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The Influence of ASCII[1] on the Construction of Internet-based Knowledge

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Abstract

When conducting research and inquiry into learning on the Internet, there is a tendency to focus only on what is happening *on* the Internet, not realizing that consideration should be given to what is happening *in* the Internet. That is, we look at programs, tools and technologies directly available to users, and from this perspective we inquire into how learning and learning environments are organized, constructed, managed, and how knowledge is built. There are, however, a myriad of activities going on beneath the surface of the Internet that not only influence what activities can be both undertaken and observed, but also inform and ultimately control the types of learning that can take place online. In this chapter, I will consider and critique the value neutral assumptions often made about the Internet by engaging the software, code, discourse and metanarrative of the Internet itself with the intention of revealing how what is hidden beneath the surface has a direct and profound impact on any explicit learning activities we choose to undertake on the surface.

Program of Inquiry

The intention of this chapter is to engage the deep structures of the hegemony of the digital technology revolution as represented by the Internet, levels beneath those addressed by most of the contemporary critical discourses. I am not working with more obvious barriers that constitute the "digital divide" such as the relationship of access to safe drinking water and basic rights of women's education to global attempts to bridge the digital divide (Nolan 2000), the future of educational technology in North America (Nolan and Hogbin 2001), or the potential for zero-cost computing and telephony technologies and indigenous language software environments (Nolan, Dicum, Singha 2003). The goal is to extend the dialogue to a consideration of the locations of control over which disadvantaged groups of users of communication technologies have little or no control, and even less information or understanding. I am looking not at the content/information/data that is presented through the various media of the Internet, but at the bias inherent in the medium itself (Jones 2000).

The Internet is first and foremost a learning environment in both formal and informal learning (Nolan and Weiss 2002). It is one that presents itself as value neutral; a manifestation of McLuhan's global village where bias and difference all meld into a stream of bits (McLuhan 1995). There is a great deal of pedagogy and curriculum about the Internet that both challenges and reinforces difference (Cummins and Sayers 1995; Harasim et al. 1995; Haynes and Holmevik 1998). But there is very little curriculum or curriculum theorizing that engages the software, code, discourse and metanarrative of the Internet itself, leaving current pedagogy to function in a sea of assumptions about what can be done and said and accomplished online. There is an "anti-intellectualism" similar to what Giroux describes as present in the classroom, or lack of interest in the sub-surface discourse of the code and software of the Internet (Gray 2001; Giroux 1992, p. 116).

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[1] ASCII stands for American Standard Code for Information Exchange, and is the encoding method by which most text-based information moves around the Internet.

McLuhan's *medium is the message* mantra is ever current as we are infected with the latest rash of technological developments. However, as educators and researchers confront the dominant and subversive ideologies presented online, very few are willing or aware of the need to critique the imposition of the locations of power that have brought the Internet into existence. There is a need for us all to be aware of the levels of implicit colonialization that accompanies the proliferation of Internet-informed culture (Said 1993). There are a variety of layers that must be unpacked and brought into the light of inquiry, "to know as much as possible about the house that technology built, about its secret passages and its trapdoors" (Franklin 1992, p. 12). First and foremost is the foundation and genesis of the Internet itself, located in the Cold War desire for a computer network designed to withstand nuclear war (Krol 1992). Who made the Internet? Who are its informal architects? What culture was this creation located in? Second, we have to look at the software that runs the Internet, the servers that move information, and the software that extends its purview to our desktops at home and in our workspaces. Third, there is the post-1994 World Wide Web which opened this brave new world to both the general public and to the commercial influences that followed them (Berners-Lee 1998). Fourth, we are faced with the Internet representing technology and discourse as the informing metanarrative of the new global economy. Fifth, we need to envision strategies to help educators encounter difference in our pedagogy, practice and inquiry. These will serve to point to locations, the potential avenues, for radical repositioning of the discourse at the nexus of the educator and her performative/transformational capacity as creator of learning environments (Nolan 2001).

