

The Techneducator Effect:
Colliding Technology and Education in the
Conceptualization of Virtual Learning Environments

by

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Abstract

The techneducator stands at the nexus, Janus-like, between the realms of education and technology. These two worlds meet head-on through the collisions experienced and instigated by the author of this dissertation in the conceptualization and creation of polysynchronous virtual learning environments. The dissertation itself explores multiple strands of inquiry into the author's emergence as a techneducator over two decades of working in the worlds of technology and education. The intention of this inquiry is to develop a narrative picture of the struggle to relocalize developments in technology more firmly within the purview of the educator, as opposed to the present situation where developments in educational technology are primarily controlled by programmers, technicians, administrators and corporations.

Commencing with the realization that the understanding of how technology and education should interrelated, in order to redress the imbalance that positions educators in the role of being primarily passive participants in the imposition of technology on education, the author embraced the emergent nature of inquiry and the focus of the dissertation shifted from a consideration of groups of educators learning in the virtual learning environment of MOOkti that he had created, towards a narrative inquiry of his own practice, particularly as a creator of learning environments. The resulting text, in which theory is embedded in metaphor through out the narrative, developed into the articulation of the *techneducator effect*. This effect in turn became the foundation for the conceptualization of educational technology manifest in COLLIDE, the Collaborative Object-based Lifetime Learning Interaction Design Engine, described in Chapter Five. COLLIDE is presented as a narrative description of a software environment that embodies the key elements of the *techneducator* distilled from the narrative inquiry of the previous chapter. The dissertation concludes with a meta-inquiry into the construction of the entire dissertation project in order to contextualize the inquiry into the creation of learning settings within theories of critical narrative, as a way to bring closure and to allow for meditation on locations for future inquiry.

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Dedication

I dedicate this dissertation to my partner, Yuka Kajihara, for having more sustained and consistent influence on the conceptualization, learning, production and completion of this project than anyone.

Table of Contents

Abstract.....	ii
Acknowledgements.....	iii
Dedication.....	iv
Chapter One: Context and Questions.....	1
Situating the Researcher.....	1
Context.....	5
Initial Research Questions	7
Background Research	8
Initial Process.....	9
Data Sources	11
Ethical Review	12
Emergent Research Questions	15
Emergent Process.....	16
Whose Idea Was This?.....	17
Chapter Two–Curricular and Pedagogical Importance of MOO as Collaborative Virtual Environments	22
MOOs in Iceland.....	24
MOOkti @ OISE.....	25
MOOs are Themselves Valuable for Two Main Reasons: Rationale.....	26
Learning Possibilities.....	27
Questions Informing Inquiry.....	28
Curriculum Design: The Participants and the Space	28
Maintenance.....	29
Objects	29
HTML and Programming.....	29
Chapter Three: Situating Narrative Inquiry	32
Why I Dumped the Data, or Did I?.....	36
Chapter Four: Why I Hate Computers... and Computers Hate Me.....	43
I Think it is Necessary	43
DataCrown: Technology in the Real World (1979).....	44
DataCrown: Phase Two (1980).....	48
Colossal Cave Adventure.....	53
The End and the Beginning (1981).....	56
Japan (1986-1987).....	57
Gradschool and the CAWC (1987-1992).....	58
Online Experiences	62
Home Computing My First PC	66
Teaching at York University: Computer Literacy	69
FEUT & OSEE (1991-1995).....	73
A Mac of My Own, and a Place on the Web	78
Toronto Freenet (1992-1994).....	81

Japanese Language Processing and Community	82
The Whole Internet User's Guide and Catalog.....	84
Yuka on the Internet.....	85
OISE Day One (1994-)	88
A MOO of One's Own.....	94
Cosmo, Cosmites, and Aquamites: the Spammy Bits.....	98
Examining the MOO Research Environment via a Theatrical Metaphor.....	106
Lynn's Learning Lounge.....	110
Communications	110
Navigating.....	111
Building.....	113
The Roles	114
The Director (aka Lynn)	114
The Technical Director (aka Jason)	115
The Acting Coach	115
The Actors.....	115
The Performances	116
Time in a Bottle.....	116
Pacing and Patience	117
Role of the Technical Director.....	118
What Have We Learned from Students? Techn'educators: Oh Strange New World, That Has Such People in It!	118
The Curtain Call.....	119
The Techneducator Effect.....	121
Chapter Five–COLLIDE: Objects that go Bump in the Night.....	127
Prelude	127
Purpose.....	127
Colliding Features in the Engine.....	128
Colliding Elements: Objects that Smash in the Night.....	129
COLLIDE.org: Open Sourcedness in Educational Technology	131
Open Source Versus GNU	131
What are GNU and Public Licenses: GPL and GFDL.....	132
What is Linux?.....	135
How do You Pronounce Linux?.....	136
MOOkti and the Nexus of the Collision	139
What will COLLIDE actually Do?	139
COLLIDE.....	141
COLLIDE Engine Use Case	142
COLLIDE: the Nexus Raster Matrix	154
And Where Does this All Leave Us?.....	156
A Future Scenario	157
COLLISION.....	160
Chapter Six: The Dance of the Dissertation.....	164
A Tale of Two Metaphors: Musique Concrete and the Ode.....	165

Data Panic in the Year Zero: How Aspects of the Curriculum Anticipated in the Dissertation Proposal Were Negotiated.....	167
The (re)Structuring of the Proposed Research.....	171
Considering Narrative in a Larger Context.....	172
Reflections on the End of an Era	175
Bibliography.....	180
Appendices.....	197
Appendix A.....	197
Actual Curriculum Used for Some of the Research Courses Under Observation ...	197
Appendix B	204
Research Questionnaire.....	204
Appendix C	206
Raw Data Example.....	206
Appendix D.....	207
Letter Of Consent.....	207
Appendix E	208
@participate Sequence and Transcript Data.....	208
Appendix F.....	209
Weightlifting Simulation Code	209
Appendix G.....	211
Email Regarding the Naming of MOOs in Iceland.....	211

Chapter One: Context and Questions

Situating the Researcher

I have a background as a teacher, and have a long term interest in the use of technology in my teaching. For the last decade, I have explored using various forms of technology in my teaching and research inquiry. My experience and skills as an educator and conductor of inquiry have grown along with the growth of the Internet and related technologies. These experiences started with early word processors, email, news, and chat functions. As the Internet embraced the World Wide Web in 1994, I moved with it. I have developed dozens of web sites, some with over a thousand items (web pages and images). These online experiences have included beta testing and assessing new technologies for possible adoption at the University of Toronto, and has culminated in the development of two virtual communities: MOOkti (Nolan, Casey, Snyder, Beermann, & Goulden, 1995-1999) at OISE/UT, and Project Achieve (Nolan, Casey, Beermann, Goulden, Snyder, & Sponnas-Robbins, 1999-2000), under contract to Industry Canada/Canada's SchoolNet. Along the way, I have created new technologies such as the MOOcaJava Applet, data collection tools for the Computer Curriculum Corporation, various enhancements to the MOO platform, and the Virtual Assignment Server Environment (VASE). VASE has been recently registered as an invention with the University of Toronto. Each new experience has led me to a deeper understanding of the potential role of the educator as a shaper of new technologies.

My commitment to online learning, through the creation of collaborative virtual learning environments (CVEs), has led to various programs of inquiry, publications and presentations at various academic conferences, and web sites. My academic and personal experiences have led me to inquiry into the creation of learning environments, and a realization of the importance of educators and academics to take the lead in the creation and development of such environments. I feel that educators in particular must stake out a position in the forefront of new technologies as they relate to learning and inquiry. The lead is presently held by technologists: programmers, software designers and corporations. However, if educators are not present on the cutting-edge of new innovations, we will not have the power or voice we need in order to effectively influence the development and creation of new locations for learning and inquiry.

Unfortunately, the discourse of technology has outdistanced the educator. Change is too fast for the profession to acculturate university faculty, let alone teachers, to new developments, technologies, ideas, and discourses. Institutions that train teachers are still scrambling. And in few fields other than education do we find that students are often more conversant in technology than their teachers. Educational institutions still embrace a discourse that is linear, organizational, applied, not the post-modern discourse of technology that is embodied (Kroker and Weinstein 1994; Kroker, 1993; De Kerckhove 1995), embedded (Manen, 1997), experiential (Gibson, 1984), emergent (Novak, 1991; Baym, 1998; Bruckman, 1992; Bruckman, 1992a); that is, metaphorical (Harré, Brockmeier, and Mühlhäusler, 1999; Turkle, 1995).

Present users (educators, in terms of this thesis) are divorced from the actual workings of computers and technologies, even when the user is involved in the production of technology. The percentage of users who can actually 'hack perl' (a scripting language that processes web data, among other things), understand a 'traceroute' readout ('traceroute' is a unix command that describes all the various computers that a unit of data travels between a server and client) or usefully manipulate TCP/IP packet rates (Internet data travels in TCP/IP packets) to test a network connection, is miniscule (Gilly, 1992; Moore, 1994). These three arcane concepts are presented as examples of a world that the users will not usually encounter, and illustrates that they are not even scratching the surface of the complexities of the technology involved in filling in a form on a web page, or other more complex internet-based interactions. These examples illustrate the distance between the average user and the technology that is already regarded as a *black box*, and as such, there is little sense to the claim that situating technology within the purview of the user will further dis-empower the user. The gulf is too wide.

This dissertation takes up the challenge of positioning the educator as both present at the forefront of new technologies, *and* deeply embedded in the discourse of technology. The intersection of teacher experience, the development of new technologies, and the post-modern discourse of technology is an attempt to bridge these three domains. The purpose of the bridging is to create a tripartite location for inquiry to bring all three under a single program, that of the creation of virtual learning environments. The aspects of this

combined position can perhaps be described as *code*, *create*, and *critique*. To code is to program software. To create is to create learning environments. And to critique refers to the development of a philosophical positioning of these activities with the discourse of technology. This dissertation describes how I, as a technologically-focussed educator, took up the task of trying to manifest these three elements in my professional practices as an educator, programmer, academic. The path was not a pre-ordinate program of inquiry. It was an emergent coming to an understanding of the issues facing educators thinking about and creating learning environments. The path has been long, spanning almost two decades of experiences, a decade of teaching, and more than five years as a doctoral candidate. However, only towards the end of the journey did the various strands coalesce into a reflective understanding of how the interwoven threads supported and built upon each other to define a new role, that of the techneducator; the educator as a technology-savvy conceptualizer/facilitator/constructor of learning environments.

My initial goal in the thesis was to work with teachers in Collaborative Virtual Learning Environments such as MOOkti. CVEs are for me, an important location for inquiry into how educators relocalize their personal and professional practice from real environments into on-line and virtual environments. There was very little written about educators working in virtual spaces. But inquiry into how educators transfer their skills is important for both issues of curriculum development and research into the creation of and work within these environments.

The program of research, as outlined in the dissertation proposal, intended to conduct inquiry using quantitative and qualitative methods into educators learning how to work in a collaborative virtual learning environment called MOOkti, running on a server at the Ontario Institute for Studies in Education of the University of Toronto since 1995. The program of data collection, carried out over about a year, involved research and data collection carried out with the participation of three graduate classes of educators studying computer applications. Data were collected, questionnaires were completed, and many participating in the research were interviewed. The author and his supervisor anticipated that research would have to accommodate a large amount of indeterminacy, because very little inquiry had been conducted into environments such as MOOkti, and no published studies of educators working in these environments had been located. Even

so, the intended research was challenged by new questions and issues at the beginning of data analysis which prompted a reconsideration of the program of inquiry and a redirection of the thesis into new areas and locations of inquiry. This dissertation represents outcomes of these shifts.

The original design was predicated on the novelty of the collaborative virtual environment for which there was no foundation in the literature with which to prefigure possible outcomes of the inquiry. As such, the researcher needed to be open to events and experiences as they occurred in the hopes of developing an understanding of what was going on in the research site, and with the data collection. The most startling situation that emerged from conducting the research was that the data collected was unable to provide an indication of the hoped for level of interactions in the research subjects. In discussion with my thesis supervisor, I began to look more closely at my own practice and experience with teaching, learning and technology. Inquiry shifted from a consideration of teachers in the technology-based learning environment of MOOKti to a personal inquiry of a creator of technology-based learning environments. This second location, personal narrative, represents a form of emergent inquiry in which understanding came about concomitant with the actual writing of the thesis and reflection on the issues and experiences described. The resulting style of the dissertation reflects this journey of discovery and inquiry of how one educator became a creator of learning environments.

According to this form of emergence, a recursive and somewhat cyclical process has been to a large extent captured within the pages of this dissertation as a series of interwoven strophe and antistrophe; the back and forth movements of a dance. The first three chapters are very much positioned in the design of the initial inquiry, and the challenges the author faced. Chapter Four represents an extended narrative of the author's experiences with technology over almost two decades ending with the creation and development of the MOOKti environment. Various themes and issues relating to the understanding and creation of learning environments are brought to light as part of a story of the author's relationship with many individuals and technologies. In Chapter Five, these themes coalesce into the description of a new technology environment called COLLIDE which is situated within a conceptualization of the relation among users,

discourse, and technology. COLLIDE, itself, plays upon the notion that the use of technologies by users involves a variety of collisions, often abrupt and dynamic, which traditionally have tended to dis-empower the user; “Many newcomers to the world of computing imagine that software behaves the way it does for some good reason. On the contrary, its behavior is often the result of some whim or accident that is thoughtlessly propagated for years” (Cooper, 1999, 69). The collisions take the form of conceptual, technological, hardware and software glitches where technology is unable to perform according to the needs and intentions of the user. The COLLIDE environment seeks to conceptualize the realignment of the power relationship by forcing technology to react to the user, rather than the user responding to dictates of the technology (Cooper, 1999; Foucault, 1979; Foucault, 1980a; Foucault, 1980c). This realignment privileges the idea that technology must do a better job of functioning within the social and human world than it has done up to the present (Cooper, 1999). The goal is not to further dis-empower the user by playing to the user’s ignorance of the minutiae of a particular technology, but rather to situate technology more clearly and explicitly within the needs and goals of the user and the user’s social and professional environment. As well, whether COLLIDE represents an idea, and whether it will actually work, is secondary to what it says about the creation of learning environments and the practical power relationship between the user and technology. Chapter Six stands back from the action to reflect on the entire dissertation project. This chapter takes up many of the strands of inquiry and situates them in narrative theory and challenges posed by the inquiry of the first five chapters.

Context

MOOs, such as MOOkti and Project Achieve, are an emerging form of educational computer-mediated communication; a text-based polysynchronous collaborative virtual learning environment¹ that allows users to design and program models of people, places and things, and share them with others (Nolan, 1998). MOO stands for MUD Object Oriented, and describes a server, database and programming language (Curtis and Nichols, 1993). MUD stands for Multi-User

¹ The phrase “text-based polysynchronous collaborative virtual learning environment” is too ‘busy’ to be repeated. All of these adjectives are implied when reference is made to MOOkti and MOOs.

Discourse/Dimensions/Dimensionals/Domains, and many are role-playing virtual environments (Aarseth, 1997; Bartle, 1990). MOOki is a learning environment based on the LambdaMOO database and server, version 1.8.0p5 (Curtis, 1996). Polysynchronous environments are defined as virtual spaces which more closely approximate real life environments than other technologies presently available that are merely synchronous or asynchronous. Polysynchronous² communication is a term that came to my mind in response to comments that MOOs represented synchronous communication, in opposition to asynchronous technologies such as email, Usenet newsgroups, and learning environments such as WebCSILE, Participate, or Virtual University. People communicating polysynchronously not only talk synchronously (in real time) but also create temporal objects such as mail messages, newsgroup messages, as well as objects that can be experienced by others (Davie, Abeygunawardena, Davidson and Nolan, 1998; Nolan, Kajihara and Lawrence, 1998; Davie and Nolan 1999). I refer to the communicative products as “objects” rather than as “texts” to focus attention on the object-oriented nature of MOOs. In MOOs, the text is contained within or mediated through “objects”. These “objects” are programmed containers that allow the “text” to be manipulated by both the MOO server and the users of the MOO environment who create and interact with them. The contextualizing of the “text” within the “object” situates the communication more clearly within the technology, than it would appear to be otherwise. People communicating polysynchronously not only talk synchronously (in real time) but also create temporal objects such as mail messages, newsgroup messages, as well as

² 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 email where a message is composed and transmitted to another individual or group. In a 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

software objects that can be experienced by others. This form of virtual reality has potential as a dynamic learning environment. The research site is MOOkti³ (<http://noisy.oise.utoronto.ca:9996>) that I have developed and in which I have conducted inquiry since 1995.

Initial Research Questions

When first conceptualized, the research was intended to help educational researchers, educators and students come to an understanding of what can be done, how it can be done, and how to train for work in polysynchronous virtual environments. Studying this one instance of educators learning in and about the polysynchronous environment of MOOkti hoped to answer the following questions: What is it that educators do when they are introduced to MOO learning settings? How do educators create learning settings? How do educators react to what they learn? What are their thoughts feelings and perceptions regarding this experience?

The idea was to aid in developing an understanding of how educators function in CVEs, the more general term of which MOOs are a specific example. Such research look to revealing strategies to improve the efficacy of programs which introduce and enable educators to work in and with these virtual learning environments, so that educators and students work effectively with and gain a critical understanding of the social and political dynamics inherent in a virtual environment. How teachers take up the imbalance in knowledge and power will end up reflected in the future forms of CVEs used for learning. Not developing an understanding of these environments and the particular requirements they place on educators and students may result in situations where educators become passive participants in their own work and learning, and follow the

in the future.

³ MOOkti exists in its present form due to the work of many programmers who have spent hundreds of hours, mostly as volunteers, developing this environment. Leigh Casey of the University of Toledo has been instrumental in the development of the database, server, web interface, multilingual capacity, and numerous other modifications. She is also responsible for coaching the rest of us in various aspects of MOO interactions and programming. Dave Goulden (Expresto Software) has developed the MOOca Java client. Matthew Beermann (Sophomore at University of Nebraska) has helped with web and database development, and Scott Snyder (Microsoft) is responsible for much of the topology of MOOkti educational utilities. MOOkti could not exist without the assistance and friendship that they have given to me and the MOOkti community.

agendas of programmers and technicians, not to mention administrations, governments and corporations, because they lack the tools and sophistication to negotiate the types of learning that they see to be important to themselves and their educational community.

Background Research

There is relatively little published print material in refereed journals of educational research relating to educational research on MOOs. De Mulle has explored elements of the informal use of MOOs for self study and peer support by academics (De Mulle, et al., 1997). Papers have been published on community support for constructivism, constructivism and professional community, work with children in MOOs, and courseware (Bruckman and Resnick, 1996; Bruckman, 1998; Jin and Yano, 1997). Haynes and Holmevik (1998) take up the issue of collaboration, research and teaching in MOOs and countering popular conceptions of them as unreal places for chatting, noting that they are important tool for community building that allows for opportunities to explore new definitions of research into new media.

Richard Bartle's work on MUDs and gaming (1990) has recently been supplemented with a paper that helps identify people who find MUDs suited to their interests (1997). Schwartz (1997) maps possible directions for MUD research. Most of the research tends to centre around community issues (Fowler, 1997), gender issues (Cherny, 1994; Stone, 1992), cultural studies (Reid, 1991; 1992), psychology (Sempsey, 1997; Schwartz, 1997), anthropology (Fanderclai, 1995; Rosenberg, 1992), literature (Aarseth, 1997), and MUD administration issues (Green, 1997).⁴ Many of these issues are also taken up by researchers quoted elsewhere in this dissertation.

