his early adoption of technology, Freire did not possess a naïve or technophilic attitude. To the contrary, in *Education as the Practice of Freedom* (1976), he is actually quite explicit about the tendency of high technology and the electronic media to domesticate and maneuver people into behaving like mass-produced, specialized mechanisms (p. 34). Under such conditions, Freire felt that:

> the rationality basic to science and technology disappears under the extraordinary effects of technology itself, and its place is taken by myth-making irrationalism ... Technology thus ceases to be perceived by men as one of the greatest expressions of their creative power and becomes instead a species of new divinity to which they create a cult of worship.
> (2000, pp. 62-63)

Reflecting upon this passage, Morrow & Torres correctly surmise that 'Freire thus rejected from the outset any slavish imitation of given forms of "modernization" driven by the unregulated capitalist exploitation of technologies' (2002, p. 70).

In a less well-known text, but one deserving of being more widely read, Freire treats the theme of modernized development in a particularly rigorous manner as part of a sustained critique of neocolonialism. Chronicling his activities in Chile during the late 1960s, the book *Extension or Communication* (Freire, 1973) sets out to address the question of whether the extension of modernized science and technology – exported to Chile (and other countries) as part of Northern agricultural development initiatives – has served more to educate or alienate the traditionally based farming cultures of the Third World.[11] Though he was hardly unfriendly to Western modes of science and technology, Freire here inveighs against the politics of 'cultural invasion' (Freire, 1973, p. 117), which in his mind amounts to the 'imposition of one world view upon another' (Freire, 2001, p. 160). Cultural invasion, he notes,

> signifies that the ultimate seat of decision regarding the action of those who are invaded lies not with them but with the invaders. And when the power of decision is located outside rather than within the one who should decide, the latter has only the illusion of deciding. This is why there can be no socio-economic development in a dual, 'reflex', invaded society.
> (Freire, 2000, p. 161)

Rejecting 'the imposition of ostensibly value-neutral technocratic solutions on peasants that do not take into account either local knowledge or the impact on the community' (Morrow & Torres, 2002, p. 56), Freire defended the cultural integrity of 'ethnoscience' and 'ethnotechnology' (Freire, 1992, pp. 85, 227); but never in a 'basist' (p. 84) manner.[12] Instead, he articulated a dialectical view in which the complex situation of autonomous Third World cultural practices, imperialist and capitalist First World desires, and the promise of modernity offered by the beneficial aspects of science and technology could be understood together as part of a holistic cultural development of radical *conscientização* ('conscientization'). Often misrepresented as a 'consciousness raising' project, in this context the conscientization process (Roberts, 2000, pp. 144-145) is more properly revealed

as a people's movement towards self-determination through engagement in emancipatory and critical praxis.[13]

Whereas agricultural and other technologies may have represented the leading edge of a potential cultural invasion of the Third World in the 1960s, today similar debates rage around the attempt to develop a base of information and communication technologies (ICTs) throughout Latin America, Africa, and other regions of the planet. For example, the World Summit on the Information Society's Plan of Action projects that by 2015, with the help of the United Nations and the International Telecommunication Union, 'all of the world's population will have access to television and radio services' and that 'half the world's inhabitants [will] have access to ICTs within their reach' (2003, p. 2). In Freire's own work, the myriad possibilities and problems inherent in this vision were already beginning to be delineated and a critical politics was tentatively developed.

During the early 1990s, as Secretary of Education for the city of São Paulo, Freire recognized that computers represented society's and education's inevitable future, and thus he acted decisively to commit to the infusion of computers in all of the schools under his direction. As he told Moacir Gadotti:

> we need to overcome the underdevelopment Brazil faces in relation to the First World. We haven't come to the Department of Education to watch the death of schools and education, but to push them into the future. We are preparing the third millennium, which will demand a shorter distance between the knowledge of the rich and that of the poor. (Freire, 1993, p. 93)

Accordingly, Freire established the Central Laboratory for Educational Informatics, while also investing in 'televisions, video cassettes, sound machines, slide projectors, tape recorders, and 825 microcomputers' (Freire, 1993, p. 152).