The foundation and genesis of the Internet

Most of us are aware of the genesis of the Internet at the hands of the Advanced Projects Research Group, of the US Department of Defense which, in late 1960s founded research that led to the linking of computers at university in the Western US (Cailliau 1995; Gray 2001; Krol 1992; Mitchell 1998). This foundation has morphed into an ostensibly uncontrolled and uncontrollable global phenomenon that has exploded the opportunities for voice and communication around the world. It has gone down in Western history alongside Gutenberg and Caxton's moveable type revolutions which propelled text out of the Medieval modes of production and privilege (McLuhan 1995). And just as the print revolution was about the technology of the printing press, the Internet is as much about the software code and Internet Protocols (originally TCP/IP, Telnet, SMTP, FTP, and recently HTTP) that bring the Internet into existence as it is about what we do on it. Those who controlled the printing presses still controlled what could be and was said. Someone needed to control a printing press in order to have voice; as time went on more people had access, and differing voices could make themselves heard. Of course, concomitant with this means of production, one needed to have access to networks of distribution, a limitation that still restricts the diversity of voices that are heard both in media-rich and media-poor cultures/languages. Today, access to public consciousness via the medium of print is seen as widespread, but in many situations individuals and groups are still voiceless (OECD 2000).

The Internet stands now as a force within our collective worlds. But control is still located in corporate and government institutions. In 1992, the US government released the rules governing acceptable use of Internet resources, opening the Internet up to business, and since then corporations have taken over much of the Internet (Cerny 2000; Hochheiser and Ric 1998). Individuals must purchase or rent time on expensive machines made by an ever-shrinking number of multinational corporations. Organizations such as the various Freenets (Scott 2001), FIDOnet (Vest 2001) and the Free Software Foundation (Stallman 1999) are still challenging the hegemony of institutional and corporate interests, but their influence is small and localized.

Technologies of Resistance

The Internet is not the free-for-all anarchic space that business, the media, Libertarians, and

cyborgs would have us believe (Gray 2001). Though chaotic and anarchic activities do exist, and these are very important locations of resistance, every act of resistance or conformity occurs under the graces of the protocols of the Internet. These protocols are governed by various institutions, governments, and administrative agreements. The most fundamental of these it the TCP/IP protocol, invented by Vinton Cerf and Bob Kahn. Almost all Internet traffic must conform to the TCP/IP protocol or it is rejected by the servers that pass information from computer to computer. How that information is encoded is governed by standards developed and maintained by various groups such as WC3 (World Wide Web Consortium), ICANN (Internet Corporation for Assigned Names and Numbers), IEEE (Institute for Electrical and Electronic Engineers), and JPEG (Joint Photographic Experts Group) (Champeon 2001). These regulatory bodies, organizations, and protocol standards control what can and is done on the Internet. Many of these groups are transnational, but they contain a very narrow selection of interests that are contiguous with the goals of the West.

There is no question that the software and hardware we use is primarily informed by multinational corporations; Microsoft, Sun Microsystems, Intel, AMD, AOL Time Warner, Apple Computer, IBM, Yahoo, Hewlett-Packard, Sony, etc., along with their support companies and organizations, control at the most basic level how we communicate online. Their software is not value-neutral. It is culturally and linguistically embedded in a technologically positivist metanarrative that sees the technology itself, and those who create it and use it, at the apogee of human cultural experience (Lyotard 1984). This predisposition is encoded in the software itself.

There are a number technologies and movements that challenge the consumerist/corporatist profit driven models of the Internet, positing a somewhat prosumerist[2] model; "As prosumers we have a new set of responsibilities, to educate ourselves. We are no longer a passive market upon which industry dumps consumer goods but a part of the process, pulling toward us the information and services that we design from our own imagination" (Finely, 2000). The open source movement is the key idea that brings otherwise competing interests together; it is one of the most important in computing in the late 1990s, and will probably be one of the dominant forces into the next century (Scoville 1998; Raymond 1998; O'Reilly & Associates 2000). Open Source Initiative and the GNU Project are two organizations influenced by specific individuals; GNU by Richard Stallman, and Open Source by Eric Raymond (Scoville, 1998). In general terms, they both want to promote software that is free, freely available, and open to the Hacker community. These projects both support the traditional notion of sharing resources among members of a community.