As a creator of virtual spaces, I find this material very interesting, but their influence on educational research is cursory and peripheral at best. Though three areas of influence do stand out: constructionism, gender and the emotional aspects of communication. Bruckman's work with MediaMOO (Bruckman and Resnik, 1995) and MOOSE Crossing (Bruckman 1997), and those of many others, around the issues of construction and

⁴ Key sites are for research materials on MOOs include: TECFAMOO (<http://tecfa.unige.ch/edu-comp/WWW-VL/eduVR-page.html>), I Came, I MOOed, I Logged Out: MOO Resources for Educators at OISE/UT (<http://achieve.utoronto.ca/tortoise/moo.html>), and The Lost Library of MOO (<http://lucien.sims.berkeley.edu/moo.html>).

community, have greatly informed the discourse of the epistemology of virtual environments, as well as this thesis. As well, notions of gender and identity, culture and community as being liquid and flexible in MOOs has many pedagogical possibilities that are presently being explored in Project Achieve (Aarseth, 1997; Anderson, 1983; Bruckman, 1992a; Bruckman, 1992b; Cherny, 1996; Curtis, 1992; De Kerckhove, 1995; Fanderclai, 1995; Leonard, 1997; Nolan, 2000a; Reingold, 1993; Schank, Fenton, Schlager, and Fusco, 1999; Stone, 1992; Turkle, 1998). And perhaps most important to me personally is the notion of emotional information than can be imparted to MOO code, as described in Fowler's (1995) paper. The term "emotional information" is used in this context as a description of a particular manner which interacting with objects can invoke an emotional response that many users have noted that they only find in MOO spaces. This emotional response is beyond the way in which written text conveys emotion, such as "I hate you." or "You are pissing me off." In a MOO, you can be hugged by an a person, or virtual teddy-bear object, and a little penguin can thank you graciously for feeding it. The ability of MOO users, objects and virtual beings to smile, hug, wuggle, pout, sulk, walk away, blow you a kiss, give you the finger, as well as talk, is what sets MOOs and other CVEs apart from the bulk of technologies available today. If it was not for the fact that MOOs, more than any other web-based technology, can convey immediate emotional information, *and* that MOOs encourage the continuance of contact in real life situations, they would not be nearly as valuable as they are (Reingold, 1993). I often say that computers are only good for putting people in touch with people, but with MOOs, emotional and communicative information includes interacting with objects created *by* people as well.

Initial Process

Initial data collection and research, the earliest phases of this dissertation, followed a four-part pattern of "invention, discovery, interpretation, and explanation" (Kirk and Miller, 1986). Invention included not only the proposal, and the ongoing creation of the research site, but also the novel presentation of the dissertation itself. The MOOkti research site has been under construction by the researcher and volunteers for years, and it continued during the research as the needs of the participants are met by the developers

of the site. The participants themselves became active participants in the invention as their work becomes part of the site itself. The discovery stage covers the data collection by the research site itself in the online transcripts and through researcher field notes, and the subsequent recontextualization of the entire research within a narrative approach presented and conceptualized in following chapters. Initial data, both collected and recorded experience, was generated using “participant-observation” techniques with a stress on the active participant aspect, interviewing (“key-informant” informal interview and questionnaire), and the analysis of “written sources” in the form of the MOOkti generated transcripts (Wolcott, 1988). The questionnaire (Appendix B) participants were asked to complete grew from an initial interaction with them (Wolcott, 1988), and was intended to give them the opportunity to share their experience and attitudes about working within MOOkti and participating in the research. Interpretation was ongoing during and after the research period. What happened to these data will be taken up in Chapter Three, and my response to it forms most of chapters four and five.

This dissertation, both the data collection and the final production of the text, was not conducted as a traditional emic⁵ ethnography, as encountering a given community on its own terms, using its own cultural norms and understandings (Bogdan and Biklin 1982; Wolcott 1988). The reason for this is that I brought the participants into my community; a community I initiated and nurtured. And I have not been able to identify any research that particularly takes up this notion of location and community where the participants come *into* a researcher’s community. There are the obvious situations where a researcher has constructed a test environment into which she brings participants, but my situation is quite different. This is a functioning diverse community, a community that is totally new to almost all of them, and it is in this context that I am attempting to conduct research. I have been here for almost six years, and I have significant experience in similar communities (e.g. LambdaMOO, BayMOO, EdenMOO, LinguaMOO, EcoMOO,

⁵ The specific description of how this research fits with notions of emic ethnographic research is described below. The *Oxford English Dictionary* defines emic as “an attempt to discover and to describe the pattern of that particular language or culture in reference to the way in which the various elements of that culture are related to each other in the functioning of that particular pattern, rather than an attempt to describe them in reference to a general classification derived in advance of the study of that particular culture.” (<http://www.chass.utoronto.ca:8080/patbin/new/oed->

E_moo). MOOkti is part of the larger MOO/MUD community consisting of hundreds of sites and thousands of users around the world. What I did was to bring participants into a community I initiated, and then observe how they learn, interact, and bring their own experience into my community. While I observed a full cycle of activity, I anticipated that a majority of the participants would not continue their association with the MOOkti community after the research period (Wolcott, 1988). At best, I think I can only make a claim for “borrowing ethnographic techniques” (Wolcott, 1988). This positioning stems from my particular position with relation to the community, virtual environment of MOOkti, and the “micro-ethnographic” nature of the context of research that is limited to education and virtual environments (Wolcott, 1988; Weiss and Nolan, 1998). This inquiry qualifies as Action Research according to the definition that Bogden and Biklen (1982) give, “Action research is the systematic collection of information that is designed to bring about social change.” (33). My long term commitment to learning in virtual environments carries with it the implication that what is concluded in this dissertation will direct future work and research in this area beyond the conclusion of this dissertation. What has become Project Achieve and V.A.S.E. The Virtual Assignment Server Environment reflect my commitment (Nolan, 2000a; Nolan, 2000b, Nolan and Weiss, In Press).

Data Sources

Data sources for this dissertation are both novel and varied. Data come from three distinct sources; the researcher (me), the individual participants (observation, database collected transcripts, questionnaire, interview) and elements of the database itself. Data collection is presented in the various raw forms in Appendix C. Online data collection has two main components: data from the logs of research participant’s actions, communication and construction of objects; an audit of actual objects and spaces, what they do and how they are described. Forty-seven participants completed an online questionnaire (Appendix B) at the end of the course. And a further seventeen completed hour long interviews. Everything that research participants, including the course instructor and this researcher, did in the MOO was recorded and time stamped.

Particulars regarding non-research participants, and non-logged communication is covered in the next section.

Ethical Review

Conducting inquiry into online and virtual environments, where the researcher has access to a complete record of every interaction, creates many potentially problematic ethical issues and technological challenges. The ethical issues raised by the research inquiry are novel and particular. The main issues addressed include: conducting research on students in a graduate course, having the researcher working with the participants within the research environment, and how to respect the privacy of others who will be using the semi-public MOOki space who will not be participants of research. In creating the data collection tools for this present research, Leigh Casey, of the University of Toledo, programmed a suite of tools to enable a data collection that attempted to generate as complete a record of participant interaction as was possible, while trying to ensure the privacy of non-research members of the MOOki community would be respected. Research in polysynchronous virtual learning environments is a field in which the ethics of data collection have not been addressed. This is true for some other online environments, for obvious reasons. Software on which online learning takes place is usually owned by the university or company that produces it (such as CSILE/Knowledge Forum (kf.oise.utoronto.ca), Virtual University (virtual-u.cs.sfu.ca, www.vlie.com), BSCW (bscw.gmd.de), WebCT (www.webct.com), UltimateBB (www.ultimatebb.com), Firstclass (www.firstclass.com)). They are under license to the user, and the participants, usually students in a course, are not in a position to dictate terms of participation. Forms that allow for the collection of data must be signed in order to gain access to the learning environment (Harasim et al., 1995). Opting out of research means choosing an alternative course.

MOOs force educators to consider the observability of learning because all aspects of the participant's interaction fall under the purview of the database software that is the environment (Foucault, 1987; Foucault, 1991). The researcher has access to every element of the user-database interface. In fact, this is the easiest form of data collection. Since the MOO database 'listens' to what the user does in order to determine what is

required of the software, it is easy for the MOO to log every entry onto a file. This 'logging' creates a transcript that includes data regarding what is said, done, programmed, interacted with, as well as when it is done. The log will also record when people have connected and logged out, providing a complete, and perhaps invasive, picture of MOO interaction.

My understanding of the negotiated nature of learning, and the administrative dominance of education has led to my taking up not only Foucault's notions of the governmentality and how we must encounter issues of observation in learning settings where we can actually simulate the Panopticon (Foucault, 1979; Foucault, 1980a; Foucault, 1980c; Foucault, 1991; Gordon, 1991) but also Ostrom's (1990) work towards an understanding of how communities observe and govern themselves. In MOOkti we have the capacity to write a function that parses the input/output for what we want and write it to disk in one or more files. And the form that this collection takes is entirely dependent on the research questions and techniques that we wish to apply to the data. Because of the consequence of MOO software allowing for the logging of all actions, events and communication of all people connected to MOOkti, the big questions are how do we selectively stop this to ensure privacy, and also to end up with a transcript that is manageable. Because this is the first time that this technique was used to collect data in this manner, we opted for a blanket approach to capture all the typed text that the MOO database was able to parse. This means that anything that was typed in to the MOO (communications, commands, queries, programming) was recorded. However, all actions initiated in the programming editor and all web-based commands were not recorded. Collecting these other data seemed to be adding complexity to insane complexity and was until recently impossible. For future inquiry, such as is presently underway in Project Achieve, I am arranging to collect more data, but in better organized formats that will avoid the problems encountered in this dissertation.

There were two main ethical issues involved with data collection in this dissertation. The first is conducting research on students in a graduate course in which the instructor is online *with* the students. Students might consider their success in the course to be dependent on their participation in the research and positive response to the learning environment. The other is based on the fact that MOOkti is a *public* space. The utility

responsible for the transcripts must be able to distinguish between research participants and others. This project depended on the goodwill of the research participants, so the thoroughness of the transcript depended on negotiation with the participants. All students in the classes under observation were asked to fill out a research permission form (Appendix D), and at the end indicated whether they were willing to participate in the research. With this technique there was no way for the instructor to see who was participating or not; all students filled out the form, but only the willing participants circled the box to give permission. All responses were sealed until after the final marks had been submitted for the course. Neither the researcher or the instructor knew if a student had indicated a willingness to participate until after the course was complete. When the students connected to MOOki, and obtained an account, they were directed to type in a command '@participate' (See Appendix E). @participate has two functions: '@participate on' adds participants to the data collection process and transcript; '@participate off' removes participants from having further data collected on them. If a participant types '@participate off' they are asked a series of questions as to whether permission is given to use data collected up to this point. The participant are asked to respond yes/no. The participant is then informed that they can type '@participate on' at any time in order to return to active data collection status. According to the data transcript, forty-one participants initiated data collection; five participants stopped data collection; four participants returned to data collection later. While some may have indicated that they did not want their data to be used, I cannot say, as that would be using their data. However, an apparent error in programming has left me with no clear indication as to whether people who stopped data collection and did not return indicated what they wanted done with the data. As such, this data was discarded. In order to maintain distance between research and the course and the instructor never saw the raw data except as presented here. The students/research participants used real names in the MOO, and they interacted with both the instructor and the researcher, however the transcripts recorded only the object number that the database uses to identify players, for example Ted is #124, Peaty is #1220. This means that in the transcript Ted would be identified by as #124 and Peaty as #1220.

The limitations of this dissertation can be found in the choice and location of research participants, the particular nature of MOOKti and MOOs in general, and the techniques available for data collection and analysis. The participants have all chosen to study distance education at the graduate level. They have self-selected themselves based on their interest in or commitment to some form of online learning. They are not representative of the larger educator population, or the population in general, many of whom find online learning and working with computers to be a very intimidating experience.

MOOs are themselves a particular form of online learning, and its key element of polysynchronous interaction is not reflected in other more established online learning environments such as CSILE/Knowledge Forum (kf.oise.utoronto.ca), Virtual University (virtual-u.cs.sfu.ca, www.vlie.com), BSCW (bscw.gmd.de), WebCT (www.webct.com), UltimateBB (www.ultimatebb.com), Firstclass (www.firstclass.com). MOOs tend to be public education environments that are not isolated from general Internet traffic. This suggests that results and understandings gained in this dissertation may not be easily transferable to asynchronous and more controlled environments. MOOKti, in particular, has many features not found in other MOOs, and some forms of interaction, data collection and analysis may not be replicated in other environments without a lot of programming and development. However, published results may lead to the adoption of these research and educational findings by other MOOs and polysynchronous virtual learning environments in the future.

Emergent Research Questions

The initial research questions were refocused as the inquiry shifted with the relocalization of inquiry to take into account the researcher's experience. Inquiry still took up questions of how educators created learning settings, thoughts and perceptions regarding the experience. These notions are still important to this dissertation. In fact, they are part of what prompted me to look inward since the data collected would not lead to answers to these questions that were meaningful to me. This process led me to create COLLIDE as a conceptualization of an environment able to address the power imbalance,

and resituate the locus of control as a conversation among the individual, community and technology (Aarseth, 1997; Barlow, 1995; Cooper, 1999; Foucault, 1979).

Emergent Process

The act of writing the text of the thesis represents the emergent process of inquiry as an auto-ethnographic act (Wolcott, 1988) of reflective inquiry (Schön, 1983; Schön, 1987) as action research (Bogden and Biklen, 1982). The process of inquiry, in taking up research questions and making sense of the experience(s), was a recursive exercise that involved revisiting every aspect of the inquiry in order to ascertain what elements could and should be recontextualized, and brought into line with the direction that the thesis has taken. The process turned out to be a very dynamic/chaotic form of emergence.

The challenge of this thesis is located in its chaotic and metaphor charged structure. By chaotic, the suggestion is not that it is disordered or disorganized; but differently organized (Finke and Bettle, 1996). A chaotic structure is different than the ordered structure that is found in the majority of dissertations and academic writings. Chaotic structure describes a situation that recognizes and privileges the emergent and situational reality of experience and understanding over the pre-ordinate and planned execution of plan of inquiry. It builds a picture accretionally, responding to situations, allowing understandings to emerge in response to events, rather than forcing and ordering a predetermined plan.

In the case of this dissertation, the result of chaotic emergence of order and the (self-) understanding of life experience unfolds often through the use of metaphor (Aarseth, 1997; Lakoff and Turner, 1989). The method of presentation and conceptual analysis that creates the space for reflection on the effects of lived-experience creates the necessity for the presentation of theory and method as "embedded in metaphor." In the earlier stages of research, the tumultuous intersection of experience and the reflective process of narrative led to the creation of a location of inquiry. The bifurcating nexus of events and the representation of their subject effects was a location of calm such as exists in dynamic systems (Gleick, 1987). This location of calm is presented through metaphor. And these static locations, constellations of understanding, became for me the unspoken yet crystallized repository of a metaphoric image or thought left relatively unexplored and

open-ended for the contemplation of the writer, and the reader, in the context of previous points of calm and the productive intersections of text, textuality, and subjective experience (Aarseth, 1997; Derrida, 1976; Eco, 1979; Eco, 1986; Iser, 1989; Morgan, 1998; Oort and Iser, 1997; Trifonas, 1993; Trifonas, 2000a; Trifonas, 2000b). An attempt has been made to unpack these moments of metaphor in order to bring the elements of theory they contain closer to the surface. The goal is to expose the roots of the space for reflection that metaphors catalyze on the question of the theory and praxis of education through the mediation of technological media. The success of this explication is left up to the reader, but it is hoped that by keeping the metaphors intact and providing some explication, a richer and more evocative and heterogeneous image of the program and process of narrative inquiry that I have engaged in will emerge like a matrix of multiple and malleable understandings rather than a discreet model of remote controlled responses.

Whose Idea Was This?

I am referring to the form in which this dissertation finds itself. As things stand, I have always written in a *reactive* manner, reflecting the styles and norms I perceived to be expected by others. While I was fussing about trying to figure out how to approach my data, my supervisor said something like, “Do you realize that you have never taken up the question of how this research project came to be in the first place? Perhaps the reason you’re having trouble contextualizing the data is that you haven’t first contextualized the research site itself in your own personal experience. Why don’t you look at yourself and your story just as a way to help you to contextualize the experience of your subjects within the research program.” We discussed how this would require me to write a narrative account of my own experience with technology. The conclusion was that I would have to write from my own voice, and I warned Joel that this voice was a dangerous thing to let free, and would probably infect the entire thesis. Not only did my voice take over the tone, but it took over the text, the conceptualization, the data, the philosophy, the *theoretical underpinnings*, and just about everything else.

This thesis is predicated on the notion I outlined in my dissertation proposal about how teachers translate their personal and professional practice from real to virtual

environments. This notion was played out by studying graduate students in education in the Computer Applications focus in the Department of Curriculum Teaching and Learning (CTL) at the Ontario Institute for Studies in Education of the University of Toronto (OISE/UT). These subjects (I prefer to call them participants) had positioned themselves as computer teachers, computer-based educators, or wanting to incorporate technology-based education into their practice. Some were certified to teach computers, while others were using this program as a mechanism to gain experience to qualify them to teach with computers. My desire to study their work in virtual learning environments was founded in my hopes that I would be able to develop a baseline understanding of how to teach and conduct research on teachers working in virtual environments. I wanted to do this because I think that online environments are not only a form of conceptual learning space that will dwarf all others in the coming decades, but one that unfortunately devalues and marginalizes the teacher, educator and often learner at the hands of technicians, programmers and software companies.

I was quickly faced with a number of problems due to my own misconceptualization of the relationship between myself and my participants; mainly, that I was not one of them. Attempting to deal with this error led me to try to recontextualize my own experience within the experience of my participants, to situate both the problem and the realization of how different and drastic our experiences were. Simply put, and I will develop this notion further, we were different species. I was not like them. I had no *formal* training or experience teaching computers. My research participants could not learn about technology and computers the way I did, and the answer to the question that had been bothering me, “Why can’t they make sense of technology the same way I made meaning of it?” ended up with the question, “Well, how did you come to make meaning of technology in the way that you did?”

Prior to taking one course at OISE/UT in Computer Applications, I had failed the only other computer course I had taken, ‘Introduction to Computer Concepts,’ in Grade 10 at Markham District High School in the mid 1970s. I was actually given a passing grade of D on the explicit agreement that I would never take another computer course. This is an agreement I kept for about 20 years.

I was also a high school dropout who started working in the shipping room of a large computer installation, working up to become a junior computer operator before realizing that I really wanted nothing to do with computers, ever again. Then I was the graduate student in English who hesitatingly returned to computers in the late 1980s to help remediate persistent writing problems, only to be hired by the Computer Assisted Writing Centre at York University mere months later. This vicarious path of unintended educational encounters with technology (described in Chapter Four) continued until I entered OISE/UT, supposedly to develop my background in environmental education, my chosen profession, but with a background desire to study how virtual communities developed, based on a short experience with an environment, TinyMud, called Apex4201 back in 1989.

It did not occur to myself, or any members of my committee, until I was in the middle of my research that my background was itself problematic. I was merely frustrated by the fact that none of the educators I was studying with were *getting into* the virtual environment at the level I was. I had anticipated that I would be quickly out-distanced by these teachers, some with computer backgrounds, and some with years of teaching experience. I was expecting them to have a greater sense of conceptualizing learning and, because they were mostly Computer Applications students, I expected a level of sophistication with technology that would quickly dwarf mine. I was working on MOOki and other projects with a 17 year old programmer who was more sophisticated than I. Why should not my research participants do the same? I was posed on the brink of what I hoped to be great learning and collaboration with these participants.

My desire to observe differentiation in the work of the research participants is based on my original goal to develop a base-line understanding of how educators re-localize their personal and professional practice from real to virtual learning environments. When I realized, through observation of participant, and participant/researcher, interactions, and the objects they co-created, that there was little differentiation despite the diversity of backgrounds of the participants, I was drawn to question the design of my original inquiry. This questioning led to the redirection of inquiry to my own practice as a creator of learning settings.

As I worked through my frustration I went through discernable stages that started with the view that “teachers can’t do technology.” But this was a reaction to my own frustration, and was obviously problematic and negative. I then realized “teachers can’t do technology, but it is not their fault”. Finally, with my supervisor’s discreet suggestion, I shifted focus from them to me; “If teachers can’t do technology, and it is not their fault, how come I can?” And it is this final conceptualization that has led me on the path that resulted in the form that this thesis took. I was forced to consider my own narrative experience with technology from the first failure in ‘Computer Concepts’ class to steering committee member with the Knowledge Media Design Institute in order to understand how I could come to be the sort of virtual educator I had become, in order to begin to understand what conditions could make a successful educator as I saw myself to be. And this finally led me to three possible solutions to answer the question “What possible solutions can I imagine and delineate for the creation of successful educators in virtual environments?”