This is not to say that Paulo Freire sought to adopt computers uncritically, rather his policy was formed as a result of a political and pedagogical strategy that sought to intervene in the status quo of a multimediated age. Though the rhetoric surrounding computers in education is often ebullient, Freire countered that he had worries about infused technology, fearing 'that the introduction of these more sophisticated means into the educational field will, once more, work in favor of those who have and against those who have not' (Gadotti, 1994, p. 79). To this end, he was concerned that the science and technology of technocapitalism was increasingly producing knowledge representative only of 'little groups of people, scientists' (Darder, 2002, p. ix). That most people, in either the First World or the Third, have neither the ability to produce a computer, nor even to manufacture or manipulate the software upon which computers run, was in his opinion antidemocratic and dangerously unparticipatory.

Hence, during a debate in the late 1980s with the computer aficionado and educational futurist Seymour Papert, Freire rejected outright Papert's claim that computer technology surely meant the death of schools. Pointedly, Freire responded by observing that for all their pedagogical value and apparent historical necessity, computers were not technologically determined to compel students to use them in a critically conscious manner (Papert, 2000). Therefore, Freire felt that all cultures which now confront an ever evolving and expanding global media culture have a responsibility to utilize new technologies with a critical (but hopeful) curiosity, thereby remaining committed to a pedagogy that both rigorously interrogates technology's more oppressive aspects and attempts, through the conscientization of technology, to foster reconstruction of the social, political, economic and cultural problems that people face.

Ivan Illich: Epimethean pedagogy

In contemplating Paulo Freire and Ivan Illich, Carlos Alberto Torres (2004) has been led to write of the dialectical and complementary relationship between the two theorists, noting that the analogy that comes readily to mind is of Dr Martin Luther King and Malcolm X. Equal in merit, but often opposite in approach, the work of Freire and Illich combines to provide a form of forward- and backward-looking Janus figure. Both sought radically to defend the dignity inherent in humanity's potential and to provide the possibility of a better world, but the paths by which each pedagogue traveled largely diverged. Whereas Freire sought to intervene on behalf of the poor, critically pose problems into the 'facticity' of their oppression, and divert technologies and other forms of cultural

capital away from those in power towards those in need, the renegade pastor/academic/intellectual Ivan Illich developed a less messianic method. As an alternative to Freire's Promethean politics, Illich instead promoted an Epimethean sentiment and style (Illich, 1970, pp. 105-116) that looked to the historical past, and to the earth itself, for guidance in revealing the limits which, upon being transgressed, become counterproductive to life.[14]

Though famous for his notorious 'deschooling' thesis, which called for the disestablishment of the norm mandating institutionalized education, in later years Illich reconstructed his position by making it hostile to the idea of 'education' *in toto*. Having previously realized that society's 'hidden curriculum' (Illich, 1970, p. 74) manufactures schools in order to introject forces of domination into student bodies, Illich went on to insist that, in a highly professionalized and commoditized media culture, all aspects of life either promote themselves as educative or increasingly demand some element of training as a cost of unchecked consumption. Under such conditions, the being possessing wisdom, *homo sapiens*, becomes reduced to '*homo educandus*', the being in need of education (Illich, 1992a); and in an age when the computer becomes the 'root metaphor' of existence (1992b), this reduction then becomes further processed and networked into the lost reality of '*homo programmandus*' (Illich, 1995; Falbel, 2002, p. 133). Against this vision, Illich chose to defend 'the fact that people have always known many things' (Cayley, 1992, p. 71) and managed to live decently even amidst conditions of hardship, when left to their own autonomous devices. Thus, Illich came to propose a negative definition of 'education' as the industrialized formula: 'learning under the assumption of scarcity' (Cayley, 1992, p. 71; Illich, 1992a, p. 165).

One need not commit to Illich's indictment of education, however, to realize that one of his enduring contributions is the manner in which he perceived the deep ideological relationships between modern institutions like schooling, the church, factory production, medicine, the media and transportation systems as aspects of unchecked industrial society. It is in this respect that Illich generally chose to speak of 'tools', and not technology, both because it was a 'simple word' (Cayley, 1992, p. 108) and because it was broad enough to

> subsume into one category all rationally designed devices, be they artifacts or rules, codes or operators, and ... distinguish all these planned and engineered instrumentalities from other things such as food or implements, which in a given culture are not deemed to be subject to rationalization. (Illich, 1973, p. 22)

Therefore, for Illich, 'tool' includes not only machines, but also any 'means to an end which people plan and engineer' (Cayley, 1992, p. 109), such as industries and institutions.