The Free Software Foundation is clearly immersed in the Hacker philosophy that information wants to be free. The Free Software Foundation's GNU General Public License (GPL) was first brought forth in 1991: “The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users” (Stallman, 1999).

The Linux operating system builds on this open source philosophy. It is both a software and a conceptual revolution that has changed computing in a way that we cannot have imagined. Because of its success, it is also an important pedagogical signpost, showing an alternative direction from the commercialization of online exploration of learning. "Linux is a free Unix-type operating system originally created by Linus Torvalds with the assistance of developers around the world. Developed under the GNU General Public License, the source code for Linux is freely available to everyone" (Online 1994-2000). As such, it represents a movement that critical education can follow, through vehicles such

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[2] Prosumer, in general, is an individual who partakes in both production and consumption.

as the GNU, to allow individuals and organizations to maintain ownership, while freely sharing of their work with a larger community.

The rise in importance of Linux (www.linux.org) is predicated on the fact that it is an open source operating system. The dynamic potential of the CVEs (Collaborative Virtual Environments) I work with is fundamentally due to their open source existence. This means that the raw source code of the system is publicly available under a license that allows anyone to use it and modify it for their own purposes under relatively flexible conditions as laid out in the license (Nolan and Weiss 2002; Nolan 2001). The result is that thousands of users are motivated not only to modify and add to open source software for their own purposes, but also to share what they have created with the entire community. The strength comes from the openness of the system and the community that surrounds it.

Cultural Production

These initiatives do not challenge the Western bias outlined in this chapter. They do, however, challenge the multinational corporations' ability to control what software we use, and how software can be modified. Open source initiatives offer individuals and groups interested in social justice not only valuable allies who are often underutilized, but most importantly a model of resistance that seeks to transform debates and relocalize them within social, as opposed to corporate, purviews.

Hackers are the first community of the Internet. Many of the original members are the programmers who hacked the Internet together in the first place. They were the first to subvert the dominant discourse of the Internet to human, communicative, social ends (Ruffin 2001; Sterling 1993). Hackers are not the malicious Crackers and virus programmers that strike fear into corporations and are vilified in the popular media (e-cyclopedia 1999; Raymond 2000b; Stoll 1989). They are not destroyers, but travelers, seekers, and creators of alternatives and solutions to barriers to accessing knowledge and information. Their mantra is that information wants to be free (Gray 2001). They are also predominately ultra-privileged young educated heteronormative white males, but they are philosophically opposed to the hegemony of corporate and governmental interests. I work with queer Hackers, cyborgwomen and cybergirls, and the work of Stone on the transgendered body (Stone 1992), and Harraway's cyborg (Harraway 2000), and Hayles post-human (Harraway 2000; Hayles 1999) collectively reveal how the interfacing of women and technology are relocalizing the discourse of hacking in gendered spaces. As the technologies and influence of technology on the body are engaged by women, they are staking territory in the realm of the Hacker. The roots of the community, however, are located in this opposition to institutions that want to control information and access to resources.

There are social learning environments, collectively called Collaborative Virtual Environments (CVEs) such as MOOs, where individuals and groups construct/program/hack out virtual spaces and communities (Cicognani 1998; Fanderclai 1995; Rheingold 1993; Schank et al. 1999; Turkle 1995). I have been involved in CVEs since the late 1980s, and developed two MOOs. MOO is an acronym for Object Oriented MUD, itself an acronym often unpacked as Multi-User Domain/Dungeon/Discourse (Curtis 1992; Curtis and Nichols 1993). My MOOs are virtual places where participants from as far away as Taiwan, Iceland, Brazil and Russia "create representations of people, places and things and share them with others" (Nolan 2001). The key to these constructionist, polysynchronous[3] (integrated synchronous