Briefly put, there are three paths along which solutions can be found. And I think that an assessment of my narrative will bear me out. The first is the permanent recourse to a ‘Jason character’, someone like me, who I call a *techeducator*, a teacher-technologist, who, as opposed to a computer programmer or technician, is dedicated to facilitating teacher’s curriculum and professional needs in virtual environments. I describe the *techeducator* more fully in Chapter Four. The second is for the teacher to abandon active teaching and employment for about 5 years, as I have, and dedicate herself to experiential and constructionist learning in virtual environments, playing and experimenting, rather than being forced into a cycle of teaching without the opportunity to play. Finally, and this notion forms the bulk of my conclusions, I was led to envision the development of a software environment that reorganizes the relationship of the educator, or any user, to technology such that all of the mundane support work that I did for educators becomes automated in an “engine” that is able to accomplish all the ‘tasks of configuring the steps along the learning curve that must be traversed in order to successfully become a sophisticated educator in virtual environments. The “engine”, however, would be one that contains tools to help the user learn and make sophisticated choices. The choices allow for more active participation in the conceptualization of how technology is taken up

according to her needs. I call this environment COLLIDE: A Collaborative Object-based Lifetime Learning Interaction Design Engine. The development of ideas about COLLIDE is awash in personal history and research understanding of the relation of teachers and technology. Its roots are based in using, learning about, teaching with, designing, programming and repairing computers and computer technology-based environments.

The present situation of technology and education is to expose teachers to technology in Additional Qualification and in-service courses at OISE/UT. The courses provide the most superficial introduction to the corporate-promoted use of the technologies. This is all the time that the vast majority of teachers have to learn about what they are now expected to learn and teach. However, I think that the future of education using technology is to shift all aspects of how teachers take up technology into the locus of control and purview of the teacher. The challenge is to conceptualize the tools and mechanisms to facilitate this shift. This is about issues of governance, power and control, of a narrative *space* that extend beyond teachers to the general public (Foucault, 1980; Foucault, 1991; Kreiswirth, 1995; Lefebvre, 1974; Morgan, 1998; Ostrom, 1990; Polkinghorne, 1995; Trifonas, 2000; Wertheim, 2000; Willinsky, 1989). My focus on teachers and education is dictated by this being my field of interested and experience.

Chapter Two—Curricular and Pedagogical Importance of MOO as Collaborative Virtual Environments

Online learning in polysynchronous environments is moving beyond the present “system of calculation,” the substrate of our educational system, to one of “symbolism” and metaphor (Aarseth, 1997; Harré, Brockmeier, and Mühlhäusler, 1999; Turkle, 1995). MOOs are environments in which text must stand in place of physical and conceptual things, and that which is imagined and described is created. And since there are no constrictions on what can be created in this manner, there is no *de facto* educational hierarchy in the MOO from which the educator derives power, though she may still control resources and access. For educators to function successfully in symbolic learning environments and within the non-hierarchical context of the Internet, there may be a need to embrace the idea of learning through the co-creation of learning community, and then link these voluntary learning community spaces in informal setting to the formal setting, and in turn revolutionize it. At present, little research is available on how educators function in virtual learning settings.

MOOs promote constructivist and collaborative learning (Bruckman, 1997; Gallagher and Reid, 1981; Papert, 1980). Users, be they educators, students, or casual users, work together and learn by building their knowledge as they build *things*. This social nature of MOOs is recognizable even in the development of the core database and server software. MOO system development proceeds in a social and collegial manner, with programmers and Wizards⁶ (administrators) discussing code and ideas through the MOO-COWS mail-list (moo-cows@the-b.org) and through work at various projects around the Internet such as MOOSE Crossing, TecfaMOO, Diversity University, BioMOO.⁷ The entire hierarchy of MOOs from generic player through to Arch-wizard is predicated on what an individual knows and shares with others. Within this context, the educator-student relationship is

⁶ The Wizard and Archwizard are legacy terms referring to the administrators of the software that have not been fully exorcised from the software and general consciousness of MOO developers by educators, this despite the problematic connotations. In MOOki, a serious effort was made to distance the users from encountering the term, and as with other MOOs such as BayMOO and MOOSE-crossing, the term Janitor was used where possible. However, in order to keep consistent, I have chosen the more archaic, but correct in terms of the software itself, term.

⁷ MOOSE Crossing (<http://www.cc.gatech.edu/fac/Amy.Bruckman/moose-crossing/>), TecfaMOO (<http://tecfa.unige.ch/edu-comp/WWW-VL/eduVR-page.html>), Diversity University (<http://www.academic.marist.edu/duwww.htm>), BioMOO

fluid, and educators must accept their place as students, and students will always be thrust into the position of having the opportunity to teach what they know.

I have taught on and worked with the Internet for almost a decade, and I started a MOO at OISE/UT in the fall of 1995 because I was interested in understanding the role that MOOs might play in learning on the Internet. I saw MOO's potential for de-linking⁸ learning from the administrative control of educational spaces to allow educators and students to take control of the learning environment in ways that did not recreate 'classroom'⁹ style educational interactions (Caley, 1992; Fanderclai, 1995; Illich, 1970). Learning takes place beyond schools and throughout our lives, and polysynchronous virtual learning environments lead to a challenge of the popular conception that privileges school-based and accredited learning over all other forms. I say this while recognizing that MOOkti can be used in accredited learning situations, and that this research was conducted within an accredited institution. MOOkti, however, incorporates multiple spaces. Chateau MOOkti is used to hold classes and meetings, JewishMOO brings together like-minded Internet-based community members, EcoMOO was used for 2 classes in the Division of the Environment at the University of Toronto and facilitates learning about environmental issues including field study simulations, IcelandMOO was designed to help Icelandic educators localize MOOs within Icelandic language and education, and the janitors' space, where the Wizards work to maintain the software, works to develop MOO technology and programming. MOOkti was developed with volunteers and was intended to facilitate diverse educational interactions within a single virtual community space. We provide the forum and the materials to enable people to use the space, but otherwise place no strictures over MOOkti's use beyond that the users be able to articulate an educational vision for their projects. Because MOO spaces are created with text, the act of creating a virtual project space is the act of articulating it. I am not interested in adjudicating which interactions were acceptable. The only other

(<http://bioinfo.weizmann.ac.il:70/1s/biomoo>)

⁸ I am drawing on Ivan Illich's notions of learning outlined in *Deschooling Society*, and revisited in *Ivan Illich: In Conversation* (Illich 1972; Cayley 1992).

⁹ I do present an apparently contradictory notion of the classroom as an object-oriented learning environment in Chapter Five. This present notion refers to the governance and administration of the classroom, while the latter describes its utility as a learning tool.

limitations are those placed on use by OISE/UT's policy for use of their computing resources. The limitations included the use of resources for financial activities, illegal activities, and anything that contravened the rights of OISE/UT's members rights for a safe environment.

MOOs in Iceland

In the summer of 1997, I was invited to teach an inter-session course in MOOs¹⁰ at Kennarahaskoli Íslands (Iceland University of Education). This course was an introduction to the use of MOOs for the Icelandic curriculum. The 13 educators who completed the course had no prior experience with MOOs, and only a few had experience with online tools for teaching. A significant result of the course was that we continued to meet in the MOO to continue to learn about MOOs, as well as MOOkti itself. The MOOkti team spent six months developing technology to enable Icelandic MOO users to communicate in Icelandic, and we worked on a plan to establish a MOO in Iceland for the use of Junior/Intermediate level students¹¹. Significant for me was learning from these educators how I taught MOOs, how they envisioned using MOOs for learning within their own culture and teaching, and the need for a structured environment to create MOO-based educators. This experience informs many of the ideas and conceptualizations for educator support and training presented in this thesis. This experience left me with informal impressions, and suggested that a more formal undertaking was necessary.

As my students in Iceland taught me during our morning coffee break on the second day of the course, I was teaching them as they tried to teach their students. That is, I was expecting them to explore, experiment and learn, as well as share what they were learning, as any experienced teacher tries to do. But I was not providing them with a pedagogical and theoretical contextualization and justification up front. Most classroom

¹⁰ The Íslanders came up with their own name for MOOs, as they do not traditionally feel comfortable with foreign loanwords. Their choice is Dulheimar, meaning 'The Hidden Worlds' (See Appendix G for a more full etymology.).

¹¹ The spin-off of this technological development is that MOOkti has gone multilingual in a way that we had not anticipated. MOOkti has now been tested using Tamil, French, Icelandic, Hebrew, Gree and Inuktituk character sets. This means that while programming is still done in English, and the use of verbs still follow the English grammatical syntax of Direct Object, Verb, Indirect Object, the text in the programs, and general communication can take place in a number of languages. This capacity has not been fully documented, but it represents exciting new possibilities for teachers across Canada.

teachers do not begin a lesson to students by contextualizing the lesson within, say, a description of how Dewey's notions of experience is taken up by Eisner in his notions of Connoisseurship (Dewey, 1938, 1958; Eisner, 1985, 1991). A classroom teacher teaches the lesson, not the theory behind it. However, my Icelandic students expected that, as educators taking graduate and professional development courses, that I would couch the course with theory and pedagogy. To their credit, more than mine, they recognized that I was enticing them to rethink their own teaching and professional practice as both classroom educators and as teacher educators at Kennarahaskoli Íslands as they asked their students to learn; by taking risks and experimenting with only partial knowledge of what they were trying to accomplish. My learning from this interaction was a realization of my own practice. I had an intuitive knowledge of what kind of learning worked well with MOOs, but I was unaware that I was modeling any particular kind of teaching and learning. These students were again teaching the educator, further blurring the lines of what it means to work in an educational MOO environment. I sought to capitalize on this cross-fertilization in my own work and inquiry.

MOOkti @ OISE

In the fall of 1997, I was given the opportunity to re-apply what I had learned teaching in Iceland with graduate students in Professor Lynn Davie's course at OISE/UT who were studying the online learning technologies, Virtual University, WebCSILE, and MOOkti. I was able to work with these students on a weekly basis over thirteen week periods, both online and in a classroom environment. The significant elements of MOO-based teaching and learning that grew from this exposure have been the formalization of specific curriculum to enable educators to learn about MOOs, the need for specific MOO-utilities for educators to facilitate the use of MOOs with students, and the need of educators to reflect on their experiences learning on the MOO. This formal curriculum became a source of difficulty for me, as described below.

My original intention was to study how educators learn in and about MOOs, and develop MOO spaces for teaching¹². The intention was to describe the *nature* of

¹² The research itself was conducted in Professor Lynn Davie's EDT1503H Introduction to Computer Applications in Education and EDT1551H Special Topics in Computer Applications: Master's Level.

educational interactions as opposed to the *amount* of what was being observed (Kirk and Miller 1986). I saw, and still think, that learning in the MOO environment is no different than that involved with any other language, skill, or complex social interaction, and perhaps the research speaks in part to the adoption of any learning technology by educators. Research looked toward developing an understanding of how educators can be trained for and work in polysynchronous virtual environments. And I wanted to work with MOOs as a present example of these complex environments that include immersive environments such as VR and Collaborative Virtual Environments (CVEs) (Tromp, 1996). I hoped that, though development of these environments are still in their infancy, the development of some forms of virtual environments will gain prominence in online learning in the coming decades as online learning moves from isolated and sensorially limited tools to environments whose richness hopes to challenge that of real life (Stone, 1992). The outcome of this research was intended to lay the ground work for educator training in the various polysynchronous virtual environments that will rise with the integration of the synchronous and asynchronous learning technologies in present use.

MOOs are Themselves Valuable for Two Main Reasons: Rationale

MOOs are themselves valuable for two main reasons; their presence as the first generation of polysynchronous virtual learning environments, and the fact that they represent a direction for educational technology development potentially more rich and complex than existing environments can promise (Aarseth, 1997; Bartel, 1990; Benedikt & Ciskowski, 1995; Bruckman, 1992a; Bruckman, 1992b; Bruckman, 1994; Bruckman, 1996; Bruckman, 1997; Cicognani, 1998; Curtis, 1992; Curtis & Nichols, 1993; Evans, 1993; Fanderclai, 1995; Haynes and Holmevik, 1998; Nolan, 2000a; Nolan, 2000b; Nolan & Weiss, In Press; Turkle, 1996). As more learning moves online, both within the context of schools and in informal settings, educational researchers are faced with a need to understand both the nature of these environments and what it means to teach and learn in them. Much important research has been done in asynchronous online learning

These courses in education were offered by the Department of Curriculum Teaching and Learning at the Ontario Institute for Studies in Education of the University of Toronto. Students met in classroom seminars and virtually in the MOO, and worked through the curriculum described below in conjunction with other class requirements.

(Cummins and Sayers, 1995; Harasim, et al. 1995, Hewitt and Scardamalia, 1998; Oshima, 1997), but few of the polysynchronous environments under development have had research on them published in recognized educational research forums. And inquiry into how to conduct educational research on the role of educators has not been explored adequately.

Learning Possibilities

MOOs do not limit the types of learning possible, just as a forest or field can be encountered by learners for many purposes. But MOO-based learning suffers from its *tabula rasa* state. On one hand, educators tend to ‘fall back’ on what they know, and they attempt to relocalize the experience of the classroom into MOOs. This is no doubt what many educators do with other technologies, digital or otherwise, as any new technology calls on an educator’s imagination, creativity and willingness to take risks. However, due to their limited experiences with online technology and MOOs, they tend not to make use of the elements that are most different from their previous experiences. On the other hand, this may be due to the reliance on non-educators who traditionally run MOOs, and who do not have the breadth of educational experience necessary to envision the alternatives that MOOs can afford. However, MOOs are best used in ways that challenge educator’s existing classroom experience base, and allow them to play with and develop their educational experience; educators have some unlearning to do in their learning about MOOs, but this learning seems to be an enriching and social process.

MOOs can be anarchic ‘out-of-control’ places, like much of modern life, where negotiation and consensus are key valuable resources for organizing learning community. Many MOO educators I have talked with informally feel uncomfortable with the creation of virtual ‘classrooms’ such as the environment found in Diversity University (<http://www.du.org>), in which the educator and the site administration behind it still dictates much of the structure of the learning environment. The development of these environments represents an opportunity to escape the ‘schooling’ metaphor that the classroom represents (Bereiter, 1973; Cayley, 1992; Foucault, 1979; Foucault, 1980; Illich, 1970).

Questions Informing Inquiry

The original direction of the research was intended to be in the form of a case study directed toward questions relating to how educators make sense of these virtual learning environments. And this element has survived, but the sense of who the participant was has shifted slightly toward the researcher. A case study is appropriate for inquiry into new settings to determine the actions and perceptions of participants. Originally, I wanted to develop a picture of educators who find this type of learning attractive and meaningful to them, and what elements of polysynchronous online learning frustrates educators. This picture would be based on educator/participants' own descriptions of the type of educator they are and the kinds of learning activities they prefer to engage in. To understand this picture in more detail, I wanted to determine what kinds of support mechanisms these educators find most useful in facilitating their understanding and use of MOOs. I presumed a certain tentativeness and sensitivity on my part to the evolving curriculum in the MOO during this research period. To round out this picture, I wanted to inquire into how the participants' envision using MOOs in conjunction with their IRL teaching responsibilities, and what role the participants see in MOO-based learning for the negotiation of the governance of learning spaces, both virtual and IRL (Gordon, 1991; Foucault, 1979; Foucault, 1980; Foucault, 1991; Wertheim, 2000).

Curriculum Design: The Participants and the Space

Data collection focused on the learning settings actually created by the students in the various courses mentioned previously. Students developed objects and areas that were interesting to them; however, they were also intended to be directed to follow an introductory curriculum provided in order to ensure that they have a basic knowledge of the elements of MOOs that I think would give them a useful understanding of what is possible, available and of use to educators and their students (Appendix A). There are three basic areas of MOO curriculum that were intended in the original proposal to ensure that participants have a basic ability to work and teach using MOOs. In Chapter Six, I take up the problems that this intended curriculum caused that were unanticipated at the time this curriculum was developed. In this list of details it is most important to get a sense of the variety of tasks set for the research participants, and, as mentioned later, the

fact that none of the participants, mostly graduate students in Computer Applications, were able to complete all of these steps.

Maintenance

- 1) demonstrate facility with the following maintenance commands: @recycle, @audit, @exits, @contents, inventory, @quotas
- 2) link rooms owned by different players using @add-entrance and @add-exit
- 3) create a 'child' of the detailed, sittable room (@chparent to #598) and set the properties, add seats and describe interactions
- 4) learn how to find information on things @examine, @display, @show

Objects

- 1) build a room, with entrances and exits, setting all the parameters on the room
- 2) create a selection of things using the parent object, and making a child of it, using syntax: @create parentName called kidName
- 3) create an instance of \$thing, \$note, \$container, listening device, lecture rooms, transcripts, GRIB, following-bot, interactive statue
- 4) describe a room, add seats, details, noises, and weather, and demonstrate a knowledge of how to remove everything

HTML and Programming

- 1) add tag "this page has web browsable components @ URL: " if any of the .http_* and .redirect_url tags are set
- 2) set image, add html, and redirect to existing URL to every object in the project
- 3) complete a modified version of Yduj's famous duck tutorial on how to program virtual objects
- 4) program a social verb
- 5) use one element of MOO programming that requires assistance of a wizard

This structured curriculum was to be used because of both the limited research and classroom time available. In a free-standing MOO environment, users are able to learn in a less structured manner over a longer period of time.

The learning utilities available on MOOkti are varied: a combination of guided experiential learning, hands on examples, text and web-based help files. These options include the ‘caverns of innocence and experience’ which help localize a MOO user’s experience in a virtual setting. The caverns are a series of rooms in which a visitor is asked to perform various tasks such as moving, speaking and emoting. MOOkti Museum is accessible by anyone in the MOO by typing @museum. It contains various rooms filled with generic objects, features and ‘rooms’ and instructions on how to create personal versions (kids, or children of the parent programmed object) of them. Objects in the museum include: generic thing, container, note, mail recipient, feature object, gendered object, listening note, musical instrument, beverage container, bulletin board, clock, sign, notebook, sextant, magnetic note, Generic Roaming Interactive Being (GRIB), interactive statue, and wearable object. These objects are basic bits of code, software that are copied by the users of the MOO in order to create and populate the virtual spaces they are creating. Another room in the MOOkti Museum is the ‘Feature Object’ room in which there are features that you can add to your character for greater functionality. Every user of the MOO has a character created for them that they use to “inhabit” the MOO. These features are used to add to the capacity already built into the characters. They include: login watcher, multi-communications feature, basic social feature, word-finding feature, big cow feature. These examples extend the capacity of the user’s character to communicate. All of these features are particularly useful for negotiating communication in large groups. The Generic Rooms Room in the Museum contains various tools for building spaces. They include: generic room, generic exit, portable room, ‘multi’s improved all-in-one room, generic door, and scrabble room.

There is also specific museum space for this curriculum that will help participants understand the utilities that are particularly useful for educators. They include, @shout, @gag, and @ban commands, as well as how to create communication channels, slide projectors, and lecture rooms. Some of these functions are not usually available to regular users, usually just to ‘wizards’. The Janitors (Wizards in traditional MOO-speak) do not

actively interact with users, but rather only perform tasks related to keeping the environment functioning properly. It is standard practice of the wizards to have a actively character that is used to interact socially; for me, Jason is the wizard character, and Spazzmodius is my social character. The reason for this is that the wizard character has particular administrative capacities that should be kept isolated from social interactions. A mistake made by someone using a wizard character could have catastrophic consequences and easily destroy a MOO irreparably. A comparable example in real life would be a police worker bringing all the tools of her trade, including guns, into a social situation with family and friends. We understand that the professional life must be separated from the social, except when the professional capacity is required specifically in a particular social situation. The Wizard character exists to hold a particular set of abilities that the average user should not have access to, such as being able to recycle players or erase the entire virtual environment itself.

As well as the particular learning materials that we have developed ourselves, there are all the generic help functions that are also available. All help functions are available in the text interface as well as being web browsable (<http://noisy.oise.utoronto.ca:9996/help/>). In order to facilitate the development of a basic level of knowledge of MOO programming and construction, a paper/moo/web browsable curriculum was made available to research participants (see Appendix A). This was done to accelerate the process of learning, for teachers restricted within the confines of a 13 week course, how to work within the MOO, which usually takes place over many months. It helps participants to create a room and detail it, create a series of objects useful for education, maintain the environment, build upon the MOO's basic html functionality, and write two small programs.

Chapter Three: Situating Narrative Inquiry

“Narrative is a fundamental human activity — ‘international, transhistorical, transcultural: it is simply there, like life itself’” (Tappan and Brown, 1991, 175). I contextualize the form of narrative that my dissertation has led me towards within the genre of narrative inquiry methodology in perhaps a particular way, because I did not intend to use narrative as a method of inquiry when I began. Accordingly, the narrative I have ended up with was not based on any intentional model from the literature on narrative. I had intended using a multi-method approach, using descriptive and analytic tools in order to identify their intersections (Miles and Huberman, 1990). As I have mentioned previously, my dissertation became narrative when I was looking for ways to make meaning of what had transpired, and I realized that the dissertation was inhabiting a much larger space than what I thought was the sole location of my research, that is MOOkti.