In Illich's account, it is wrong to demonize tool making – he was practical, dialectical and not a technophobe – but tools do become problematical for Illich when they additionally produce 'new possibilities and new expectations' that 'impede the possibility of achieving the wanted end' (Tijmes, 2002, pp. 207-208) for which they were made. Doing so, tools turn from being 'means to ends' into the ends themselves, and they thus alter the social, natural and psychological environments in which they arise (Illich, 1973, p. 84). By amplifying human behavior and needs beyond the limits of the natural scales that existed prior to the tools' creation, tools move from being reasonably productive and rational to paradoxically counterproductive and irrational (Illich, 1982, p. 15).

As Morrow & Torres (1995, p. 227) rightly observe, Illich's 'tools' are thus related to Max Weber's concept of 'instrumental rationalization', as well as variant formulations proposed by Frankfurt School members like Max Horkheimer, Theodor Adorno and Herbert Marcuse.[15] For Weber, the process of instrumental rationalization resulted in the bureaucratization and disenchantment of existence – a sort of mechanized nullity brought about by 'specialists without spirit' (Weber, 1958, p. 182). Likewise, Horkheimer and Adorno found it to be the irrationalism produced by culture industries bent on reifying the rational in the form of fetishized commodities; and Marcuse, in his notion of 'one-dimensionality', offered that modern technology and capitalist instruments organize a society of domination in which any possible opposition becomes rationally foreclosed.

Somewhat partial to these more pessimistic views, Illich occasionally felt limited to testifying, with simplicity and silence, to contemporary horrors like nuclear terror (Illich, 1992a, pp. 32-33) and the dehumanized cybernetic reality of 'Techno-Moloch' (Illich, 1995, p. 237). Yet, Illich ultimately remained married to hope for 'post-industrial' conditions [16], and so he spent much of

his life in imagining and creating 'convivial tools' (Illich, 1973) that can reconstruct and transform rampant technocracy and the globalization of industrialized culture which occurs under the moniker of modern development (Illich, 1971). Remarking that '[h]ighly capitalized tools require highly capitalized men' (Illich, 1973, p. 66), Illich implied that it is necessary that people struggle to master their tools, lest they be mastered by them (Illich, 1973, p. 22). For when people uncritically operate tools and invest them with unquestionable power, Illich believed that oppressive monopolies and managerialized societies can arise that constrain freedom through defining specific tools as necessary for life.

Conversely, Illich's 'tools for conviviality' are appropriate and congenial alternatives to tools of domination, as convivial tools promote learning, sociality, community, 'autonomous and creative intercourse among persons, and the intercourse of persons with their environment' (Illich, 1973, p. 27). These tools work to produce a more democratic society that is 'simple in means and rich in ends' (Cayley, 1992, p. 17), and in which individuals can freely communicate, debate and participate throughout all manner of a cultural and political life that respects the unique 'balance among stability, change and tradition' (Illich, 1973, p. 82). Through the idea of conviviality, Illich proposed positive norms to critique existing systems and construct sustainable options using values such as 'survival, justice, and self-defined work' (Illich, 1973, p. 13). These criteria, he felt, could guide a reconstruction of education to serve the needs of varied communities, to promote democracy and social justice, and to redefine learning and work to promote creativity, community, and an ecological balance between people and the earth. Indeed, Illich was one of the few critics working within radical pedagogy in his period who took seriously the warnings of the environmental movement and he critically appraised industrialized society within an ecological framework that envisaged post-industrial institutions of learning, democratization and social justice.

Illich was aware of how new tools like computers and other media technologies could themselves either enhance or distort life's balance, depending upon how they are fit into a larger ecology of learning. He had a sense of computers' great promise, but was also suspicious of the new cybernetic regime of truth that seemed to him to be becoming instituted around ideas of data, networks, information, virtualization, feedback and transmission (Illich, 1992a, p. 177). Thus, he remarked that he was fascinated by cybernetic texts like Hofstadter's *Gödel, Escher, Bach* (1999), but found them unreadable as they corresponded more to the 'cut & paste' technics of word-processing software than to a sequence of sentences representative of a continuous vision and inner voice (Cayley, 1992, p. 249). This underscored, perhaps, his chief fear of the information society: that computer literacy was outmoding the (as he saw it) eight centuries of print literacy that had given rise to moral subjectivity and the possibility of an individual's inner life (Illich, 1992a, b). Illich saw it as politically dangerous, and spiritually painful, that such interior texts were being exteriorized and broadcast upon digital screens.