[3] "Polysynchronous is a term coined to describe the nature of MOOs where communication is an embedded combination of both synchronous and asynchronous communication (Nolan, 1998; Davie and Nolan, 1999). An IRC chat group is completely synchronous. Users communicate in real time, and there is usually no record kept of the communication unless one member personally creates a transcript of the interaction as a log. Asynchronous communication refers to the what happens on bulletin boards and via e-mail where a message is composed and transmitted to another individual or group. In a

and asynchronous communication) spaces is that people not only communicate online in a multimedia, open source software environment, but that they can collaboratively create and program these spaces according to whatever criteria they choose to conceptualize and describe (Nolan 1995; Davie et al. 1998; Davie and Nolan 1999). Though MOOs still suffer from their English-only roots, we can and have worked simultaneously in English, Chinese, Japanese, Russian, Icelandic, and we are conceiving a MOO dedicated to polylingual communication. A polylingual space, versus multilingual, suggests that not only can many languages be accommodated, but that no one language reigns supreme; that multiple, intersecting language events and spaces can be created, and participants can work within the language(s) of their choice without being mediated by an overall dominant language.

The Internet is Written in English

The Internet infrastructure, corporations and technologies/groups that challenge them are primarily English/male/Western dominated discourses. All strands are Western in voice. More importantly, software is written in programming languages such as C, C++, ObjectC, Java, and/or scripting/markup languages like Perl, PHP, HTML, XML. Though it is possible to use these languages to express written languages other than English through various encodings, these languages were created by speakers of English to be used by English speakers. You cannot participate in the creation of software without *using* English in the programming, scripting or markup of content, without participating in the hegemony of English, even if you do not have the ability to speak or write English.

What does this mean in terms of education and technology? Simply put, it means that it is practically impossible to participate in the world of technology without privileging English. The Internet is written in English. A programmer who wants to write a word processor for Icelandic writes the word processor in English using a language like Java or C++. The software is installed into, say, a Windows, Linux or Apple operating system that has been *localized* into Icelandic. And files created still require, in most instances, a .doc .txt .html suffix; all derived from English. These *localized* versions are localized as an afterthought. The major operating systems, and the various software packages, are most all written for English consumers first, tested and made available to English consumers, and then *ported* to other languages, *if* the software company feels that it is profitable to do so. In 1997, Microsoft was pressured into porting one of their versions of windows to Icelandic by the Icelandic government, highlighting the fragility of languages in the face of English and corporate interests (Ford 2001).

Though many operating systems, such as Macintosh's OSX and Linux, now are sufficiently international to ship with multi-language package options, and has localized versions for a few major language markets, there is very little available that is not Anglo-centric. The hegemonic influence of English in the computer languages running the Internet, however, means that concerted effort by educators of difference who are willing to work towards the creation of alternative language spaces is required.

The 26 letters of the English alphabet form the basis of how most content moves across the

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MOO, communication can be synchronous or asynchronous, but it can also be a combination of both. A conversation can be encoded into an object for others to read. MOO objects can be programmed to listen to conversations between members and generate responses that become part of the MOO-space itself for other participants to listen to later. As well, a conversational interaction may take the form of direct synchronous speech *and* the co-manipulation of MOO objects. It is possible to talk with another person, hand her virtual objects for her to look at, co-program MOO objects, and record the conversation for a third party to read later. This type of polysynchrony is particular to MOO-type environments, but reflects the direction that collaborative virtual environments are anticipated to follow in the future" (Nolan 2001).

Internet, encoded as ASCII (American Standard Code for Information Interchange) text. The Internet functions primarily using the 94 printable characters that make up the ASCII character set:

> abcdefghijklmnopqrstuvwxyz
> ABCDEFGHIJKLMNOPQURSTUVWXYZ
> 0123456789
> !"#$%&'()*+,-./:;<=?@[\]^_`{!}~ (Lunde 1993, p36)

And when Japanese is displayed on your computer, the characters look and act like Japanese, but the encoding method still involves ASCII characters in the background.

かな漢字
82A9 82C8 8ABF 8E9A

In this example the two groups of characters, *ka na* and *kan ji*[4], are presented with ASCII characters shown below[5]. These *characters* which represent words that describe the two main writing scripts in Japanese (*ka na* and *kan ji*) are each represented by four hexadecimal digits; digits which are part of the ASCII character set.[6] That is, the Japanese language is represented by characters that make up the American Standard Code for Information Interchange. And Japanese is often encoded using methods that represent data based on ASCII in order to be to be communicated to another computer, even within Japan.