I had come to think of narrative inquiry as the telling of badly written stories of teachers who did not have any notions of self-reflective criticality; unquestioned and uncritiqueable. I had grown up in the school of close textual analysis of the Northrop Frye and M. H. Abrams type of Modernism, and this led me to read texts critically for internal consistency (Abrams, 1971; Frye, 1982; Frye, 1971). The fact that I can now contextualize my inquiry as a continuation of my previous work in English has opened new vistas to explore in the future mainly because it brings the narrative space of the constructionist environments I am actively creating within a very traditional paradigm of meaning, as Eisner notes in his forward to *Teachers as Curriculum Planners*, “it is more important to understand what people *experience* than to focus simply on what they *do*” (emphasis in original) (Eisner, 1988).

From this background, I suspected narrative inquiry as I saw it at the time as lacking in the quality of writing I expected in literature. It has taken me a while to get beyond assessing the literary value of narrative inquiry to respecting its value as inquiry. I think it was Polkinghorne that gave me the key,

Narrative is a meaning structure that organizes events and human actions into a whole, thereby attributing significance to individual actions and events according to their effects on the whole. Thus, narratives are to be

differentiated from chronicles, which simply list events according to their place on a time line. Narrative provides a symbolized account of actions that includes... temporal information about the sequential relationship of events. The data describe when events occurred and the effect the events had on subsequent happenings. The data is often autobiographical accounts of personal episodes and include reference to when and why actions were taken and the intended results of actions (Polkinghorne, 1995, 11).

This description provided me with a definition that could lead me to sense of rigor that I needed to realize was central to narrative inquiry.

I really do have a background in narrative that I did not associate with educational research until the very end of writing my dissertation. I have both a B.A. and M.A. in English with somewhere in the neighbourhood of 20 full year credits in the fiction and poetry of English and other languages. My B.A. thesis, on the topic of the Creative Imagination in Pre-romantic Thought, has come back to haunt me like one of the obscure terrors of the early Gothic poetry of the period. I had put this world largely behind me when I started a doctorate in education, thinking that I was focussing on virtual learning environments and environmental studies. But I have always lived with stories, and I had always thought of stories as being powerful tools for knowing, but just not in an educational research context:

1. story provides us with possible human experiences;
2. story enables us to experience life situations, feelings, emotions and events that we would not normally experience;
3. story allows us to broaden the horizons of our normal existential landscape by creating possible worlds;
4. story tends to appeal to us and involve us in a personal way;
5. story is an artistic device that lets us turn back to life as lived; whether fictional or real;
6. story evokes the quality of vividness in detailing unique and particular aspects of a life that could be my life or your life;

7. and yet, great novels or stories transcend the particular of that plot and protagonists, etc., which makes them subject to thematic analysis and criticism (Manen, 1997, 71).

This is what I always thought about in my English studies, but have only recently begun to see educational research in terms of. In both contexts,

narrative structures provide a format into which experienced events can be cast in the attempt to make them comprehensible, memorable, and shareable.... The skillful use of these forms constitutes an important form of thought. Narratives, oral and written, represent events in comprehensible form and thereby make those into objects of consciousness, reflection, and analysis. (Olson, 1990, 6)

And particularly for inquiry, I have finally realized that “there is open recognition that the researcher is collaboratively constructing the narrator’s reality, not just passively recording and reporting” (Marshall and Rossman, 1995, 87). And in particular relation to the creation of the novel learning environment of MOOkti, “some narratives make universal assertions or claims, but more commonly narratives are used to express the new and unfamiliar in terms of comparison with the known or familiar” (McGuire, 1990). This has been a totally thrilling realization on my part.

It is the story of my personal practical knowledge, as learner, educator and creator of learning environments that is perhaps the most compelling rationale for my use of narrative. The story involves “the calling forth of images from a history, from a narrative of experience, so that the “image” is then available to guide us in making sense of future situations” (Clandinin, 1985). And because this story represents a journey of imaginative creation of a sense of self and a co-creation of learning spaces, it is important that imagination is central to the form in which the inquiry is conducted; “without imagination nothing in the world could be meaningful. Without imagination we could never make sense of our experience” (Clandinin and Connelly, 1990, 242). Clandinin notes how Schon’s work legitimizes “our professional memory and [makes] it possible to return to experience... as a resource for the education of professionals including teachers” (Clandinin and Connelly, 1990, 243).

In a very real sense, this thesis is a form of auto-ethnography; “a form of self narrative that places the self within a social context” (Burdell and Swadener, 1999, 22). I

have tried to bring the long and winding path of my experience with technology, and the people who I found in MOOkti with my own story of the creation of a learning environment (Nolan and Weiss, 1997; Nolan and Weiss, In Press). The intention is to show, in part, that though I make the claim that “teachers can’t do technology” I have, as a teacher, been able to do so. The social context of the narrative illustrates how I was able to “do technology.” As such, this narrative is very much one of self-identity combined with trying to understand myself in relation to technology and the field of teaching, as opposed to the field of research. The narrative is a way of acknowledging the various influences that so many people in the technological world had on my work (Burdell and Swadener, 1999).

Teaching is a textual and storied profession:

When we teach, we tell stories about the world. Some stories are scientific, some historical, some philosophical, some literary, and so on. Educational theories are stories about how teaching and learning work, about who does what to whom and for what purposes, and most particularly, educational theories are stories about the kind of world we want to live in and about what we should do to make the world like that (Pagano, 1991, 197).

But technology is, in a sense, both a story told and a tool for telling other stories. This is technology as narrative.

I mention the term *code* often in Chapter 5 of this thesis when talking about COLLIDE, and it should be understood that code is a form of communication that at times can be considered as narrative or story. Code is composed text, in a way that software is not. Code is text that must be compiled into an executable form in order to run. It can be read, if you know the language, as the story of process(es). It has its own narrative structure, and perhaps, though I am not exploring this point in my thesis, various genres. And on another level, the virtual learning environment of MOOkti is explicitly textual and narrative in structure. You interact with others in textual, and with the virtual space itself through an imperative grammatical sentence structure, and the MOO server processes typed text in a grammatical manner, parsing verb, direct object, preposition and indirect object in order to understand what the user wants the server to

do. And we do actually call the programs *verbs*. As for what goes on in MOOkti-space, I have often described it as a narrative form of *creating representations of people, places and things and sharing them with others* (Nolan, 1995b). According to this three part pressure of narrative, the story of creating the learning environment, the code, and the textual nature of MOOkti, I am surrounded by story, text and narrative in a way that I had not realized until I started to write the story of how I could “do technology” though I had suggested that teachers as a species could not.

On the level of research, this dissertation is also involved with critical personal narrative, drawing on a “critique of previous structures and relationships of power and inequity in a relational context,” as I explore what I have accomplished and experienced, and the roles of various people and influences (Burdell and Swadener, 1999, 21). This is particularly important in the section that I co-composed with Professor Lynn Davie on the theatrical nature of MOOspace in Chapter Four.

Why I Dumped the Data, or Did I?

I have claimed that I *dumped my data* when I adopted a narrative form of inquiry. But this is of course not true. I merely changed the form of my inquiry, jumped to a new set of discourse metaphors to produce new theory/meaning, and broadened the scope of the research environment to include myself and my past. The data include an 6.7 megabyte log (1.3 million words) of all the interactions that the participants typed into MOOkti over an 5 month period (21:45:53, July 9, 1998 to 15:17:51, December 4, 1998). The original intention was to mine this data using either an LSA tool or to use the other data collected in order to direct qualitative data observation to significant events in this bulky transcript.

This big fat pile of text is organized into 4 columns: date, user identification number, user location in the database and a transcript of the event. Like this:

Sep 29 14:09:48 1998 #80 #812 register #88

Sep 29 14:09:49 1998 #2112 #1922 look

Sep 29 14:09:49 1998 #1234 #134 go s

Sep 29 14:09:53 1998 #80 #812 displays

Sep 29 14:09:54 1998 #525 #812 @recycle #2448

Sep 29 14:09:59 1998 #685 #1588 @dossier Wobba-man

Sep 29 14:10:01 1998 #1234 #589 whereis Lars

Sep 29 14:10:01 1998 #3470 #1925 help #343

Sep 29 14:10:06 1998 #865 #1588 @examine me

Sep 29 14:10:08 1998 #3496 #589 @go #812

Sep 29 14:10:14 1998 #525 #812 @more

Sep 29 14:10:20 1998 #525 #812 @audit me

Sep 29 14:10:22 1998 #865 #1588 -jason they're are no politics here [sic]

Sep 29 14:10:28 1998 #3312 #1922 @join Rose

The act of data collection worked perfectly, insofar as we anticipated it, but there were some limitations that I was not aware of until well into the data collection, and could review what the data looked like. Namely, any work done with the graphical user interface was not recorded in this transcript. This did not restrict data collection on communication between users, but it did mean that when participants clicked on anything in the Graphical User Interface (GUI) it was not recorded. GUI interactions were saved in another log, but not in a form that we were able to reconcile with the main database in a reasonable manner. In the GUI, participants could create objects, program verbs, send and read MOOmail and move about MOOki. These actions could all be accomplished in the text part environment, and most of the participants used the text environment for most of the time except for moving through MOOki and viewing spaces created by users. I did have another 8 megabytes of web server logs which provided data on every mouse click and image download, but I did not at the time or have the ability to organize that data in any meaningful manner. There is software that can do it now, but I was not in a position to make use of it then. Finally, interactions that failed to trigger a response from the server, due to typing or use errors were also not recorded. While this is not being described in order to justify my response to the data, but to clarify what was there, and to start to draw a picture of how I initially encountered the data before coming to the conclusion that the answers and questions important to me and the dissertation lay elsewhere. This is not to say that analysis was accomplished by gazing at “sheer mega numbers” without any interpretive lens. I was personally present during the collection of

this mountain of data, and by reading through selections of the transcript was able to confirm impressions left by personal experience and the interviews noted below.

The second element of data collection was in the form of a web-based questionnaire (Appendix B) that was administered to 46 participants on a self-selecting basis. That is all participants were asked to complete the questionnaire, and this is the number that completed it. These questions were intended to develop a picture of the relationship between the participants' experience and attitudes and what they accomplished in the period under observation.

The third data set is in the form of 17 hour long interviews conducted on a self-selecting group of participants who had completed the survey questionnaire. I found these interviews the most enlightening, and they provided me with the greatest insight into my own practice, as well as the needs, interests and expectations of the participants. And I am definitely indebted to the participants for their time and willingness to share their personal and professional knowledge with me. What was enlightening to me was the strong impact that participants noted that MOOkti had on them as individuals and learners, *and* that this impact was tempered by the sense that though MOOs represented an important learning experience for them, they could not imagine how MOOs could be part of their teaching.

I was never able to observe the kinds of interaction and development that I had hoped to observe. What I did see was that all the participants did involve themselves in completing the curriculum that the instructor, Lynn Davie, planned for them in the various courses (Appendix A). All participants created characters for themselves, and described their characters. They constructed rooms for themselves and populated the rooms with objects, objects that represented pedagogical interests and curriculum concerns. They also spent time experiencing MOOkti and generating for themselves a sense of what CVEs could accomplish as learning environments in their own teaching. With very few exceptions they did not differentiate their work, however, sufficiently from one another.

The exceptions were in one particular course 1799: "Special Topics: Creating Computer Based Educational Simulations" that was run in the fall of 1999. This special topics course in developing dynamic learning environments represented the height to

which the participants' use of MOOkti reached. The participants developed two simulations relating to particular learning objectives: the development of a simulation for teaching students about nutrition, and a simulation to support the proper use of weight training environments. While these two simulations went far beyond what had been done in previous courses in terms of complexity, completeness and conceptualization, they did not represent a quantitatively different level of interaction with the environment itself. To be specific, none of the participants actually reached the level of actually successfully programming or compiling a program in MOOkti by themselves.

The lack of this final step of programming meant to me that there was not sufficient differentiation in the participants' use of the research environment for me to be able to answer questions about which types of educators were most likely to work successfully in these environments, or to develop a model or pedagogy for teaching in CVEs. I am not sure what "most likely to work successfully" means, but it was hoped that with a rich baseline of diverse experiences a picture would emerge as to who exhibited the greatest interest and dexterity within the CVE space. Two participants from this last course were different from the others for one particular reason and accomplished more than anyone else. Both of these individuals were fulltime students. They were not actively involved in teaching or working at that time, and as such had much more time to spend working on MOOkti. But their work required an order of magnitude of more work on my part in order to complete their projects such that I have no way to differentiate their contribution to the final product from my own had I encountered the experience in the original form of inquiry I was conducting.

I do not think that I am contributing to my own learning or the field in general if this thesis centres around an examination of a data set. Let me recount what I see to be the probable outcomes of a traditional analysis of the data. The primary locations where observations were made are indicated. They consist of direct observation and interviews either conducted face to face or in MOOkti.

- Educators who are have taken a year off school to study do more interesting and complex work in CVEs than teachers with a full workload. That is the more time you have to 'play' with CVEs the more you learn about them (Direct Observation);

- Educators who have minimal experience teaching and learning using computers are most timid about using CVEs (Interviews);
- Educators whose first language is other than English find working in English language based CVEs most challenging (Direct Observation);
- Educators who feel more comfortable with transmission based learning find working in CVEs more challenging than educators comfortable with constructivist, emergent or dynamic learning environments (Interviews);
- Educators prefer interactions in CVEs that are more intuitively graphical rather than text-based interactions that require the memorization of complex commands (Direct Observation);
- The more time educators spend with Jason the more they enjoy working in MOOkti, and the more complex levels of interaction and conceptualization they are capable of, suggesting the value or need for the ‘techneducator’ that is described elsewhere (Direct Observation);
- The educator who created the learning environment and spent up to 10 hours per day in CVEs over an extended period of time did quantitatively more sophisticated work than those whose experience was restricted to a couple of hours per week.

These are the answers that I think a sustained and exhaustive exploration of the data would reveal. I must admit that I personally found these revelations interesting and useful to the development of the generation of MOO that followed MOOkti. This new MOO is fundamentally graphical in interaction with the environment itself. Text is primarily for synchronous communication, and the other elements are relegated to the graphical user interface or GUI.

At a late stage in my writing I discovered something while perusing the original data set that I had missed. Something I find quiet interesting because it may have forced me down the path I finally chose for entirely different reasons, had I known at the time. As mentioned in the previous chapter, 42 participants agreed to partake in this study AND actually typed the ‘@participate on’ command to initiate data collection. This does not seem bad until I realized that 17 of them were from the summer pilot run of the course.

This means that out of a potential of almost 40 students who signed the research permission forms in the two fall courses only 24 actually initiated data collection. Furthermore, of the 26933 entries in the pilot study 8043 were by me when I looked at the lengthy 5 megabyte transcript in more detail, 32356 of the 65976 entries were made by me. Over 50% of the database interactions were made by a single individual. The next busiest participant recorded only 8.2% of the entries. It is hard to imagine a research site in which the researcher is more prominent than all of the participants combined. It would seem to me that the paucity of collected data would be problematic in any situation.

I am working towards an explanation of why I do not think that the data I collected sheds much light on the question that has become most pressing to me, and which I think is necessary to address before questions of user/participant use of CVEs can be taken up. This is the question of the conceptualization, development and management of the virtual site itself. What became obvious to me while looking at the amassed conglomeration of data were that I did not have a clear sense of how the MOOkti CVE came into existence. Unlike a classroom, or informal learning environment such as the workplace, mall, museum, or science centre, I could not draw on a literature that could contextualize my research participants' experience in an existing discourse of development and use, such as a curriculum of CVEs (Moore, 1981; Nolan and Weiss, In Press).

The initial concern that I experienced on realizing that my data was leading to an exploration that would most probably lead to the conclusions described above, turned to enthusiasm and elation when Joel suggested that I consider rethinking my relation to my data in terms of my original proposal. His point, and my big question, was that I needed to situate myself more clearly within the data: Was not my own work an example of the type of interaction I was seeking to observe in my participants? Had I not proposed that my research would be one of emergent design within a context of participant observation? Was I not a valid participant who had been overlooked in the initial conceptualization of the research?

On reflection, I realized that this circular model of researcher becoming participant being researched was indeed the case; a participant and researcher and advocate and student all at the same time. I was a teacher/educator who had left the classroom to

pursue studies into CVEs. I had started as a neophyte or newbie MOOer, taken ownership in the development and maintenance of my own teaching and classroom learning environment, developed a complex experimental curriculum, invited students into it, and finally, through collaboration with other learners, learned how to actively program learning simulations.

My realization, that though my conceptualization of the research included me, my observations had not, gave me a direction to continue inquiry. By repositioning myself within the data I was able to see that the curricular goals of the research did indeed get as far as I had originally hoped. Of all the participants, I was the only one to successfully ‘program’ simulations. But this point requires some qualification. I did not do this alone. Particularly, the objects I was programming were not of my own design, but rather I was programming functions into objects created by, and with curriculum conceptualized and implemented by the research participants for their own ends. And behind me stood the other MOOkti wizards who checked my code for errors, and had worked previously to develop many of the objects and verbs that we were all using as the basis for our work.

The specific verbs I wrote are attached in Appendix F and functioned to facilitate key interactions in the two simulations that were not already available in MOOkti using previously created objects. For example, Leigh Casey, our most experienced database programmer, had ported and modified a bot for our use in the nutrition simulation, but I had to add verbs to the bot for controlling the consumption, location and recycling of food. As well, the exercising simulation required specialized verbs that controlled the various exercises and kept track of the user’s schedule and accomplishments. Not only was the research curricula somewhat successful, once I was reminded to include myself as a participant, but I was now oriented to try to re-conceptualize my entire interactions with technology that led up to my dissertation research in order to be able to develop a picture of this participant (me) in order to try to account for the creation of MOOkti itself. This project, which makes up Chapter 4 of this dissertation, has become the bulk of my analysis, and it contextualizes the entire dissertation within a personal reflection of a single individual’s encounter with technology throughout his adult life, leading up to and including actual data collection.

Chapter Four: Why I Hate Computers... and Computers Hate Me.

I Think it is Necessary

When a botanist is out working in the world of taxonomy she is part of the narrative that started before the Beagle made landfall in the Galapagos in the 1830s. But there is no way that the *techneeducator* can easily participate in the world of Charles Babbage, Aida Lovelace and Alan Turing, let alone Eniac, IBM and Wang. The narrative path is just too differently contextualized. I am not following a technological agenda, but inquiring into the creation of learning settings, inquiry into personal practice and how these two intersect in technology-based learning environments. What I am trying to accomplish in this section is to share the story of my path from first exposure to computers in the late 70s to the late 90s where I am writing this thesis. By constructing this narrative, I have been able to clarify for myself the experiences that led me to work in technology despite my initial dislike and my continued wariness with technology in education. And this narrative may provide some sense of historicity for educators.

I hated computers. And perhaps, in a way I still do. I would like to think so, anyway. In the beginning, I saw them as obvious yet opaque. They were suspect, arbitrary, uncreative, antagonistic machines. I think that I hated them for their lack of humanity, interactivity, creativity, understanding. Computers were machines to be controlled, dominated and according to logic, plan and flowchart, and core dump. I could have cared less. Computers, however, had their own plans for me. From 1979 to 1999 computers crept into my life, unbidden, first like a leach sucking at my soul, though the relationship changed over time, not because I changed my attitude towards what they were, but because they changed themselves, rethinking their attitude towards me.

I took the course 'Introduction to Computer Concepts' in grade 11. My sole experience with computers in high school is described below. It was a fiasco, but it was my first experience with many of the problematic aspect of technology that I describe throughout this dissertation. How the experience played itself out also was my first experience that highlighted the importance of human interaction when working in technology-based environments.

DataCrown: Technology in the Real World (1979)

My life with computers started as a servant of the great machines. The lowest of the low; the *non-literati*. My mother got me a job unpacking computer tapes for the company she worked for, DataCrown Inc., a subsidiary of Crown Life Insurance. I worked in a back corner of the shipping department, after school and on weekends unpacking boxes of tapes. Removing the plastic and cardboard wrapper and stacking them on a trolley. Ten tapes per box, 30 tapes per row, six rows per trolley, 2000 tapes per order. I am not sure how many tapes had been processed before I started, but by the time that I left DataCrown in 1981, there were over 125,000 tapes in the library.