On the other hand, Illich was 'neither a romantic, nor a luddite' and he believed 'the past was a foreign country' not worth endorsing (Cayley, 1992, p. 188). Nor did he believe that there was an either/or choice to be made between print and computer literacies; and so he suggested that for 'anti-computer fundamentalists a trip through computerland, and some fun with controls, is a necessary ingredient for sanity in this age', as well as 'a means of exorcism against the paralyzing spell the computer can cast' (Illich, 1992a, p. 207). Thus, Illich himself – ever the polymath – remained committed to learning and better understanding the latest developments in computing, and while he personally chose to forego word processing (as well as a regular relationship to newspapers, television and automobiles), it is important to note that he was in advance of many intellectuals by making a great many of his books, essays and lectures freely available for reading and sharing online.

Further, while the last decade has produced a plethora of writing which cites Gilles Deleuze & Felix Guattari's concept of the 'rhizome' as demonstrative of how the Internet can unlock radical possibilities in education, Illich's 'learning webs' (1971, pp. 72-104) and 'tools for conviviality' (1973) even better anticipate the Internet's various social networks, blogs, wikis, chat rooms, listservs and compendious archives in many respects. Thus, whereas big systems of computers promote modern bureaucracy and industry for Illich, personalized computers made accessible to the public for their own ends could demonstrate how online tools might provide resources, interactivity and communities that could help revolutionize education by enhancing autonomous modes of

learning. Consequently, Illich was aware of how technologies like computers could either advance or distort pedagogy, depending on how they were fit into a well-balanced ecology of learning.

Reconstructing Education with Freire and Illich

Theorizing a democratic and multicultural reconstruction of education in the light of Freirean and Illichian critique demands that we develop theories of the multiple literacies needed to empower people in an era of expanding media, technology and globalization (Luke, 2000; Kellner, 2002). It appears certain that technology will drive the current reconstruction of education, but we should make sure that it works to enhance democracy and empower people, and not just corporations and a privileged techno-elite. Producing democratic citizens and empowering the next generation for democracy should be a major goal of the reconstruction of education in the present age. Moreover, as Freire reminds us (1972, 1998b), critical pedagogy comprises the skills of both reading the word and reading the world. Hence, multiple literacies include not only media and computer literacies, but also a diverse range of social and cultural literacies, ranging from ecoliteracy (e.g. understanding the body and environment) to economic and financial literacy, to a variety of other competencies that enable us to live well in our social worlds. Education, at its best, provides the symbolic and cultural capital that empowers people to survive and prosper in an increasingly complex and changing world, and the resources to produce a more cooperative, democratic, egalitarian and just society.

More than ever, we need philosophical reflection on the ends and purposes of educational technology, and on what we are doing and trying to achieve with it in our educational practices and institutions. In this situation, it may be instructive to return to John Dewey and see the connections between education, technology and democracy, the need for the reconstruction of education and society, and the value of experimental pedagogy to seek solutions to the problems of education in the present day. A progressive reconstruction of education will urge that it be done in the interests of democratization, ensuring access to information and communication technologies for all, thereby helping to overcome the so-called digital divide and divisions of the haves and have-nots so that education is placed in the service of democracy and social justice (Freire, 1972, 1998b; Dewey, 1997) in light of Illich's critiques of the limitations and challenges of education in post-industrial societies. Yet, we should be more aware than Dewey, Freire and Illich of the obduracy of the divisions of class, gender and race, and so work self-consciously for multicultural democracy and education. This task suggests that we valorize difference and cultural specificity, as well as equality and shared universal Deweyian values such as freedom, equality, individualism and participation.