When you write a program, script or electronic document, it must be written using an English-based programming language, such as Java, C, Perl, HTML. This following example from MOOca.java describes connecting to our MOO and setting the parameters for encoding non-English characters:

> outputWriter = new OutputStreamWriter(mSocket.getOutputStream(), mRequestedEncoding);
> s = new String(inputBuffer, 0, byteCount, getEncoding()); (Nolan and Goulden 1996-2001)
>
> Where mRequestedEncoding is taken from the applet parameters and is a string such as "SJIS" "ASCII" "UTF8" [Unicode] which tells Mooca how it should encode the characters to send it to the Moo. Where getEncoding() usually is the same as mRequestedEncoding above. The only time it would be different is if someone tried to ask for an encoding that didn't exist, such as "japlish", in which case it would fall back to the user's default encoding. (Goulden 2001)

It is possible to see this form of encoding as unproblematic. A minor price to pay for global communication, but the hegemony of English is even more profound: "*Does the interiorization of media such as letters alter the ratio among our sense and change mental processes?*" (McLuhan 1995, p. 119). When you send an e-mail message, regardless of the language in which you compose your text, your e-mail program must talk to a server. A message is sent to a server on port 25 and the first message it says is "HELO", an abbreviation of "hello", in order to initiate a process that gets your e-mail moving on its

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[4] The *ka na* and *kan ji* characters and their encodings have been created by Ken Lunde for this publication.

[5] For more information on Japanese language and computers, please see Jun'ichiro Kida's web site "Japanese in the Age of Technology" (http://www.honco.net/japanese/). Of particular relevance to this paper is the section "Inputting Text with Two-Byte Characters (http://www.honco.net/japanese/05/page4.html).

[6] Dave Goulden (2003) notes that Japanese characters are more properly identified as having been encoded into hexadecimal digits, rather than ASCII characters. Hexadecimal is a base-16 numbering system used by programmers for, among other things, representing binary data. The hexadecimal character set (1, 2, 3, 4, 5, 6, 7, 8, 9, 0, A, B, C, D, E, F) can, for the purposes of this discussion, be characterized as a subset of ASCII, versus

way (commands sent to initiate communication are in **bold**):

> **telnet achieve.utoronto.ca 25**
>
> Trying 128.100.163.xxx... Connected to achieve.utoronto.ca.
>
> Escape character is '^]'. 220 achieve.utoronto.ca ESMTP Sendmail 8.9.3/8.9.3; Tue, 6 Nov 2002 14:36:15 -0500
>
> **helo achieve.utoronto.ca 25**
>
> achieve..utoronto.ca Hello envvirtual.utoronto.ca [128.100.163.xxx], pleased to meet you

This means that every e-mail ever sent on the Internet by anyone in any language to any country, is couched in, or bracketed by, English. Communication is initiated in English and concluded in English. As Steiner notes: "So far as language is the mirror or counter statement to the world, or most probably an interpretation of the reflective with the creative along an 'interface' of which we have no formal model, it changes as rapidly and in as many ways as human experience itself"(Steiner 1998, p. 468). Steiner's ideas suggest that what we can do and think with technology is forever informed by a language that, though in flux itself, forces the expression of human experience to conform to the influence of a single language and perhaps the metanarrative of those who thus situated it. The phenomenon that is the Internet has come upon the human species fast and unanticipated. Educators are playing catch up in their critical awareness of the foundations of the Internet, with the result that aspects of this revolution that should be challenged and problematized have slipped by, perhaps unnoticed.

The Educator as a Creator of Learning Environments

I am writing this chapter in English, as it is the only language to which I can claim fluency, but I choose to code this chapter in raw html, the hidden background scripting language that forms the background of most web pages. What I have written looks to me like this:

> </blockquote>
>
> The educator as a Creator of Learning Environments
>
> <blockquote>
>
> I am writing this…

I am also writing using programs such PICO and BBEditLite, free word processors. These choices remove, even if just temporarily, a level of commercial influence over the production of text, and a level of isolation from what goes on behind the location of the presentation of text. In order to participate in the publication of this book, however, I will have to convert my text into Microsoft's Word program. These vaguely symbolic acts do highlight how an educator can position herself within alternatives to corporatist agendas, and model a practice that can be both emulated by students and stimulate awareness and inquiry into alternatives.