I worked with two young women, daughters of the head cafeteria cook and the president's executive secretary. My mother was Operations Secretary for the managers responsible for running the computers themselves. In a way, probably the three most important women in the company from a postmodern perspective. But I have always found that the real power is in those who work behind the scenes, not those with doors to hide behind; probably a reason for my later reconciliation with technology. But back to our corner of the warehouse. I remember a lot about these girls I worked with. We were all about the same age 16-17, and we reflected our mothers more than we perhaps would have liked. Cheryl's mother ran the cafeteria, and was always good for a bit extra on the plate and a smile. Like her mom, she was friendly, serious and religious; Baptist, I think. I met her a decade or so later and found that she had become the lawyer she wanted to be. Sharon had the polished elegance of her executive secretary mother, sophisticated, social and religious; Catholic this time. I, too, was like mom, exuberant, talkative, colourful with a touch of the bombast and hyperbole, all wrapped in a somewhat frumpish package, and with the spiritual curiosity of the atheist (me at least), and coming from whiter than white Markham it was a novel experience for me to be in a minority experience with two women of Asian background. But at that time it was the relative sophistication of their living in Toronto that they teasingly held over me.

For some reason, one of my strongest memories was talking about religion, along with the usual chatter about work, girl/boyfriends. Sitting in the underground vault of the computer centre's warehouse, having to pass through computer locked doors, under the

eyes of security cameras was not all of what gave the experience a somewhat gothic air, it was the tapes. THEY were mysterious.

We unpacked them, put them on the trolleys. Then we would put numbered stickers on them AA0001 to ZZ9999. THEN we would colour code them with two small round dots. Each row would have a single colour on the top then one of 10 repeating colours below. That was it, unpack, chat and sticker. The pay was good and the living was easy. But what these things were for was another complete mystery. It was as if we were beneficial parasites initializing our data larva with stickers. The larva would hover around the computer somewhere to be fed data. When we had a few trolleys done, we would call for them to be picked up and get new blanks.

Well, it was not as if I did not know what a computer was, but more likely that I did not have any personal sense of *why* a computer was. It was an unknowable black box used for unfathomable scientific, corporate or government purposes. Sure, I had taken a course called something like 'Introduction to computer studies' at good old Markham District High School, but as with everything else I encountered there, it was as unknown a discipline after taking the course as it was before. We had some ex-IBM mini-computer with 8 kilobytes of ram. After sweating through the entire year, filling in punch cards manually, graduating to the punch card typer, failing every test and assignment, and not even being able to get the printer to print out a series of asterisks to look like Elvis Costello, my early computing career came to a sudden unseen salvation. Mr. Payne, wonderful man he was, graced me with 51% in the course on the condition that I never take another computer course in my life. Ah, the human side of technology! I jumped at the opportunity, and being the honest and compliant little guy, I never did again. Or rather never did until about 20 years later when I took two courses at OISE/UT with the august Professor MacLean. But I jump ahead achronologically.

In the data-crypt that was Datacrown Inc. I sat sticking labels on digital larva, firm in my belief that computers and I should remain separated by a fireproof door. My domain of expertise, that of enjoying mindless tasks while chatting to friends, was further entrenched when I traveled across the cypherlock barrier with my mom one day when she gave me a tour of the 'other side'. It was, and still is in memory, a strange experience. Through the door, we first encountered a small room filled floor to ceiling with those

punch cards that had thwarted my grade 11 year, and reams of paper output such as I was never able to coax out of our school computer myself. And in the corner were some of my tapes! Well, not the ones I had personally disrobed and provided an identity to perhaps, but something I knew from my own experience. Part of my world. From there we walked through into a room filled with computer terminals and a closed door filled with screaming and crashing machines; the printing room. But that was for later. This tour took me up the Rubbermaid sloping ramp from ground zero up 18 inches to the computer floor. As the door *StarTreked* open at our advance, I was hit with the first impression of the 'computer room' in front of me; icy cold air propelled by an other-worldly hum. It sounded vaguely like what I heard on my first visit to the Niagara Falls' Hydroelectric generating plant.

My mom patiently explained the environment. We were on an elevated floor-way because the drop floor held all the cables, and was the conduit for air-conditioning to keep the computers cool. Some people had a floor panel raised and I was able to look down and see the snakes in the freezer below my feet. As I looked about at all the computers around me with blinking lights behind smoked glass doors, I asked which one was the mainframe? My mom laughed and said something like "Dear, this is just the communications room. This is where all the screens and keyboards get hooked into the computer." She motioned for me to follow her around the large bank of the Gandalf communications 'things' and for the first time I saw the computers. They spread out like a vast panoramic cityscape of blue and gray buildings taking up the space of a football field. Close to me were row upon row of washing machine sized boxes, disk drives I later learned. Over in the near corner, a wall of fridge sized tape drives stood like an electronic Stonehenge. But in farthest corner there was a Manhattan of boxes, a complete assortment of full sized kitchen appliances arranged in some sort of matrix that could only be deciphered from the air. Over there, my mother told me, were the computers. As we moved in that direction, I saw about a dozen of the biggest units, and motioned toward them. But they were merely APUs (Attached Processing Units), the prize was almost not worth remarking on. Smaller than the disk drives and only about the size of a dishwasher stood the 4 CPUs (Central Processing Units), 4 great IBM 360 CPUs. This was it. The centre of this great infernal digital project. I stood in the midst of a frozen

over hell of computing looking at a couple of boxes that offered no answers or insights to the whole project. I, as a Dante on a tour of Hell led by my wise and far-seeing Virgillian mom. Just a couple of faceless boxes. While I was impressed that they cost a million dollars each, and had the awesome processing capacity of 1 megabyte of ram each, they left me cold. I began to look around for some realm of meaning and purpose, since the heart of this operation was dark.

I looked up to see a bunch of shaggy headed, bearded men looking at us through the glass in some control room. They were relaxing at consoles grinning at us, while some 'suits' muddled about in the background. "That's the control room, and those are the Computer Operators," said mom. "We'll go there after I show you the tape library." I looked behind me at the Computer Operators under glass as we wove our way off through the APUs, more diskdrives towards the impenetrable wall of the tapedrives.

As we moved through an opening in the wall, descending to the next circle of Hell, it was like moving from an arctic waste into the Chicago Commodities Exchange floor; people moving about at high speeds, things happening, machines whirring, phones ringing, people shouting. We were at the edge of a great circle of tape drives. In the centre of the circle were 4 consoles with multiple monitors with 4-6 people in front of them reading the screens reaching behind them to grab a couple of what must have been a few thousand tapes, moving briskly over to a tape drive and one after another opening the drive, mounting a tape, closing the drive and moving off to repeat the process at the next drive before rushing back to the consoles to start the process again.

Behind them, streaming in and out of two doors like worker ants spilled what seemed like an unending supply of people carrying anywhere from one to 20 tapes, and a 4 x 8 inch piece of paper with what I guessed were instructions. They dumped the tapes on the racks behind the people who were actually mounting the tapes on the drives before disappearing back through one of the doors. But it was behind these doors that caught my attention.

In the gleaming florescent light shone row after row of computer tapes, thousands, tens of thousands of them. This backroom, this vault contained over 100,000 tapes, the first I encountered were the ones I had unpacked, in a room that must have been 40' x 150'. Floor to ceiling; row on row; swarming with people grabbing a tape here,

reshelving a tape there. And in one corner 3 small printers spitting out those 4 x 8 inch pieces of paper full of instructions, and waiting to be grabbed by someone.

I was captivated. This was a tape library. This was knowledge, this was information, this was data. I did not know the purpose or contents, but I understood that this room was the repository, the storehouse of data, and that meant people were the primary actors here. I felt like I was in a public library looking at all the books on the shelves that I may never read, and I was captivated, wondering about who they were created by, and why. Mom had been an assistant librarian at the Unionville public library, and I think that my experience there with books and their care gave this aspect of dealing with computers a face I could relate to. About a year later, I would be standing back in this same room. Not as a visitor, but as a worker in the tape library.

DataCrown: Phase Two (1980)

By December 1980, I had quit school, and mom had gotten me a full-time job at Datacrown as a Junior Computer Operator, earning something like \$2.35 an hour. But this was not the first experience. The previous summer, I had worked for 8 weeks in the same job, my first big summer job, and first experience living on my own. I had learned that being a tape librarian was indeed like being part of a hive mind. We never knew what we were participating in, or why. I spent the whole summer trying to make meaning of what I was a part of. I tried to imagine relationships between tapes, particularly ones that tended to get used repetitively, or at certain times or days. I also tried to learn about the system, the programs run, job classes, anything. I had quickly tired of the people here. Aside from me, everyone there was from some workstudy/coop programs at Waterloo University. They were interested in nothing except getting out of the tape library onto some real job, like debugging a core dump. Ugh. Debugging a core dump is the most opaque and arcane aspect of computing I have ever witnessed or heard of. The act of debugging a core dump means taking a printout of the entire memory core of a printout of a computer that has been dumped into a printable file because of some failure in the hardware or software program. A core dump looks like hundreds of pages of this:

```
L/Backspace^@Select-by-word characters^@Image^@Background type^@None^@Background
pixmap^@Pixmap file
:^@Browse^@pixmap^@^@Transparent^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
@Background should be shaded (slow)^@Colors^@Color palette:^@Foreground color:^@Background
color:^@Colors:^@Scrolling^@Scrollbar position^@Scrollbar lines^@Scroll on keystroke^@Scroll on
```

```

output^@apply^@help^@ Color selector^@STRING^@Menu_Quit^@_Close terminal^@_Hide
menubar^@Creates a new terminal window^@_N ew terminal^@_Show menubar^@gnome-
terminal^@C_olor selector...^@_Help^@_Settings^@_Edit^@_File^@*she ll !=
NULL^@get_shell_name^@^@^@^@^@^@^@^@^@^@file %s: line %d (%s): assertion failed: (%s)^@
^@appl ication/x-color^@text/plain^@drag_data_received^@button_press_event^@widget !=
NULL^@size_allocate^@ app !=
NULL^@TERM=^@TERM=xterm^@COLUMNS=^@LINES=^@COLORTERM=gnome-
terminal^@TEST^@Terminal^@GnomeTer
minal^@term^@configure_event^@child_died^@title_changed^@delete_event^@Error: unable to
fork^@WINDOW ID=%d^@Could not exec
^@dummy/num_terms^@%s^@geometry^@command^@class=^@%dx%d+%d+%d^@class^@rm^@TIT
LE^@Set the window t itle^@title^@NOWTMP^@Do not update wtmp entry^@nowtmp^@WTMP^@Update
wtmp entry^@wtmp^@NOUTMP^@Do not update utmp entry^@noutmp^@UTMP^@Update utmp
entry^@utmp^@Background color^@COLOR^@Foreground color
^@COMMAND^@^@^@^@^@^@Execute this program instead of a
shell^@GEOMETRY^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@Specifies the geometry for the
main window^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@Start up she lls as logins
shells^@login^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@Do not start up shell s as
logins shells^@nologin^@FONT^@Specifies font name^@TCLASS^@Terminal class
name^@tclass^@^@<90> sr/share/locale^@gnome-
core^@GNOME_TERMINAL_CLASS^@save_yourself^@die^@Terminal/%s^@^@^@^@^@^@^@^@^@^@^@^@^@8

```

The systems analysis and programmers must read through all this jumble of symbols and characters looking for some clue as to what went wrong. The human-computer interaction was to them a messy *wetware*-hardware interaction worth scant attention.

I developed two ways to cope with the disappointment of finding that there was no meaning to be squeezed from either the environment or the inhabitants. First, I started reading much more than I ever had before. I would carry a book around with me, and read it in between picking tapes, or while mounting them. Certain times of day/night, it got so quiet that we would be allowed to take extended breaks. I volunteered to watch the machines, rather than sit in the back room with the co-op folk and talk about nothing, I would read books all by myself in front of the consoles. Or I would sleuth. Since most of these minions of the machines did not care for the tapes as a librarian would care for books, they would get lost or misfiled. And no one could find them. I developed a systematic technique for tracking them down. This was so important a job, especially when some unseen client somewhere was screaming for a lost tape, that I would be excused from all other duties to track down the miscreant tapes. A whole shift could go by while I ran amongst the various rooms, snooping, climbing to the tops of the tape racks, looking under the raised floor until I found the tape. It was a game, an adventure, a challenge. I had already lost interest in what the tapes themselves could offer. But this sleuthing was a social act of exploration. I began to figure out the psychologies of the different people who misplaced the tapes. I began to recognize patterns of use, carelessness, even skillful resistance that led tapes to be dumped in improbable locations,

such as under floor tiles and on top of shelves, as some act of sabotage against the tyrannical demands of the computers.

When there was no sleuthing to be done, I would explore the computer out of boredom. Try commands I had been taught, amuse myself. One day, I was on the midnight to 7am shift, and all my peers, supervisors, managers were out sleeping or playing cards, or doing work elsewhere. If the people running the system needed anything, they would call me directly, so I did not even have to watch the screens. After tiring of reading my *SiFi*, Nietzsche or Ayn Rand one day, I was fiddling with one of the 3 terminals I had in front of me. I was not working, or connected, or whatever, as far as I thought, so I was making pictures on it by typing in various lines of characters that repeated in interesting graphical ways. The best was lines and lines of ‘s s s s s s s s s s s s s’ offset by one character. Like this:

```

s s s s s s s s s s s s s s s
s s s s s s s s s s s s s s s
s s s s s s s s s s s s s s s
s s s s s s s s s s s s s s s
s s s s s s s s s s s s s s s
s s s s s s s s s s s s s s s

```

As the text flowed down the screen, you got a nice shimmering effect. Very pretty. Early computer graphics I guess.

While I was amusing myself, I heard over the intercom, “Would Mr. C. R. Ashman, please call extension 4001.” I cheered to myself. That was a sign that the first of the four mainframes had or was about to crash. Crash, man! Get it? This was supposed to be code, so that clients in the building would not know that the systems had crashed, man. That usually meant that they would shut things down and we would get to go home early while the hackers got to work pulling their collective hair out looking for the bugs. Then within short succession the following announcements:

“Would Mr. C. R. Ashman, please call extension 4002.”

“Would Mr. C. R. Ashman, please call extension 4003.”

“Would Mr. C. R. Ashman, please call extension 4004.”

I had never heard of them all crashing like that. Usually they would bring down the other machines before they crashed. Some heavy stuff going down.

At that point, all hell broke loose, and the next 20 minutes were somewhat of a blur. From every orifice around my tapedrive cocoon, managers, shift supervisors, systems engineers and analysts converged on my little world. All of them screaming at the same time, “What the fuck did you do?” “What happened?” “Are you alone?” “What the hell is going on here?” The rest is history, as they say.

The terminal I had been idling on was not disconnected. It just was not updating itself. I was typing and getting no response except to see my input. What I had been doing, as far as computerdom was concerned was typing in a command, ‘s s’, over and over and over again. That would not have been a problem, except ‘s s’ stood for ‘start stupid’ a diagnostic program that was designed to test memory buffers by filling up ‘job queues’ with fake jobs that just sat there. I had innocently filled up the buffers of mainframe one, until it overloaded, and passed it’s load onto the next machine, and the next, and the next. Until they all panicked and died.

I knew I was dead. I had probably caused \$10k worth of damage. I would get fired. Maybe my mom would get fired. Maybe they would just open up the floor boards and drop me down there never to be heard of again in some new technological 8th level of hell that had not existed when Dante was getting guided tours. But that was not to be.

The shift manager interrogated me until I was pumped dry, and then dropped the bomb that bespoke of divine intervention.

“It was not your fault, Jason.”

I was stupefied. “Huh?” I replied, in shock.

“Well, you were just trying to learn things, and keep busy, even if it was a stupid thing to do. Your supervisor should have been doing his job supervising.”

A *person* crept back into the digital domain, and things got reasonable. The result? My bosses, floor senior and shift supervisor were given severe reprimands for a) sleeping on the job and b) not realizing that a creative little kid like me could be put to better use. I do not know what my co-op co-workers thought, except perhaps envy since I could make computers crash, and they were the comp-sci majors. I liked that thought. I was given 2

weeks 'holiday' from the job and sent on a training course for my troubles, and was given the added job of assisting in the printer room. Wow. Break things in the process of learning, impress your bosses and get time off gruntwork. Gotta love it. Like I have said to some of my friends as a quip, "4 out of 5 mainframes can't be wrong!"

This is how I became a troubleshooter, something akin to a hacker in the traditional positive sense of the term (Rheingold, 1993). By causing the trouble myself. All in the name of exploration, self directed learning, and of course boredom. This is part, I realize, of the myth, perhaps true, of the hacker who when apprehended is hired by companies to become a security expert.

But this was the beginning of the end for me and DataCrown. Sure, I had a raise in job and status. I was really a Junior Computer Operator now. I worked in the printer room most of the time. We had 5-6 big noisy impact printers that had to be kept happily full of paper, or have the paper unjammed. Unjamming machines was lots of fun. And we had the first generation of laser printers to play with. A million dollar monster that was so big that it had its own built-in vacuum cleaner. I happily sat in this room, while my bosses slept in some back room. This time I had their phone numbers and could call them if someone came by. I read my books and played with the print queue. My favourite trick was to back up a file going to the laser printer, then as the first copy was going through, to run my finger down the pages as it moved from toner drum to fuser drum. All the dry ink would stick to my finger and the output would have a long, sometimes 20 page, streak down it. Then I would quickly reload the printer with the backup. When the person, of course someone I knew, got their output, their jaw would drop, thinking they had to resubmit the whole job. At which point I could bring the other one forth and say, "OH, there's this one too!" Printer room humour at its worst.

Any psychologist can probably tell you in a second that I was starved for stimulus at work. All that information and data, and no knowledge whatsoever to be found. This was meaningful work in the computer industry? By this time, I had friends who were computer operators. Once they let me 'boot' the computers. A big deal back then called IPL (Initial Program Load). It was 3 minutes of terror as I ran about the room pushing buttons as they watched me perform like a trained dog; a good time was had by all, as they laughed at my panic.

Colossal Cave Adventure

One gruff character, who looked like he would have been more at home in a mountain cabin, took pity on me and showed me how the unbraindead dealt with the braindeadening world of technology. First by looking over his shoulder, and later on a terminal of my own, he showed me what he called Advent, which I later knew to be called the earliest form of text-based simulated environment Adventure (Leonard, 1997).

And as soon as I thought about this period in my life, while composing this chapter, I searched about and downloaded a copy from a web archive that had a Macintosh version available ported by Anthony Ard aard@ucsd.edu in 1991, and played with it for a few hours. Interestingly enough, back at DataCrown, I stopped playing with Adventure at a specific point when I realized that nothing interesting was ever going to happen. The narrative became too repetitive. There were no meaningful interactions between characters. And it merely got harder and more complex; it did not grow. When I revisited the game while writing this, I used a 'walkthru' created by Barbara Besser in 1984 (Besser, 1984). This walkthru tells you exactly what to do when. And if you follow her instructions you get to the end without wasting all the time testing and guessing things out for yourself. I stopped at about the same point as I had more than a decade before even with the cheat sheet. I guess that for people like me, who do not look to games or computers as controlling activities, I do not feel the need to beat the computer or programmer by solving the riddle. If he/she wants to make it so opaque that it cannot be 'figured' out by the likes of me, then I leave it up to them.

This sense has figured highly in my understanding of how CVEs should be setup and developed. I do not mind the environment being complex, but I refuse to allow it to be opaque. An opaque environment is one in which the answer cannot be known unless you happen to be the person who created it, or make studied guesses to solve the puzzle that is their intention to construct. There are many people who love to solve puzzles, and puzzles have their place in learning. However, this puzzle model is only one of many paradigms for learning, and one that places an unreasonable amount of power and control, governance, of the environment in the hands of those who created the puzzle. I am over simplifying the situation a bit. But I figure that if I have to ask someone how to

FIND information on how to do something, then I cannot be bothered. Support documentation and info must be available.

For a while, the world stopped spinning on its axis. I was lost in a maze of twisty passages. ‘Advent,’ as I called it, was the first of the mainframe based adventure games. It is really called “Colossal Cave Adventure” or just “Adventure,” though it was originally called Adventures, by Willie Crowther and Don Woods (Crowther and Woods, 1976; Aarseth, 1997; Leonard, 1997). ‘Advent’ was just the command I had to type to start the game. I could not imagine that computers could do this sort of thing. Here was a whole world presented to me in text to explore and experience.

I found that as long as I did my job better than anyone else at my level, I was left pretty much alone. That and if I was able to make sure that the screen did not show I was playing a game, or if my novel was out of site, when a manager came by. This had a thrill of its own for a short while; sort of a special privilege.