Therefore, the project of reconstructing education will take different forms in different contexts. In the overdeveloped countries, people should be empowered to work and act in a highly technologized information economy, and should learn skills of media and computer literacy to be able to negotiate autonomously in the new social environment. Traditional skills of knowledge and critique should also be enhanced, so that people can name the system, describe and define the changing features of the new global order, and learn to engage in critical and oppositional democratic practices. This process challenges us to gain a vision of how life can be, of alternatives to the present order, and of the necessity of struggle and organization to realize progressive goals. Languages of knowledge and critique must be supplemented by the discourse of hope and praxis. On the other hand, in much of the world the sheer struggle for daily existence is paramount, and meeting unmet human and social needs is a high priority. As the United Nations has noted, however, education can everywhere provide the competencies and skills to improve peoples' lives, to create better societies, and a more peaceable and just planet. Moreover, as the world becomes an ever more integrated, globally networked technocapitalist system, gaining the multiple literacies necessary to critically use a range of technologies becomes crucially important for all.

Whether in the First or the Third World, adequately meeting the global challenges of ever multiplying technologies raises questions about the design and reconstruction of technology itself. As Andrew Feenberg has long argued (1991, 1995, 1999), democratizing technology often requires its reconstruction and revisioning by the different peoples whose needs it is meant to serve. Thus, within the world of computer high technology, 'hackers' have redesigned technological systems,

and much of the Internet itself is the result of individuals contributing collective knowledge and making improvements that aid various educational, political and cultural projects. Of course, there are often corporate and technical limitations upon computer technology's democratic design, such as the manner in which dominant programs impose their rules and aesthetics, as well as the manner in which they can alienate people based upon their cost. Still, recent movements in the direction of 'open source' software and 'free nets', which share programs and high-speed Internet connections freely amongst communities of users (Kahn & Kellner, 2005), imply that the struggle over technology between corporate and popular ownership is presently underway.

With this in mind, critical educators should help teach students (and should themselves learn) to become producers as well as consumers, thus helping to redesign and reconstruct the very hardware and programs of the technoculture. While the restrictions on what those without highly developed technical knowledge can do cannot simply be wished away, more creative and reconstructive uses of ICTs can be devised and implemented within limits, and the simple recognition of the restrictions facing critical educators can be important sources of debate and classwork. Still, many situations will allow for a surprising amount of participation, once it is encouraged. One example, for instance, is the Information Arts and Technologies program at the University of Baltimore that involves students in every level of design operations, getting their input into what works, what does not and how learning can be improved. At the high school level, notably, Los Angeles Latino/Chicano students recently spent two years producing a free online history game [17] that allows players a participatory look into the 500-year post-colonial history of El Salvador. Additionally, as discussed in a recent issue of *T.H.E. Journal* (Ferdig & Trammell, 2004), it is possible to have students develop their own weblogs. Such weblogs can range from personal diaries discussing what students are reading, learning and doing in relation to coursework, to posting hyperlinks to useful Internet sites, to debate over issues being discussed in class or of current topical interest. To assist with this, there are several weblog sites [18] that provide free software and web space, and there have been recent articles on how students are taking to the activity and making it a highly involved and interesting cultural forum (Nussbaum, 2004). From a Deweyian perspective, progressive education involves exactly these kinds of trial and error, concerns about participation and design, and ongoing critique of methods and objectives.

In discussing new technologies and multiple literacies, then, we must constantly raise the following questions: Whose interests are emergent technologies and pedagogies serving? Are they helping all social groups and individuals? Who is being excluded and why? We also need to seriously question the extent to which multiplying technologies and literacies serve simply to reproduce existing inequalities in the present, as we strategize the ways in which they might also produce conditions for a more vibrant democratic society in the future. Creating multiple literacies, therefore, must be contextual and engaged with the life worlds of the students and teachers participating in the new adventures of education. Learning involves developing abilities to interact intelligently with the environment and other people, and calls for convivial social and conversational environments. One can obviously become overinvolved with technologies and thereby fail to develop even basic social skills and competencies. As Rousseau, Wollstonecraft and Dewey have argued, education involves developing proficiencies that enable individuals to successfully develop within their concrete environments, to learn from practice, and to be able to better interact, work and create in their own societies and cultures. In a dynamically evolving and turbulent global technoculture, multiple literacies will thusly require multicultural literacies. Communicating and interacting with different groups and individuals demands being able to understand and work with a heterogeneity of people and spaces, as well as the acquisition of confidences in a multiplicity of media that can effect more democratic forms of cultural participation (Courts, 1998; Weil, 1998).