These are, however, the most superficial locations of resistance, and an entire volume such as this would be required to engage the possible examples and experiences of CVEs, MOOs, Cyborgs and Hackers (Gray 2001; Stone 1992). Technology and computer literacy as it is taught rarely takes even this stance. Review any curriculum, and you will see that it is largely infused with corporate technologies and corporate interests. The goal of technology-based curriculum is that of teaching users to be consumers of products in the name of global competitiveness and efficiency. Often the technologies are no more than computer assisted learning and evaluation tools. Teaching is limited to what is proscribed in the manual. Rarely do even the most pedagogically aware educators, informed by critical pedagogy and aware of the need to promote alternative voices, critique the technologies in which the voices are located. And if/when

they are aware, they lack the time or resources to really explore the options that are hidden away by security-conscious systems administrators (Nolan 2001). Today most decisions as to what technologies are used in learning environments are made by technology specialists and administrators, and are given to educators with little or no consultation. There is even less awareness on the part of the educators and students that alternatives exist.

This is an untenable position. If valid and sustained strides are to be made to embed alternative choices in the global culture, they must be found within the technologies we use. These technological alternatives are something that cannot be done for us either. They must be done by us in community with our peers and students. To control the conceptualization, creation, development, implementation, co-habitation and governance of these spaces we must learn to code, program, create our own software and environments that reflect our diverse needs and goals, and we must share them freely with others; allowing others to revise and relocalize what we share according to their own criteria and needs. For if we do not actively participate in the creation of our discursive spaces, they are created by someone else, and we are at the most disempowered end of the power relationship (Foucault 1991; Illich 1970). If we do not govern our own spaces, teaching and learning is open to commodification, and we are no longer creators, but consumers.

As a first step, transforming ourselves from consumers into prosumers where we are involved in communities of discourses, technologies, and narratives that we co-create and inhabit, allows us to share and interact with our stories. The much vaunted virtual community becomes a potential reality when we are able to (re)construct and embrace both collective and infinitely differentiating representations of ourselves, as we see ourselves, and reflect upon how we see others and are seen by them (Fernback and Thompson 1995; Rheingold 1993). The potential dialogues are, however, only realizable when we control the means of our own representation. The situation is hazardous simulation when dialogues are mediated by technologies over which we have minimal understanding and scant influence (Baudrillard 1988; Fernback and Thompson 1995; Stone 1992).

The influence of the Internet on diverse languages and cultures, those represented and under-represented by technology, is an act of relocalization of culture(s) from the real to the virtual. Cultural topologies are (re)constructed, and cultural experience must find new strategies of expression and resistance to survive and thrive (Ostrom 1990; Rheingold 1993). But more importantly, this relocalization is an act of translation of cultural experience (Steiner 1998). And without the concerted effort of educators informed by the ideas of the pedagogies of difference—educators who are able to engage and dialogue with the Englishness of the Internet below the surface level of written texts, down to the level of the code and encodings that make the Internet happen—we are situating struggles within colonializing dialogues, aware of whose hands we are playing into, but unaware of how deeply the cards are stacked against us (Giroux 1992). Where Steiner hypothesizes that "the proliferation of mutually incomprehensible tongues stems from an absolutely fundamental impulse in language itself [and] that the communication of information, of ostensive and verifiable 'facts', constitutes only one part, and perhaps a secondary part, of human discourse" I think that we are not only engaged in a struggle to liberate Internet discourses from the hegemony of English, but are engaged in a struggle fundamental to the defense of all aspects of difference (Steiner 1998, 497). Little can be done to exorcise English as the fundamental language informing Internet communication, but it is important that educators struggle to demarginalize communities of difference to extend their program of inquiry and resistance to an engagement of how language and cultural influences inherent in the structure of the Internet translate/encode discourse and experience within a dominant cultural ideology.

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