I started trying to decode the cave. I got a note book and tried to map out the cave, keep track of the passwords and rhythms of the game. I do not know how many months I worked on it, but I certainly liked the 12 hour weekend shifts. On one occasion I had 8 full hours of ‘Advent’ accomplished by the end. Back in those days even VT100 terminals (the screen and keyboard combination we used to see in libraries before they were replaced by PCs) were sometimes in short supply, and I was given some sort of thermal printer teletype to bang away on. It had no screen, but a keyboard and a printer. It would print out everything in a long line, my input and the computer’s output. After 8 hours of work, over a 12 hour shift, I had a neat little role of probably a hundred feet or so.

It is clear to me what I had in my hands, and I wish I still had it. It was my first, electronic or otherwise, co-constructed narrative in the most loose sense of the term; a log of an extended experience in a virtual world, not that virtual reality existed by name then. The narrative grew out of a process whereby I interacted with the narrative producing structure of the computer program. I made choices as to which options presented to me at various junctures I took. The result was a long roll of paper, a single page of text full of choices, references, contradictions, revisions and frustration, though no conclusion. The narrative perhaps only existed in this instance because it was printed out on the long

scroll of paper, rather than scrolling off the screen. Though narrative does not require either printing or archiving to exist, the artefact did give it a certain concreteness and the opportunity to be reread. I think I probably conceived of it as a log of my adventure in the cave; more archetypal. But other things were happening at the same time I was killing trees with this long printout.

At the same time I was playing Advent(ure), my sister Kelly was an undergraduate student at the University of Toronto, studying Art and Politics I think. I know she encouraged/forced/allowed me to read Plato's Cave bit (apropos) and Nietzsche's *Twilight of the Idols: Or how to philosophize with a hammer* (Nietzsche, 1971; Plato, 1974).¹³ Just the wrong stuff to give to an input starved dropout teen. Oh, and worse, Ayn Rand's *Atlas Shrugged* (Rand, 1957). It was a horrible combination, worse than alcohol and fast cars. All three were full of ideals too big for an untrained mind to get around, but, unlike Kant or Hegel, easily read. Manna. I chewed through these works so fast that I was shifting my paradigms faster than... you know, faster than something with gears. This is what I would read at work. Plato: simple but opaque. Nietzsche: superficially obvious, yet self-contradictory beneath the surface. Rand: positive yet utopian elitism. What's a young boy to do when the ideas he reads are all trick mirrors, and his workplace is a technological black box (literally gray)?

Working at Datacrown Inc. was a fundamentally hollow and hollowing experience, after you get through giving them thanks for giving me the opportunities and the learning, and in obvious cases the support, education and friendship. It was a McJob, swaddled in mystical technology; "Do you want a Scratch Disk with that Job Request, Sir?"

I enjoyed the freedom it offered me to explore and learn; something I never got in high school. The power that came from knowing something that could help someone else was also important. I am the type who sees knowledge as useful only when there is a opportunity to share it with someone to fulfill their goal. Knowledge is the social act of converting your data and/or information into a user friendly form, I would now say. I will have to look up Wesselles to see if how my distinctions of data, information, knowledge and wisdom fit in here (Wesselles, 1990). The important element was I loved to get off

¹³ I even remembered the correct editions when I was looking up these books for the bibliography.

on my own to snoop around for a lost disk, or printout, or anything versus having to do a manually repetitive job if and only if the manual job involved *cognitive awareness*. On the contrary, I did like mindlessly manual jobs like pulling scratch-tapes (tapes to be erased) or unpacking new tapes and preparing them for use. Either keep it simple and let the mind wander, or I will find a chaotic way of increasing the complexity of the environment to make things interesting. I liked searching for the elusive missing tape needed for a priority job on drive 38. I was less enamoured with:

“What do I do now, sir?”

“Oh, go complete this meaninglessly irrelevant task that you know is unnecessary and that I’ll realize is not what I want just about the time you get done.”

“Er, yes sir.”

And that is why I quit DataCrown.

The End and the Beginning (1981)

Since most of the grunts were co-op students from Waterloo University, mom scoffed at DeVry though I think she sometimes took Control Data students, they were not around long, and if they returned they never wanted the tape library again. Only myself and the president’s son were ‘full time’. He was something like a Christmas graduate at a university, or he had finished a year. He was social with the shift supervisors, and got along with his bosses. This was something I never did. I did not want to talk to them socially, just professionally. I just wanted tasks to do, tapes to find, the facts and the procedures. Consequently, I knew the job better than he, and he knew the social atmosphere better than I. He made shift-senior, and I did not.

I made an appointment with the shift manager and calmly told him that I was leaving to take another job. He asked me some questions which I am sure I answered. I know I was not angry or bitter, but saddened and felt let down. I knew I was the best choice for the job, but there were other issues; age: he had finished high school and was probably two years older; better social skills: I wanted to work and he felt comfortable schmoozing with his bosses; position: he was the son of a company officer while I was the son of a

secretary. (I have since realized that my experience learning the ins and outs of administration through mom stood me in far greater stead than the middle/upper management experience through dad.) I was a bit weird and he was a bit conventional. I am sure he is a fine man now, but I was certainly a polite and efficient angry young man.

What Mr. Shift Manager said almost made my blood run cold. He told me that I was liked and well thought of, and that they did not want me to leave. As well, they would like to train me to be a computer programmer, and would be willing to pay for my post-secondary education. Furthermore, within 5 years I would be making \$40k per year if I wanted (I was making \$12.4k). I was shocked. Why was I ignored for a promotion and then patted on the back and given the key to the executive washroom? I remember thanking him for his thinking well of me, but I made a decision based on whatever I based it on at the time, and I still intended to leave in two weeks.

This is not meant to be the *bildungsroman* (a novel of formative education, a story of the moral and psychological growth of the main character) it has perhaps become. Aside from the various mentions of my undergraduate experience elsewhere, it is worth mentioning that I did not touch a computer after Datacrown for nearly a decade (1980 to late 1987).

Japan (1986-1987)

After my degree in English, with a thesis on pre-romantic thought and poetry, I went to Japan for a year to get money to go to grad school, or to escape from my family.

All the joys and pains of that aside, I ended up teaching for a small company called something like East/West Language Institute. They sent me out to teach at companies, particularly at Nihon D.E.C., the Japanese subsidiary of Digital Computers, presently part of Compaq. I did not know them from squat, having only worked with IBMs and Amdahls at Datacrown. I taught a number of courses, conversation to shipping and sales staff mostly, and a course or two on business writing. But I also had a class for a while that consisted of their AI (artificial intelligence) department. Again I was teaching conversation, but this was different. These women and men had to talk to their AI counterparts in North America in English about their work. We had to talk “casual computerese”. I do not remember much of it. I always find it hard to remember what I did

when I am teaching since it is such an immersive act. But I managed to keep 8-12 AI experts happy throughout the course honing their conversation skills and holding debriefing sessions after they had had meetings with visitors.

Finally, I got the big one, a special contract. One D.E.C. engineer had invented a circuit board that could be plugged into a computer and diagnose problems. He had to go to America in 3 weeks to explain it. We had 3 weeks to teach him English. This poor guy had 3.5 hours of English in the morning, then a break, then me for 3.5 hours. He studied at night, perhaps slept, then started again. My job was to talk to him about his circuit board and help him explain computerese. If he could make me understand it, then he was on the right track. I have no idea what happened after that. I hope he did well. I was just a plug-and-play teacher, brought in as an educational mercenary to spend my time doing what I could, and then cut-off and left to wonder if what I had tried to accomplish was of any value.

For me the experience just distilled what I learned at Datacrown, or what I thought I would learned if you ignored the Advent experience, that computers were moronic opaque bits of abstraction. They were computers, they computed stuff. Though teaching computer people was fun, I did not want one. I did not even like the digital typewriters that were so popular in Japan. I had an ancient manual typewriter, a library close by full of unread copies of Conrad, Kerouac and Barthes at Sophia University. I wanted to go to back to York, study semiotics and English, and ignore digital technology.

Gradschool and the CAWC (1987-1992)

Graduate school had a few things of its own to contribute to this narrative. The first was that I could not understand Derrida's *Of Grammatology* (Derrida, 1976). I still cannot to any level of sophistication but it does not cause me stress any more, because I think that I understand why: the philosophy behind it. Once Peter Triphonas confirmed my suspicion that my problem with the various flavours of post-modernism stemmed from my deep distrust of Romanticism in which it and its antecedents are drenched, I felt I could let go.

The other key point was my slide into medieval thought and arthurian literature, and the medieval revivals of the various periods: Anglo Saxon to post-modern (manga). I

learned of the illuminated manuscript, marginalia, redactions, hagiographies all of which have a direct impact on how I conceptualized my work since 1994 on the world wide web, hypertext, html, et al. The connection is a legitimate one, I think. While I have not yet been able to fully develop these ideas, for myself, or in my work, the relation of the illuminated manuscript and hypertext and collaborative environments continually resurface as I conduct inquiry into technology and education. The illuminated manuscripts of Medieval Europe were a multimedia event, full of colour, light and text that could be read many different ways. The multiple *ways* to read the page, images and interpolations fits in to Aarseth's (1997) definition of hypertext. As Aarseth says of the *I Ching*, Egyptian temple hieroglyphics, MOOs, and web pages, reading the intricacies of an illuminated manuscript requires participating in "a very different and highly specialized ritual of perusal" (Aarseth, 1997, 2, 9). Reading the illuminated page is a non-linear experience. The manuscript codex were also a social public form of communicative text, often read publicly and made available by chaining them to lecterns. As well, the marginalia, writing added in the margins commenting or adding to the original content of the manuscript itself, was something I immediately saw to be related to the hypertext links. The mediaeval forms of literature described as redactions and hagiographies, the former a genre focusing on retelling of a story go get a particular religious or political slant and the latter the Lives of the Saints, both have more in common with the humble individual, family, community web page dedicated to building an idiosyncratic picture for the reader revealing something about the producer's life or world view than it does to any of the modern genres of novel, nonfiction, poetry or journalism. Hmm... I wonder if Andreas Capellanus's *Art of Courtly Love* written in the late 12th century has something to say about cybersex (Capellanus, 1959).

By late 1987, I was feeling the pinch when it came to writing at Grad school. I was struggling with my typewriter. It was too hard to organize ideas on paper alone. My typing was so bad that I could not type a clean page. I needed to do heavy revisions. I was stuck. Somehow I was directed towards the Computer Assisted Writing Centre (<http://www.yorku.ca/admin/cawc/>) high up in a back corner of the Scott Library at York University. Students were there to give me an orientation and an account. I could use the

writing centre's computers to work on papers. It was like a godsend, despite my reservations regarding computers.

We had access to 60-70 terminals connected to 5 old, even then, Sun Microsystem's computers. Our account could hold our papers and work, and we could edit files using EMACS, a primitive editor, but powerful enough that it is still in use today. It is included in most versions of Linux available on the market today. Formatting is very similar to what is used to make web pages. To create a line like this: "In the book *Revenge of the Monster Magnet*, Zappa makes specific reference to the **Bible**" EMACS formatting as we used (called nroff and later troff/me) would require the user to type:

```
"In the book
.i
Revenge of the Monster Magnet
Zappa makes specific reference to the
.b
Bible.
“
```

This was nothing compared to what the CAWC offered by way of support. First of all the students working at the CAWC were both humanities people. In fact everyone was except one tech support person. The policy of the CAWC was, if not explicitly so, that humanities people can be trained to teach computers easier than computer people can be trained to teach non-computer people. I think that this point represented the single biggest point of the CAWC's impact on my attitude toward computers. Staff understood *writing* using computers, not computers that could also be used for writing. The mandate was teaching how to write. And to that effect they provided us with writing guides, heuristic tools for brainstorming, planning, organizing and editing writing, electronic tools to do some of these processes as well as analyze writing style, and finally an electronic tutor (<http://www.yorku.ca/admin/cawc/files/etutor.html>) to read and comment on writing.

Perhaps most important is my response to the situation. I learned that writing was a recursive, cyclical process. Writing is a social process of interaction with ideas and others as well as text, and that writing was not a personal expression of some inner voice, but a

construction of thoughts and ideas filtered through both reflection and craft. I was able to use a computer to craft my ideas. Computers could be used to help me further my own learning and development, and through networked computers I could contact other people who could help me with what I was trying to accomplish. Computers for communication and learning.

In 3-4 months, I knew enough about the CAWC that I was already helping others when the 'CAWC monitors' were too busy. One day a person asked me for help, and as she thanked me, she asked me when I had started working there. I admitted I was only a user, and that the monitor was unavailable so I was helping out. Right place at the right time. This person was one of the members of the CAWC steering committee. She thought I should apply to work at the CAWC. In April 1988, I started working at the CAWC. I learned more about how computers work for writing, what it means to be a humanities-based computing support person, Unix basics, and how the pre-1994 Internet worked: Usenet News, FTP, Telnet, talk, write, IRC. I had the first inklings of my later realization that, for me at least, the primary importance of computers is that they are *social network tools for putting people in touch with people and to help them accomplish things collectively*.

As my coursework worked itself out like a bad cramp, I found myself lost in computers, not as technology, but as co-constructed text. I wanted to learn the narrative of the computer environment I was using. Again, not a history of the development and implementation of the computer, but its own story, how the language of Unix lead to mysterious corridors, actions and effects, conclusions and outcomes. Each subdirectory was a page in the overall narrative of the life of this computer site. Almost 2000 users lived there. Their lives and studies leaving signs and markers about. Computer problems became acts of conflict resolution, mediation between the individual and the CAWC itself.

Over time, I came to teach introductory and advanced courses in using the CAWC for writing, as well as language learning and case study analysis to MBA students. And later, I became an electronic tutor, an unnamed being to whom a student could email a paper and expect a detailed response on their writing replete with suggestions as to how a student might improve the paper. The technology of the computer allowed me to interact

and work with a number of people in a manner similar to the distance writing course I taught for Nihon D.E.C. using the mail, but I had a more immediate impact and sense of who I was communicating with.

Online Experiences

Somewhere between starting to be a CAWC monitor and teaching classes I was exposed to Apex4201. I did not know what it was. Apex was the name of the computer, apex.***.***.ca¹⁴, and 4201 represented the port that the software was listening to. The computer is still there, but it is not listening to port 4201 anymore ;-(. A mysterious person named Michelle ran it. We would type: telnet apex.***.***.ca 4201, and I would log in as Spazz¹⁵. I was in a narrative space that made my hunting around Unix and my flailing around Advent seem like the ‘early reading primers’ that they were. Here was a computing program that you could enter! By typing the command “telnet apex 4201,” a command that meant nothing to me at the time, and then entering a name (spazz) and password, a window opened for me into a new world. There were other people inside! You could talk to them! You could interact with them verbally, emotively, socially. You could construct rooms, and doors and fields, and and and. The only people I remember in there were CAWC student monitors, and sometime Michelle. I was in awe of Michelle who could solve any problems in Apex4201.

I learned that Apex4201 was a TinyMud, a precursor of MOOs, and that there were others about (Leonard, 1997, 52-53). And perhaps I visited some of them, I do not really remember. I only really remember two concrete things. The most important aspect for me was the social communicative and constructing dimension being all rolled into one. I did not have any idea why this was cool and important, nor did I know that I wanted to do more with them in the future. I really had no idea what good they could be used for. The concrete things I do remember consisted of a series of rooms that one of my co-workers built that represented a puzzle. I never figured it out, and found it very frustrating. You basically had to either try every possible action as a series of guesses, be the creator, or ask him what to do, as mentioned previously in this chapter. This sense of counter

¹⁴ I have replaced the sub-domain information to maintain the privacy of the computer, replacing the letters with *.

intuition made a big impact on me, and I resolved to make things interesting without making them needlessly opaque to others. I found it profoundly frustrating to encounter a space in which the learning curve was vertical; where there was no recourse to a help mechanism that would enable me to figure things out. I learned over time that we all assume that whatever is clear and reasonable to us is thus for others. Later, studying at teacher's college about the various fantasies (or rather fictions) of learning styles provided me with some justification for this opinion.

When I built my space it was going to be infinitely varied and easily interacted with. I got my brother, a computer geek and home programmer, to help plan. I think the plan is still about on paper, as I have seen it from time to time, but it never gets stored anywhere useful. What I planned to build were the 7 levels of hell, as a Dantean space that the user would negotiate his/her way through. Just for fun I added a room above the first level of hell and called it Heaven. It was a bar. At that time the band "The Talking Heads" had a song called Heaven with some particular lyrics:

Everyone is trying
To get into the bar.
The name of the bar,
The bar is called Heaven.
Heaven.
Heaven is a place.
A place where nothing,
Nothing never happens. (Talking Heads, 1979)

I did that, and built what became the 8 levels (1, 2, 3, 4, 4a, 5, 6, 7) and started to populate it with artifacts. Statues that tried to seduce you if you drank from the can of beer on the floor. Keys that would only let you through the door if you did not carry them, and tricky little bits of flotsam and jetsam.

That was as far as I got. Apex was incredibly time consuming, and got somewhat boring for two reasons. A lot of the time I was the only person connected, and back then it was too difficult to have multiple windows so that you could do your important work in

¹⁵ I still use the name 'Spazz' or 'Spazzmodius' on a number of virtual sites.

one and monitor the virtual space in the other window. As well, Apex was designed by computer programmers for computer programmers. It's organization and curriculum had nothing whatsoever to do with the way I thought. Everything had to be learned by rote and memorized. I never worked like that and I still do not. I am what Finke and Bettle (1996) call a Chaotic thinker, working through "unstructured rationality and "considering multiple realities" that results in a willingness to let structures emerge without bothering to know exactly what is going on at any particular point in the process (Finke and Bettle, 1996, 21-43). This is a major conflict with the way technology is experienced and used by most practitioners of the art.

Apex crashed one day and we lost the work we had done, and I never went back. I could not remember the steps I had worked through, or the knowledge base I had developed in my objects and creations, but I always remembered the environment itself. And later as I visited MOOs such as LambdaMOO (lambda.moo.mud.org:7777 and MediaMOO (media.mit.edu:8888), I always thought of having a MOO of one's own.

About the same time I was shown Apex, I was shown another program called Nethack (Leonard, 1997; <http://www.nethack.org/>) by my co-workers at the Computer Assisted Writing Centre. Unlike Apex, you do not interact with other people, but you interact with avatars, monsters who are trying to kill you while you learn about the various levels of this 50 level dungeon. With the help of your faithful dog, you find weapons and magic potions, gain strength and skill, and kill or run away from anything you find. It was a good time waster for slow nights. It was much like Advent, but skill was based not so much on solving one riddle, as many small ones. There was not one way to 'win' but many. As well, the maze configurations would change every time you played it. This flexibility was enticing, as it held some of the features of Apex, lacking only the multiple players and user extensibility. But it was well documented, and there were many avenues to get help with problems. I chatted with others at the CAWC in between sessions, or while sitting side by side as we conducted our own sessions. It felt like a social experience, even if it was not a multi-user environment.

Nethack's strength was that it represented a more dynamic space than Adventure, with multiple possibilities and experiences each session. Unpredictability, and randomness was the rule. What worked one time would not work another, and you had to

combine prior knowledge with calculated risk taking. But in the end it was a hollow experience, like so many others. As with Adventure, and many other computer games I have experienced since, with the exception of the Sim series of programs by Maxis such as *SimCity2000* and *SimCity3000* (<http://www.simcity.com>) or Cyan's *Myst* (<http://www.cyan.com/>), they are static spaces that once conquered can be discarded, not dynamic spaces that can either be experienced randomly as one would a favourite physical space in real life or a user-extensible space than can be infinitely constructed and modified by the user.

In 1992, someone gave me a command to type into my Emacs text editor. I was immediately connected to CERN, a Swiss physics laboratory, and their experimental environment call the World Wide Web (Cailliau, 1995). It was a text-only environment but it allowed users to navigate through various links to access data in a hypertextual manner. Much to my chagrin, I remember trying it 4-5 times before pronouncing, to whom ever was around, "This sucks. The WWW will never work." Such are my life choices, as I found myself at OISE four years later as one of the first of Bob Maclean's students building web pages. But at the time it just did not make any sense to me in light of my experience with existing technologies such as email, ftp, telnet and gopher which seemed much better suited to what I saw people trying to do. Perhaps if I had been more technical, I would have seen the potential of the WWW to navigate through data. It was certainly a missed opportunity, and with the release of the first graphical web browser Mosaic in 1994, the world changed, and I changed with it.