From a policy perspective, it seems clear that it is the duty of the federal, state and local governments, as well as other interested parties, to provide the necessary equipment and tools for teachers, students and schools to cultivate these skills. Further, it is important that teachers have the opportunity themselves to develop the requisite literacies to make progressive uses of technology in their classrooms, and there should be laboratories with support personnel who can mentor novice abilities to this effect. For recent studies have indicated that, without proper teacher

training, technology itself will not adequately teach itself and may in fact be a source of frustration, thus blocking the educational goals desired (Rawls, 2000; Zimmerman, 2000).

Teachers and students, then, need to develop new pedagogies and modes of learning for new information and multimedia environments (Hammer & Kellner, 2001). This should involve a democratization and reconstruction of education such as was envisaged by Dewey, Freire and Illich, in which education is seen as a dialogical, democraticizing and experimental practice. New information technologies acting along the lines of Illich's conceptions of 'webs of learning' and 'tools for conviviality' (1971, 1973) encourage the sort of experimental and collaborative projects proposed by Dewey (1997), and can also involve the more dialogical and non-authoritarian relations between students and teachers that Freire envisaged (1972, 1998b). In this respect, the revisioning of education involves the recognition that teachers can learn from students, and that often students are ahead of their teachers in a variety of technological literacies and technical abilities. Many of us have learned much of what we know of computers and new media and technologies from our students. We should also recognize the extent to which young people helped to invent the Internet and have grown up in a culture in which they may have readily cultivated technological skills from an early age.[19] Peer-to-peer communication among young people is thus often a highly sophisticated development, and democratic pedagogies should build upon and enhance these resources and practices.

One of the challenges of contemporary education is to overcome the separation between students' experiences, subjectivities and interests rooted in the new multimedia technoculture and the classroom situations grounded in print culture, traditional learning methods and disciplines (Luke & Luke, 2002). Already in the 1960s, Marshall McLuhan (1964) pointed to the disconnect frequently experienced by students raised on radio, television and popular media culture when confronted with print culture materials. Today, the disengagement on the part of students is even more strikingly evidenced in the contrast between an interactive and multimedia technoculture and the traditional forms of authoritarian lecturing and problematical print materials (such as outdated textbooks). Thus, a 'generational divide' is suggested that may be as meaningful as its digital counterpart.

The disconnect and divides can be addressed, however, by more actively and collaboratively bringing students into interactive classrooms, or learning situations, in which they are able to transmit their skills and knowledges to fellow students and teachers alike. Such a democratic and interactive reconstruction of education thus provides the resources for a democratic social reconstruction, as well as cultivating the new skills and literacies needed for the global media economy. So far, arguments for restructuring education have mostly come from the hi-tech and corporate sectors, who are primarily interested in new media and literacies for the workforce and capitalist margin of profit. But reconstruction can serve the interests of democratization as well as the elite corporate few. Following Dewey, we should accordingly militate for education that aims at producing democratic citizens, even as it provides skills for the workplace and social and cultural life.

Both Paulo Freire and Ivan Illich saw that a glaring problem with contemporary educational institutions is that they have become fixed in monomodal instruction, with homogenized lesson plans, curricula and pedagogy, and that they neglect to address challenging political, cultural and ecological problems. The development of convivial tools and radically democratic pedagogies can enable teachers and students to break with these models and engage in a form of Deweyian experimental education. The reconstruction of education can help to create subjects better able to negotiate the complexities of emergent modes of everyday life, labor and culture, as contemporary life becomes ever more multifaceted and dangerous. Supportive, dialogical and interactive social relations in critical learning situations can promote cooperation, democracy and positive social values, as well as fulfill needs for communication, esteem and politicized learning. Whereas modern mass education has tended to see life in a linear fashion based on print models, and has developed pedagogies which have divided experience into discrete moments and behavioral bits, critical pedagogies produce skills that enable individuals to better navigate and synthesize the multiple realms and challenges of contemporary life. Deweyian education focused on problem solving, goal-seeking projects and the courage to be experimental, while Freire developed critical problem-posing pedagogies and Illich offered oppositional conceptions of education and

alternatives to oppressive institutions. It is exactly this sort of critical spirit and vision, which calls for the reconstruction of education along with society, that can help produce more radicalized pedagogies, tools for social and ecological justice, and utopian possibilities for a better world.

Notes

[1] In this respect, Raymond Allan Morrow and Carlos Alberto Torres have also found Illich's disappearance from critical theories of education to be curious (Morrow & Torres, 1995, p. 232).

[2] Morrow & Torres's encyclopedic *Social Theory and Education* (1995) is exceptionally notable for attempting a critical assessment of both Freire and Illich, though the context of the book's focus upon theories of cultural reproduction leaves a dialectical comparison of the two, and a close analysis of their thoughts on technology in relation to the recent growth of computing, beyond its scope.

[3] As we note further in this article, Herbert Marcuse's theory of technology and politics undoubtedly exerted influence upon Illich, as it did for Freire, who in fact cites Marcuse in *Pedagogy of the Oppressed* (2001). Students of Freire and Illich, then, should concern themselves with Marcuse's theories in order to better understand their generative aspects. For our take on the contributions of Marcuse to education in particular, see our studies in the special collection of articles on Marcuse and education at http://www.wwwords.co.uk/pfie/content/pdfs/4/issue4_1.asp

[4] The concept of 'rational reconstruction' offered by the critical theorist Jürgen Habermas (1984) also deserves mention, but it should not be conflated with the more experiential and dialectical project of reconstruction outlined here. More so, projects of Freirean (McLaren & da Silva, 1993, p. 69; Freire, 1997, p. 56; Morrow & Torres, 2002, p. 31) and Illichian reconstruction (Illich, 1973) are obviously crucial, though our task here is to reconstruct them in terms of one another and contemporary needs in the context of present diverse situations in different locales.

[5] On the concept of 'media spectacle', see Kellner, *Media Spectacle* (2003a); it builds upon Guy Debord's notion of the 'society of the spectacle', which 'describes a media and consumer society organized around the production and consumption of images, commodities, and staged events', and defines 'those phenomena of media culture that embody contemporary society's basic values, serve to initiate individuals into its way of life, and dramatize its controversies and struggles, as well as its modes of conflict resolution' (p. 2).

[6] See http://web.archive.org/web/20061026234253/www.powerschool.com/media/pdf/powerschool_lennox.pdf

[7] 'Blogs' are hypertextual weblogs that people use for new forms of journaling, self-publishing and media/news critique, as we discuss in detail below. It was estimated that there were some 500,000 blogs in January 2003, while 6 months later the estimated number was claimed to be between 2.4 and 2.9 million, with a projection of 10 million by 2005; see the National Institute for Technology and Liberal Education (NITLE) Blog Census (http://www.blogcensus.net) for current figures. For examples, see our two blogs: BlogLeft: critical interventions (http://www.gseis.ucla.edu/courses/ed253a/blogger.php) and Vegan Blog: the (eco) logical weblog (http://www.getvegan.com/blog/blogger.php). 'Wikis' are popular new forms of collective databases and hypertextual archives. For an example, see Wikipedia (http://en.wikipedia.org/wiki/Main_Page).

[8] Note the comparison to the discussion of a radicalized Enlightenment project of education, conceived as *humanitas*, by Herbert Marcuse in his article 'The Individual in the Great Society' (2001, pp. 77-78).

[9] Some years later, in Freire & Davis (1981), Freire placed the figure of each projector at US$2.50. Considering the value of the dollar at that time, and that Freire purchased 35,000 units, this is obviously a large discrepancy in cost. Either way, one might surmise that Freire was comfortable with spending large sums of money on technology as long as it was being purchased for a progressive cause.

[10] As Kahn (2003) has written, Freire's emphasis upon the dichotomy between human culture and animal nature must be understood as both an ideological tenet of Freire's radical humanism and as a reconstruction of the oppressive biases held by those in power that have historically labeled people of differing race, class and/or gender as akin to 'animals' in a 'state of nature'. Freire correctly perceived that in political regimes, dehumanizing people and reducing them to uncultured savages is

equivalent to denying them power as part of a process of objectification. However, from a theoretical perspective, Freire can be critiqued for maintaining a non-dialectical view of the relationship between humans and animals, and culture and nature.