Developments in technology were changing the CAWC and myself in the late 1980s. The CAWC had 5 Suns running a flavour of Unix called, if I remember correctly, SunOS. All 5 suns were probably not as powerful together than the little PowerBook on which I am writing this, but they could just about handle the 65 users we had locally at any one time, and perhaps a few distant users via telnet. We also had a Mac and an IBM-PC to help with minor administration duties. We learned about them and played about, but not much. I almost never used the Dos machine, and the Mac did not have a hard drive that ever worked well. That was to change.

We got about 30 NeXt computers around 1990 (blackholeinc.com, 1999). NeXt were, and still are, in my mind the best computers I have ever used¹⁶. I have personally had 9 Macs, a Dos-PC, and 3 Intel Linux computers, but none of them come close to what the NeXt could do. NeXts were the brainchild of Apple co-founder Steve Jobs and represented the ultimate marriage of Unix power and Apple Graphical User Interface's (GUI) ease of use. You could interact graphically or textually with the computer's operating system, treat it like a toy or a research machine. I was for the first and only time in love with a cool bit of technology. For one year, I taught using them as TA for an undergraduate Social Science course, used them as an Electronic Tutor, and worked with them as a CAWC monitor.

However, NeXts were ahead of their time. Within a year of our purchase of half of the computers we needed, NeXt ceased production. We sold the ones we had, I heard for more than we bought them for and purchased Macintosh computers. Just as we were unpacking them my time with the CAWC was over, and I headed off to the Faculty of Education at the University of Toronto. It has been my fate to teach mostly using Windows computers ever since.

Home Computing My First PC

I do not know the exact date I got my first home computer. It was an IBM-PC 8088 with 640k of ram, and a modem for dialing into the university and the Internet. It was excellent to be able to work at home and write papers using a slightly more intuitive word-processor, but it was otherwise unremarkable. I found PCs to be lobotomized Unix computers, same metaphor of control, easy enough to use when you had a good crib to remind you of the details, but otherwise opaque for a 'user'. It had none of Unix's multi-user capacity, and at that time, no way to directly interface with the Internet. You could use a modem to connect to a Unix computer, which I always did, but it was usually on the Unix computer that I did my work, aside from word-processing. The PC was enough to get me to a Unix computer.

My brother soon gave me his Mac Plus, and I sold my PC. The reason for this shift is interesting. I had been working for my father's trucking company, Nolan Transportation

¹⁶ The World Wide Web was invented by Tim Bernier's Lee on a NeXt computer (Cailliau, 1995).

Agencies, helping out with various things. The company was mostly run by my younger brother and 2 of his buddies. Even though my brother passed away from cancer in 1995, his friends are still working away at the company.

Anyway, my job was to help fix computer odds and ends. The entire office was a strange mix of PC clone and Macintosh Plus computers strung together with a simple networking environment called Tops. It was flaky, buggy and rather silly for a corporation. But it gave me more opportunity to work with and learn about PCs. As I remember it, my brother would let me fix the things he could not fix. He knew more than I, so he could teach me how far he had gotten in the repair process, then I would get to work and fix it, somehow. No one was ever quite sure how. Sometimes it was as simple as trying strange things like opening up the computer and reseating all the computer chips with my thumb. One computer I fixed had a bad hard drive and was going to be discarded. I remember saying over the phone from home, “Ok, it’s broken. And you’re going to throw it out, right? Then try this. Pick up the computer. Hold it about 3” above the table. Now drop it.” I have no idea where the computer is now, but after writing the first draft of this thesis, I found out that the computer did work for a long time, being passed on to someone’s sister.

Most of the work was just systematically working through what people explained to me as the problem and the possible mechanisms, then I would flail about interrogating the computer, trying things seemingly at random, making changes of multiple variables, and looking at the results. It always seemed to work, and no one was sure why. Reading a copy of *Chaotic Cognition* this spring gave me at least some basis in psychology for me to suppose why it worked (Finke & Bettle, 1996). I just felt comfortable mucking about in places where I knew next to nothing and fiddling about to an uneasy alliance called a solution. At some point I developed a couple of comebacks that described my situation. Perhaps they are almost my maxims:

- You only need to be 50% as smart as the next person if you use 99% of what you got.
- Be comfortable with your ignorance, because it will never leave you.
- “If the fool would persist in his folly he would become wise.” (Blake, Stevenson, 1989, 108)

- Never let your ignorance get in the way of getting the job done.
- The idea is to just keep banging those rocks together. (From *Hitchiker's Guide to the Galaxy*, <http://www.douglasadams.com>)
- If they're stupid enough to let me, I am stupid enough to do it.

My self description always seemed to circle around what I did not know, my ignorance, not what I did know. It was not a sense of pride at my accomplishment, but a sense of astonishment that I could do it despite myself.

I finally came to the conclusion that having an insane PC/Mac environment at Nolan Transport was untenable. And though I now preferred Macs for their ease of use, and ease to fix, I thought that the company should get rid of them and go only with the Windows3.1 operating system. I figured that it was enough for me to fiddle around with half-working machines, but that a company had better things to do with its time and money. My brother did not mind, as he was becoming so engrossed with computer games, which he usually played at work, that he wanted a faster PC computer, PCs having more games than Macs at that point.

We junked the PCs. Good for them, and problematic to me. Then we had to network the bunch together. The way technology runs now at the end of the 90s is much more transparent. Today, I move with relative ease between Win95, Linux (open source Unix) and MacOS, using combinations of TCP/IP, Samba and AppleTalk running over the same Ethernet network and everything sort of sticks together. But not then. It was tough enough to get the software to run because of Windows3.1's 640k memory limitations thanks to Bill Gates. Then dealing with extended and high memory setting, *et al.* Dealing with these computers and their problems was foolish. From a personal standpoint I just could not see the trouble required to make Windows3.1 work a valuable use of my time. The pain it caused outweighed any benefits as far as I could see. But the trucking company needed to run special software to calculate distances between specific locations in North America in order to quote rates for loads. As well they needed special billing/accounting software that could handle the particularities of the trucking industry. And Windows 3.1 was to be the solution I had to recommend.

Somehow we got everything working, but there was always something else screwing up the settings. Having a DOS/Mac environment was much easier, and more fun, to maintain, despite all the common wisdom of the day that preferred the logic of using a single platform. What did me in was when we tried to set up the Ethernet network. None of the Ethernet cards liked the internal modems. And Jason learned how much he hated juggling ‘IRQ’ hardware interrupts (I have no idea what IRQ means, but they are switches that keep different bits of hardware talking to the computer in the right order.) that had to be manually set on each card, and fiddled with endlessly. I got it working, why not? Just about anything can be made to work if you keep banging your head against it long enough.

My conclusion was that if the hardware and operating system could not function in a ‘reasonable’ manner, a manner in which the technology would actually meet the criteria of being a support to the work people had to do, then I would rather not bother with it. Aside from helping out my father with his personal computer, I never worked with Windows3.1 again. And though I have, on rare occasion, had to fix a Windows95 or NT machine, I do it under extreme protest. I just do not see the point in ‘doing windows.’ As a point on the path of the thesis journey, this conclusion represents a shift in my relationship with technology. I had often rejected technology for various reasons, but this was the first time that this choice came from a position of knowledge, perhaps even connoisseurship (Vallance and Eisner, 1991; Eisner, 1991). It was a professional decision based on experience in doing a job successfully, and being now able to discern the relative values of various computing environments. I was able to not only make a choice, but I could defend that choice.

Teaching at York University: Computer Literacy

There are two pedagogically important notions that I have constructed during these mid-career experiences. One is the idea of what constitutes computer literacy. The other is ‘appropriate technology’, in the E. F. Schumacher (1973) vein. Somewhere about this time, I was a teaching assistant for Sosc1080 at York University, “What computers can do for you and to you” I think it was called. The course director had some particular notions about technology, and specifically about computer literacy, that I was always

contesting, in front of the class or in private. Basically, and I hope that time is not distorting my memory, her point was that computer literacy is a state that is achieved by being able to *use* technology involved with computing. If you can *use* a computer, turn it on, start a word processor, save and print out a file, for example, then you are computer literate. Of course this would now extend to being able to send email, surf the net, chat. Whatever.

From my experience with technology, I saw this position as a gross oversimplification of technology and the issues surrounding it. And I saw her position as resulting from what I perceived to be her own lack of knowledge of the more complex aspects of technology. The opinion she presented did not appear to be based on personal first-hand experience, or even a studied recourse to a literature that supported her opinion. She may well have had the skills and academic foundation, so I am not casting an aspersion on her personally. However, neither I nor the other TA I worked with could find any indication of them in her argument or in the course. I had at least begun to develop in experience-based framework for my opinions predicated on a wide variety of encounters and differing levels of involvement with computers.

This divine state of computer literacy is unhampered by any understanding whatsoever. I tried everything, such as arguments that tried to extend this illogic to other fields. Would a person be considered literate at all if they were able to take out books from the library and flip through the pages from beginning to end? The answer is obvious. Literacy has, in any rational way of thinking, nothing to do with a mechanical repetition of tasks learned by rote.

Literacy describes a certain familiarity with and dexterity in the use of a certain skill set in combination with a body of knowledge and experience, shared and personal, that allows an individual to interact both successfully and creatively within a specific environment. She and I agree on this point. I feel, however, that the level and diversity of experiences that she felt was sufficient was both limiting for the individuals and promoted a culture of ignorance and disempowerment. I never felt that being able to turn on a computer and run a word processor, or whatever else we play with today, qualified anyone for anything. It is certainly barely enough to get you a job.

I am a firm believer in opinions. In the world of technology, having run the gamut from Unix(SunOS), NeXt, Dos, Windows3.1, Mac6.0.7-9.0, NewtonOS1-2.X, Windows95/8, Solaris(Unix), Irix (Unix), AIX (Unix), Linux4.2-6.0, I think that I have a wide experience. Though I have only limited experience as a programmer or a system's administrator, I am a wide and deeply experienced user. I have similar broad experience with web browsers: Mosaic, Internet Explorer, Lynx, Netscape, iCab; word-processors: PageMaker, FrameMaker, MS-Word, WordPerfect, Emacs, BEdit, Nisus, *Works, raw text editors; and hardware: 10 Macs, 4 Unix, 1 Dos, 3 Newtons and 2 VT100 terminals. As well, I have worked on mainframes, mini and micro-computers, not just to accomplish tasks, but to explore them as far as I am capable. This is very important to me, as an educator, in that it suggests that I have enough experience to have formed something close to a legitimate opinion in at least some realms of technology. Taking a nod from Eisner's pedagogy of connoisseurship, I think that the arid experience of a mono-environment is not sufficient to enable an individual to develop a legitimate literacy. (Eisner, 1991, 63). Just as a wine specialist does not base his experience on drinking only one wine, or any expert from a single example of their field, I cannot see how users of technology are able to have, hold or promote a preference based entirely on the limited experience base that they tend to hold.

What this means for both the notions of literacy and facility in educators who use technology is particular. I have seen very few educators who have even 10% of my experience with computer technology. However I am not a technology educator, I am not doing a Ph.D. in Computer Applications, and I am not a certified teacher of computers or technology at any secondary level whatsoever. They are. They profess to hold opinions and make decisions based on what is often an extremely limited experience base. Of course the exceptions among my friends and research participants merely stand to prove the rule. My problem is that the assumed professionalism of teachers is extremely suspect when it comes to their use and understanding and pronouncements on technology. Unfortunately, as my observation of the participants at OISE/UT showed, even students pursuing advanced degrees had little more than a cursory facility with technology, and some even held hostile attitudes towards what they were studying, not based on experience and philosophical positioning. Most interesting is the fact that the solution to

the reticence of many of these people was to be found in simple situations: providing time, personal support and encouragement. These are exactly the elements that work in any learning environment, and what is most lacking in computer-based learning environments.

This is where Schumacher (1973) comes in. Schumacher's work on appropriate technology, did not as far as I can tell extend to computer and the Internet, but rather the issue of how to localize Western technology, primarily agricultural technology, in developing communities. His point was that a wise use of technology is knowing how to relocalize a given technology in a manner that is most suitable for the bioregion in which it will be used. This notion applies to the use of computer and Internet technologies as well. The ability to relocalize technology for an appropriate context or learning environment is crucial. In order to do so, an educator must have sufficient technological literacy to enable a sophisticated analysis of the needs of the environment and learner, as well as to be able to select from a wide range of choices the most appropriate technology for the situation. Educators rarely have that literacy. As such the job falls to system administrators and technicians who are rarely qualified to make educational decisions, and worse, the decisions that are usually made are made for technological expediency; what is easiest to install and administer, or what is readily available. As such, there is very little evidence of appropriate use of technology predicated on educator literacy for the variety of reasons described above, without even worrying about the politics of institutions or the corporate pressure.

I have hinted at the process by which I learned about technology. Technological learning is for me an oral tradition and a social act. Everything I learned at Datacrown came from example and spoken word. The 'education' I was given formally at Datacrown, after I hosed the systems with my 'start stupid' commands was in one sense an anomaly, but most of what the courses taught me about data concepts and Job Control Language covered material I had already either guessed or observed or been told about.

This experience was confirmed at the CAWC. I learned from people and used manuals as reference materials and sources of facts, not knowledge or wisdom. But at this point the Internet became an additional tool for the oral transmission of information and example. As the present point in the development of computers and related technology,

text is the primary mode of communication, with graphics, video, and audio still beyond the capacity of most users to create and share. Because of this situation, text must carry a greater responsibility in the act of communication than in our analogue world. The oral and sensual component of communication, and the spoken stories we tell, must be conveyed, when using computers, through text. The oral information was presented textually, of course, as email or Usenet news postings or conversations in virtual environments. I contend that these are forms of text-based orality (writing what is grammatically structured as a spoken utterance), rather than electronic epistles due primarily to their casual spontaneous and interactive nature. Only longer posted documents, white papers, and websites represented a form of written cannon of the Internet. Electronic text is not obviously immediately narrative and perhaps the modes of thought and composition involved in producing e-texts reflect a wider diversity of experience than it does in our multi-sensual analogue world.

FEUT & OSEE (1991-1995)

The next step in my journey occurred when I got to teacher's college, the Faculty of Education of the University of Toronto to be precise. The one reason that I like to believe facilitated my acceptance was that I bowled them over with my application. There was a question that went something like: "Why do you want to be a teacher?" To which I replied: "I do not want to be a teacher. I am a teacher and have been for as long as I can remember. What I *would* like is to become a better teacher, a more professional teacher, by spending a year with like minded individuals and experienced educators at F.E.U.T." Well, the wording was not exactly like this, but this is very close to what I wrote, and I am sure that the original is better than what I have here.

This was an interesting year for me, individually and technologically. The day before I started classes, I had been released from hospital. I had spent the previous few days in Princess Margaret as a bone-marrow donator for my brother who had some form of leukemia. I know that I am over sensitive, but no one warned me that I would be a physical mess for four full months. Just ask my partner, Yuka, about it. I would collapse every evening as soon as I got home. I could not walk up stairs, and I ate a lot! When I was conscious, I was as vocal as ever.

In a fit of bravado I had also joined in Professor Don Gutteridge's "Alternative Program One: Gifted Education" at F.E.U.T. This meant a few interesting things: I would take all my core participants with the same group of people, many of whom were also in my English and Environmental Studies courses; I would teach one day a week in a gifted school on top of my courses and practicum; and, for me, that gifted school was University of Toronto Schools (UTS) adjacent to the faculty.

This special program meant that I was more fully immersed in the community and activities of the faculty. I was intensely involved with other program members (many of whom I still see regularly), was teaching at UTS, and had a mentor in the form of Don Gutteridge. This was a bad combination when it comes to boosting Jason's confidence and curiosity. I was immediately puttering about the computer lab, a pathetic mix of out dated technology. At least that is what I thought coming from the CAWC, I now realize that this was to a large extent a valid reflection of what was in schools. There was also a special media lab restricted to general student use. I do not know how many minutes it took me to convince myself that I was not a general student. It did not take much longer for me to talk the computer centre folks into the fact too. In the end, I was reconfiguring machines to my needs, modifying software, using the scanner and toys, learning my first bits of desktop publishing, and all around getting into useful and educational trouble.

I was bored. I was warned by my stepfather that I would be bored. He was finishing a 30+ year career as an English education professor at Queen's University. His warning consisted of telling me that if I did not find my own way to make my own meaning of the experience of F.E.U.T. I would find none. Fidgety and unchallenged by the classes, I turned my energy to mucking about with computers for release. Once again I was searching for meaning and learning experiences through the chaotic increasing of complexity of a situation through creative disruption, also known as skillful resistance (Finke and Bettel, 1996).

The UTS students used the computer centre for their journal projects, which I ended up editing. This got me access to the server. As well, I had them use an Arthurian video game I had found to teach them about medieval studies. But most importantly, I got to interact with another computer administration group. I had much more interaction with both PC and Macintosh computing platforms, and was more often asked to help fix

various things. This was also the place where I really realized how important the Internet was. These machines did not have any reasonable Internet access. Their software was out of date, and I could not easily update them by downloading *fixes* and *updates* off the Internet as I do now. There was not enough human support for the machines. The entire project was not taken seriously by the people who funded it, leaving the poor people who administered it constantly rushing about just trying to keep things on their feet.

Technology appeared to me as something perpetrated on the faculty and students, it did not come from them, it was not sensitive to their needs. It dictated. It was never responsive. This was of course reasonable, as we pre-service teachers were more interested in our practicum placements, and we would be gone in months. We were being processed through a system that would never see most of us again; pushed into a provincial educational system that did not, at that time, want us. From my own position, however, the lack of regard for the technology as a whole was problematic, and I had sympathy for all concerned. To me, if it was not done right, as I saw the CAWC to be right, then why bother. My experience had been instilled in me through what I had learned at the CAWC about what I guess I can call the ‘user imperative’ of computers in education: If the technology is not benefiting the users and meeting their needs according to their own criteria, then it is probably better not to have any technology at all. I do hate how this conflicts with my thoughts that many computer users do not have sufficient understanding of technology to have valid criterion.

Interestingly enough, three of my four practicum experiences involved computer use. My first experience was at Riverdale Collegiate. The immediate problem was that my practicum *was* to teach Environmental Studies, a course that was not offered in the school at the time. I had 2 weeks to teach grade 11 and O.A.C. Biology. The last time I had studied biology myself was in grade 11 when I completed the then grade 13 curriculum, getting a modest B in the process. This time, however, was a wonderful experience realizing that I could indeed teach a meaningful lesson on a topic that I had only learned the previous night. I also reconfigured the department head’s hard drive, and loading new software, and figured out for the first time in the department, how to hook up a TV camera to a microscope so that students could show their discoveries with each other.

Technology made me a better teacher, not because technology was itself better, but because I got better opportunities to teach and flex my creative muscles.

My third placement was at the Scarborough Board of Education's outdoor education centre near Kearny, Ontario. I taught cross-country skiing, maple syrup making, and orienteering. But at night I was reconfiguring the director's hard drive, and loading new software. Some things never change, as I still do this for some of the members of my committee. Now you know you are all of an august lineage. Reviewing my practicum evaluations, both mentors noted with enthusiasm my work in front of the class and on the computers.

By the end of the year, I got a job compiling the 60 odd F.E.U.T Environmental Studies student's curriculum projects. This involved taking each disk, copying all the activities into a directory for each Mac and PC, converting all the Mac files to PC, and the reverse, then creating two master disks, one of each flavour. It was a job I repeated for a number of years after I left the faculty. However, I had an experience which reminded me of the wall of administratium that I now have decided to spend the rest of my career circumventing through virtual learning environments.

The most important event to occur during my tenure as a student at F.E.U.T. was when Bill Andrews, my professor's mentor, showed up in class to push his environmental organization, and a new curriculum project. He looked at me and another person in class saying something like, "Jason, we need someone like you to help us manipulate the files. Talk to me." That was probably the single most important sentence in getting me to the point of writing this thesis.

By September 1991, 3 months after graduating, I was writing curriculum, editing, desktop publishing and of course massaging Mac and PC files for the Ontario Society for Environmental Education's "Infusion Model Curriculum Development Project." I worked on it for almost 4 years, ending up as co-project director, recipient of lots of hardware, semi-professional DTP (Desktop Publishing) person, and with the experience necessary to get into OISE/UT when the time came. I even got an award for distinguished contribution to environmental education in Ontario in 1999. The contents of the project was distributed on CD to over 1200 high schools in Ontario, and then archived on my Noisy server (<http://noisy.oise.utoronto.ca/osee/>). It has now become the centerpiece

part of “Towards an Ecozoic Curriculum II: the Canadian Environmental Education Digital Collection” (<http://achieve.utoronto.ca/ceedc> and <http://collections.schoolnet.ca/environment>) funded by Industry Canada’s Schoolnet. Aside from learning all the bits and pieces of curriculum writing, editing, project management, and CD-ROM production, the biggest learning experience was an intense distrust of technology.