[11] Freire's book is especially sophisticated because, though based on his practical attempts to deal with the real cultural and political problems besetting Chile at that time, Freire also speaks allegorically of the theoretical struggle between the conservatives' attempt to delimit education as '*educare*' – the Latin root meaning 'to cultivate' or 'train' (like a plant, an animal, or a child) – and the progressives' alternative vision of education as '*educere*' – meaning 'to develop' that which is latent within. Thus, Freire undertakes an analysis of the modernization of agricultural practices, wondering if the extension of modern science and technology into Chile should be better understood as a literal attempt to train the Third World in First World cultivation techniques (e.g. the way in which one trains a vine or disciplines a child), or as an attempt to help develop within the Third World its own latent abilities towards cultivating greater productivity and freedom via modern science and technology.

[12] Freire thus presciently theorized the critical post-colonial research methodology of 'cultural interaction' (Fay, 1996, p. 231), which serves as the ideological basis of some notable recent ethnoscience collections (Nader, 1996; Figueroa & Harding, 2003) and the article by Kahn (2005).

[13] Freirean conscientization should thus be interpreted as a form of political engagement parallel to the decolonial, but developmental and modernization-oriented 'consciencism' formulated by the revolutionary African leader Kwame Nkrumah (1964, p. 70). As noted by Peter Roberts (2000, p. 138), Freire inherited the term *conscientizaçäo* from the radical Archbishop of Recife and Olinda, Dom Helder Camara – whom Illich also studied under, resulting in his introduction to Paulo Freire (Cayley, 1992, p. 205).

[14] Prometheus, the Greek titan whose name means 'fore-thought,' stole the element of fire from the gods to give to humankind because his brother Epimetheus (or 'after-thought') was required to give traits to all the beings of the earth but, lacking fore-thought, gave them all away before he reached humanity. As a result of his theft of the divine fire, Prometheus was condemned to eternal bondage on a mountain-top where an eagle fed perpetually upon his liver. Prometheus has been hailed as symbolizing humanity's prophetic, historical, educative and justice-seeking aspects, and in this way he became the favorite classical mythological figure of Karl Marx. Via the Marxist reading, Prometheus has also come to symbolize daring deeds, ingenuity and rebellion against the powers that be to improve human life. Alternatively, in the final chapter of *Deschooling Society* (1970), Illich revisits the myth and casts Prometheus as the original *homo faber* - the progenitor of the kinds of technologies and institutions that Illich believes have drowned hope in a global cult of expectation and social control. By contrast, he calls for the rebirth of 'epimethean men.' In Illich's depiction, Pandora was an ancient fertility goddess whose name meant 'All Giver' and in marrying her Epimetheus was wedded to the Earth and its gifts. Whereas patriarchal Greek society cast Pandora as a curious female who loosed evil on the world by opening her box, Illich notes that Pandora was also the keeper of hope and he finds that her box was really a sort of Ark of sanctuary. Hence, Epimetheus was not the dull brother of Prometheus for Illich but rather the archetype of those who give and recognize gifts, care for and treasure life, and attend to preserving hope in the world.

[15] However, their assertion that 'Illich's whole theory is grounded in Marcuse's *One Dimensional Man*' (Morrow & Torres, 1995, p. 227) possibly obscures Illich's ability to synthesize a wide range of philosophies of technology, as well as his own novel contributions that made him a leader in the radical, alternative and appropriate technology movements of the 1970s. Especially important influences upon Illich's theory of technology include Murray Bookchin, Jacques Ellul, Leopold Kohr, John McKnight, Marshall McLuhan, Lewis Mumford, Walter Ong, E.F. Schumacher and the twelfth-century monk Hugh of St Victor.

[16] Such would be entirely different than found in the hyper-industrial society theorized as post-industrial by someone like Daniel Bell (1973).

[17] See http://www.tropicalamerica.com

[18] Such as http://www.schoolblogs.com or http://www.blogger.com

[19] For instance, Mosaic, Netscape and the first browsers were invented by young computer users, as were many of the first websites, listservs, chat rooms, and so on. A hacker culture emerged that was initially conceptualized as a reconfiguring and improving of computer systems, related to design,

system and use, before the term became synonymous with theft and mischief, such as setting loose worms and viruses (see Levy, 2001). On youth and Internet subcultures, see Kahn & Kellner (2003).

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