One day, a short circuit in my printer’s powerchord traveled from the printer to my computer via the scsi port to which the printer was connected. You may notice that you do not see scsi printers any more for some obvious reason. Anyway, the shock completely destroyed my hard drive. Dead. However, I had a back-up hard drive. It was only completely erased! I was too shocked to scream or cry. I just looked at everything for a long long time feeling dead inside. Over \$200k and 2 years work by 20 teachers had gone up in smoke.

I learned a lesson in redundancy. It seems that I had been printing the project at a school at which I was teaching, and had neglected to erase a copy of the files that I had left on a computer there. I copied all that data back to my original drive. I ended up losing only 5 days work, just because I had copied the files to another machine and had not removed them. I now leave multiple copies of everything everywhere, just in case. It is the ultimate permission to never clean your virtual room.

This is a lesson that I have not forgotten to this day. I have 2 Unix servers, an 8 gig hard drive on another machine; my portable computer, a 2 gig removable for the portable, and 3 CD-ROMs of my work up until the spring of this year. All of these sites contain copies of my thesis work. As a result, I can recreate most of the work that I have done up to specific points without having to shoot myself when a hard drive crashes. The goal is to make sure that anything that is important is too important to leave in only one place. I like to build this redundancy into my teaching and information technology design. It forms an important part of my most recently funded project, the “Virtual Assignment Server Environment” (VASE), presently under development (<http://achieve.utoronto.ca:4444>).

A Mac of My Own, and a Place on the Web

When I finally got my first Macintosh computer that I bought according to my needs and specifications, I realized that I had finally made a commitment to the Macintosh platform. This was sometime around 1992. My little MacLCII was my rocket. But I was still unconnected to the Internet. I was still at F.E.U.T. at the time, I think, as well as at the CAWC, and I got it into my mind that I would like to have a real Internet connection. I could accomplish this using something called PPP or Point to Point Protocol. A co-worker at CAWC was also interested, so we started work on it together. This may seem anti-climatic for some, as PPP is now one of the standard modes of connecting computers to the Internet, but it was definitely not common at the time. The people at Computer Services at York University were also playing with it, but had not made any decision on when they would implement it or support it for general users such as us. We were on our own. As a result we spent a total of six months, browsing the Internet newsgroups and ftp servers looking for resources and information with which we could make this PPP thing work. The combination of the fact that the technology was beyond our capabilities, and the fact that the people who had control of the servers to which we wanted to connect were not willing to 'do it for us' left me with a long term commitment to play and experiment or wait until the wave caught up with our own needs.

Up until this point we were still using technologies such as Kermit and Zterm to connect to a Unix server from which we could run programs such as telnet, gopher, ftp, Emacs, Usenet newsreaders and email programs. We could run more than one program at once, but we could only interact with one program at a time; the inactive program sitting in the background suspended. This was an untenable situation when PPP would allow us to run programs directly from our home computers, in essence making our computer one more node on the Internet, the holy grail of connectivity. In fact, PPP as much as the WWW made the Internet explosion explode.

Months of trial and failure got us continually closer to the problem, but more importantly we were necessarily gaining a greater understanding of how all the parts of the Internet went together from a more technical, and also social perspective as we scoured the sites asking questions, and starting to help others with answers based on our experiments. And when we finally hit pay dirt, the first functioning PPP connections, it

was almost anti-climactic. For a while we both knew it would work, as soon as we got the correct combination of software and settings to allow our computers to talk to the greater Unix world on which the Internet mostly ran. We had the Internet in our hands; running Macintosh clients for mail, telnet, Usenet email and IRC chat clients directly from our homes.

This facility did represent a form of power or control over our digital environments, but I do not think it was of the same kind that represented the desire to control. It was the desire to remove ourselves from the control over us by the Unix server and the system administrators who controlled it. This was a level of autonomy that I never wanted to relinquish, and probably directly led, a few years later, to my desire to have my own server and MOO. The Internet became a personal social environment with which I could interact according to my own needs, not those of an administrator. There were clearly issues of governmentality and control over my own space. But I am not sure whether I was taking it up in a Foucault or Virginia Woolf vein. Perhaps both as the notions of space and observability, his Panopticon and her 'room of one's own' function intertextually in conceptualizing the construction of MOO-space (Foucault, 1979; Foucault, 1980c; Foucault, 1991; Woolf, 1921, 1990).

As I mentioned Usenet, I was reminded of one of my jobs at the CAWC. At the CAWC, we had ongoing debates regarding privacy and censorship, especially in terms of Usenet. Usenet is an uncontrolled communication space that has a lot of the problematic diversity found in society itself, with the added catch of everyone having an equal opportunity to voice whatever she or he sees fit. The women who made up the directorial committee of the CAWC were concerned with the access to pornography and later hate literature that they were making available to their students, but at the same time they did not want to exercise censorship over students. This was also a concern for the university at large, worried about the legal issues that stemmed from both censorship of academic work and exposing students to objectionable materials. Usenet was the source of the problem. The Alt.* hierarchy of topics contained many pornographic groups in which members posted erotic/pornographic images and text. Later this extended to the WWW.

It was finally decided, and I fully agreed, that we should not, and really could not restrict access to Usenet groups. There was a legal problem that I became aware of due to

my work with the Toronto Freenet (TFN). TFN lawyers had noted that if we restricted access to material that was offensive *and* made this known, we may be legally liable if offensive material got onto the site. We were advised that we could actively discourage access to some materials, but not actively ban materials for this reason of liability. However, we could separate the groups that we considered legitimate for student and faculty research and communication from the groups that we did not see as legitimate. We would make our preferred list easily available to students, and leave it up to students and faculty who wanted to access the other groups to figure out how to do it for themselves. Our logic was such that most users would stick to what we provided, and probably would not have sufficient technical ability to find the other material. It was not enough for us to separate the groups according to the existing Usenet hierarchy, but we had to go through and look at all the groups and make a decision on a case by case basis. Further justifying our act was the fact that at that time there were over 8000 groups (there are now over 20000), and many of the other groups that were not of interest to our users, such as many technical and scientific discussions, would not be appropriate for our humanities and social science users according to my bosses. Groups like comp.sci.C++.announce were as unnecessary as alt.binaries.pictures.bestiality. And this auditing job fell to me.

I had to go through all 8000 groups to create a list of about 500 that we would present to students. As mentioned above, many were easy to remove. Most groups not focused on humanities and social science issues were removed. But groups like comp.language.japan turned out to be important discussions on how to communicate electronically using computers. And groups like alt.lesbians were potentially important research and social forums. Alt.sex.stories.moderated was also something relevant to studies in literature. The experience was one of the best learning experiences for me. I did not realize that variety of topics to be discussed, and what appeared pornographic was often of social value. The satire of alt.binaries.bestiality.hamsters.and.ductape was an eye opener. One particular group threw me off. It was alt.sexy.bald.captains. I intended to check to see if it was a social discussion of queer issues, or a source of pornography. It turned out, on observation, that it was actually a discussion by fans of StarTrek: The Next Generation. The 'sexy.bald.captain' was none other than Jean-Luke Picard, captain of the Enterprise!

I had no end of fun telling people about this discovery on my part. And I was overwhelmed to learn that the only way in which I could make any judgement on my part with respect to anything I found on the Internet was to explore it and make an informed decision regarding what was important, legitimate or valuable without ‘believing’ any authority. Sounds protestant, I guess. The experience led me to the creation of my first web site in 1994, “The Dark Side of the Internet,” in which I brought together “the Good, the Bad, the Ugly and the Tasteless” (<http://achieve.utoronto.ca/tortoise/gbut/>) (Nolan, 1994). I found key objectionable sites, based on a criteria that they were objectionable to *someone* and stood as an interesting counterbalance to other sites I had found, online and presented them within an educational context so that educators could be encouraged to form their own ‘informed’ understanding of what was really out there.

Toronto Freenet (1992-1994)

In the 1992-1994 period I was also active with the Toronto Freenet (<http://www.torfree.net>). Freenets were springing up around North America and I was lucky enough to make it to the first public meeting. I joined the Schools and Universities sub-committee of the information committee under librarians Michael DeKoven (then Toronto Public Library) and Marian Press (OISE/UT). I constructed sites, in this pre WWW period for the Ontario Society for Environmental Education, and for environmental education resources in general.

I found the whole experience with the TFN extremely frustrating. Because of the availability of expertise and technology, the control of technology and access fell to the hands mainly of technocrats and technicians, not people like myself who were in the role of ‘information providers’. The frustration lead to battles, I think, among people higher up who wanted to *control* the process; my first experience with issues of governmentality and the series of issues of control over learning environments that concerns all educators. And wonderful email battles ensued. I finally gave up when the WWW and Mosaic (the first easily available web browser) came on the scene, as I realized that this battle for control was a barrier to the free flow of knowledge, information and experience. Some people running the organization were resisting what the WWW offered, I thought, and still do, that this was because of the threat of the lack of control that the web offered and

required. And I, realizing that I could get information out wider and more easily to a wider number of people, abandoned TFN for the wider world of the web.

This was a profound experience for me, and not only in terms of the exposure to mere issues of governance in online organizations. The key issues for me were the governance of *access* to resources and the governance of technologies for communications. With the TFN, control was clearly in the hands of programmers and administrators, and scant interest was paid to either educators or the general populace.

Japanese Language Processing and Community

Two of the Usenet groups that I haunted were soc.culture.japan and comp.language.japan. My partner, Yuka, was becoming interested in computers. She had worked with Macs in Japan as a project coordinator for a small advertising company. She knew about desktop publishing and design, and was indispensable in teaching me about the theoretical aspects of design. I had tried to make our NeXt computers run Japanese so that she could use them for her own work, but with no success. I decided to try again with my Mac, and the help of these groups. One member of the group, Ken Lund, was extremely helpful to everyone, pointing us to resources and providing help. I *learned* about the software I needed, and how to go about setting things up, but I could not *find* the software I needed. He suggested that I contact someone named Alan in Tokyo who was at a company that sold this sort of software. I immediately shot back, almost without thinking, “You do not mean Alan Kastner, do you?” He did. I had met Alan twice in Toronto a few years back. He was a friend of my best friend from my undergraduate years at York. And he had moved to Japan on a government scholarship to study literature. I got his email, and reestablished contact. I am still in regular contact with Alan almost a decade later, and we regularly visit when I am in Japan or he comes to Canada. We have even become camping buddies, as described on one of my social web sites: <http://achieve.utoronto.ca/noisey/kayak98/>. Alan was also a good friend of Ken’s, and together they got me the software I needed. And helped me through the setup process of making my computer speak Japanese. This was a very creative experience, since all the documentation was in technical Japanese which Yuka could not and would not deal with. Often I would just stare at incomprehensible text on my screen and try to configure the

software based on my growing understanding of the Macintosh Human Interface Guidelines (Apple Computer, 1987). The guidelines are much more rigid and consistent for the Mac than for any other platform, and I found that I could get 99% of things done just by realizing that the incomprehensible options before me were basically the same as the English ones I understood. I could ‘guess’ my way through the installation of software, and only the most Japanese specific options required me to ask Alan and Ken for help. Japanese language processing required the use of different font encoding, which I knew nothing about, as well as a Front End Processor (FEP) that converted the simple keystrokes of the western QWERTY keyboard (so named for the first six characters on the upper left of the keypad) into the complex Japanese characters.

It worked, and Yuka was able to use a special word processor we bought to create Japanese text. More on Yuka’s ascendancy to Internet stardom later, as her story speaks to issues around configuring technology to the needs of the users, not the users modifying themselves to the technology; an important factor for COLLIDE. As I was just getting to the toughest parts of the configuration of the environment, Ken announced that he had just published a book called *Understand Japanese Information Processing* (Lunde, 1993). I rushed out to buy it and was shocked to learn that my friend Ken Lund was THE authority on the subject, working for Adobe Systems and actually involved in designing systems and fonts for computing in Japanese. I had the world authority helping me with all my tiny local trials and tribulations. I could not believe it. Internet *community* struck again. I redoubled my thanks to him, but probably the best thanks I could give was in my action. What I later realized was a ‘return to service’ according to Drake’s (1992, 1993) ‘journey model of curriculum development,’ the process Drake describes in her model where the experience and learning in individual undergoes leads to a sharing of the learning and experience with others, I started to spend copious spare time helping others on the two Usenet groups with the simple problems that Ken and Alan had helped me solve. My thanks to them came in the form of taking on some of the easier tasks of answering newbie questions and helping people so that they could concentrate on the harder questions and issues. I became a low-end expert, a facilitator between the professionals and the community at large. This is a role that I have kept through out my professional career as an educator involved in technology.

The Whole Internet User's Guide and Catalog

Ed Kroll's 1992 book, *The Whole Internet User's Guide and Catalog*, was for me the first coherent guide to the Internet (Krol, 1992). This was of course 2 years before I got to OISE, while I was out on my own teaching high school, and continuing my work up at York University. The word *Whole* in the title was extremely important then because the book allowed me, and no doubt others, to get a sense not only of the diversity of the net pre-WWW, but a sense of the interrelated cohesion of the parts. It was the first time that I saw the entire Internet as a large social event; as a social act of communication. And most particularly, I realized that hundreds of thousands of other people thought about the net as I did. I was not freeloading on an academic research tool for my own needs, we were the source that kept the pieces together. Computers were to the Internet what the telephone was to the world of telephony, the conduit. Krol's book showed me that others before me realized that the Internet was about *putting people in touch with people* and the things they create. It was not a cold and abstract space, it was as intimate and social as being given permission to rummage through other people's filing cabinets and desk drawers. Well, FTP was rummaging; Telnet was like borrowing a coffee maker or lawnmower; Talk/Write were like shouting across the courtyard to the neighbour; the TinyMud was like a local pub; and email was just like mail. These were not new forms of communication, but relocalized forms of social discourse and interaction.

The Whole Internet, as I thought of it, showed me places to find farmer's almanacs (<http://www.almanac.com>), literature sites such as Project Gutenberg (<http://www.gutenberg.net>), and a myriad of other folksy and social sources for information and communication like the intercultural TWICS (<http://www.twics.com>) in Tokyo, and the WELL (<http://www.well.org>) in San Francisco. None of these addresses are the original ones, of course, as all these sites predate the World Wide Web. They would have been telnet, gopher and FTP sites. Krol fleshed out my skeletal view of my personal experience. There are now hundreds of books on the Internet, but Krol's was the first of this kind, and an important historical document of what the Internet looked like before the WWW took over in 1994.

Yuka on the Internet

My partner Yuka is probably the individual who I have spent the most time observing. From the first time I got Japanese Language Kit 1.1 up and running she was a hostile user. The computer had to prove itself to her as worth bothering with. She had no love affair with the computer; no desire to learn about it for its own sake. No vision to its potential or possible use. When I tried to interest her in new Internet tools or software, she would just laugh at me, play along for a bit to be polite and then leave me alone. The best I could get was for her to sometimes be willing to translate a word or two while I was installing Japanese language software, or fixing something that was broken. Everything she took part in, was based on her own immediate needs; to the rest she was indifferent.

She started with a word processor, Nisus (<http://www.nisus.com>), which was the only one available at the time that was multilingual, and still remains one of the best word-processors I have ever used on a computer. She refused even to learn how to find missing files, or to back it up. My job. She soon wanted to read email, not because I was doing it, but because of some external social interest, someone asked her if they could send her some email; and my job was to make it so. And I did. I think our role was an early experience that trained me for my work at OISE later on.

Later, she asked me if there were any way to view Japanese language web pages on this computer, as she had read about a web site that she wanted to visit. I got a Japanese compatible version of some browser and got her set up. The next step was to know if she could make a web page, because she had a lot of information that she wanted to share. She handed me the files and left me to it. Her site called “Lucy Maud Montgomery in Ontario” (<http://noisey.oise.utoronto.ca/lmm>) was quickly set up with all the information that was unavailable in print, and it was popular. Very quickly people in Japan knew about her site which now averages about 100 hits a week; about 20,000 hits since it was set up. Before she knew it, a Japanese Internet magazine *Doors* flew a journalist up from New York to interview her about her site for their magazine(Matsumoto, 1996). I was a technological facilitator for her work, nothing more. She had a sense of what she wanted to do, and my job was to “make it so”. Her new site, <http://www.YUKAZine.com> now averages 20k hits a month, and is a research forum for scholars around the world.

Technologically, she got all my cast offs, and the way in which I was able to buy new computers was to suggest that she needed a new one, up until one day about two years ago (spring 1998) when I showed her a picture of the new iMac computers that were coming out later that summer. She looked at it, and pointing to her computer said, “Get rid of this one, and get me that one.” pointing at the iMac. This was the point at which our use-dynamic changed. She wanted a tool that fit her needs-use assessment (personal assessment). She now wanted total control of her environment, and I was pleased but wondering why. This is where I came up with the conclusion that those who know the least about technology should probably have the best. And those who really know technology could make the most out of the least. She got the best and remains in the lead.

I realized that the technology had reached a point at which she could maintain her disinterest in the inner workings of the computer, but still make it respond to her own needs without my facilitation. She now designs and builds her own web pages, controls her own email environment, does her own scanning, uploading and downloading, leaving me with the systems administration of the Unix server on which everything is mounted, but then again, that is what a system administrator should do for all the users, so it is not much of a departure from traditional use. I respond to her needs, not she to mine.

Her writing on the net has taken off. Aside from her pages, she has been writing a monthly article for a journal of translation in Japan, emailing her scanned images and text off regularly. Now she has converted all this material into a book for another publisher, under the title *Akage no An wo kakitaku nakatta Mongomeri: Anne and After*, published with an initial print run of 4000 copies (Kajihara, 2000). She still knows nothing about modems, hard drives, ram, or coffee machines, but they all move to her needs and will. And though I would not call her ‘computer literate’ according to my thinking, she is a sophisticated user. And someone earning a significant part of her income from her online experience. She is also now the most active web researcher at the library in which she works, excelling all the librarians with their Master of Library Science degrees.

Why is this the case? I think that it was because she had a ‘techneducator’ to make the bridge between what computers were able to do and what she wanted to do, up until the point when the technology itself closed the gap, putting me out of business. And happily so. This is one of the learnings that helped me to develop my notion of what a

teacher should be capable of doing with technology, especially at a graduate level. Most of the teachers I have met fit most closely into Yuka's pattern. She has an honours degree in Education from Kagoshima University, by the way. And I think that most of them, passing themselves off as technology educators *should* fall more into my camp; mostly because they should be facilitating this sort of learning in their students as I facilitated it with my partner. From working with Yuka, the first seeds of my notions of the *techeducator*, and later the COLLIDE engine were born.

Two important experiences that we shared in the web based world were focussed around Yuka's interest in Lucy Maud Montgomery (LMM) the author of *Anne of Green Gables*. On moving to Canada and starting to work at the Osborne Collection of Early Children's Books, Yuka was continually asked about the interest that Japanese had in LMM, and she set out to do research on her own about the issue. Seeing that there was not much information about LMM's life in Ontario, where she moved at the age of 35 until her death, led to her building the web pages. In 1992, I helped her edit an edition of a Japanese magazine called *Ika* focussing on Canadian issues, and I had the opportunity to contribute an article on LMM materials available on the Internet (Nolan, 1993). She translated it into Japanese for me. And later, in 1994, we discovered an email discussion list called Kind_Spirits. We wrote about our experience with the list, and the development of the list over the past 4 years in a paper co-written with the list's founder Jeff Lawrence, for a conference on LMM in 1998, published in *Canadian Children's Literature* the same year (Nolan, 1998). Our collective development and research into LMM dovetailed with our co-learning about community on the Internet (Nolan and Weiss, (In Press)).

This was her first social community online, and her skills as a researcher and desire to share information made her an integral member of the list, answering questions, making polite corrections, and coordinating information on her web site. And as a result of our paper we established a new list, a moderated one, specifically for LMM scholars around the world. (<http://noisey.oise.utoronto.ca/lmm/list.html>). To Yuka, the computer/Internet experience was a social research tool, nothing more. And her example further helped to convince me that the *real* value of computers were in their interconnectivity and the

ability to put people in touch with people. As computers facilitated this, they were of important social value; not isolating people, but in bringing them together.

Her most recent work is also a socially important one, as part of her therapeutic support for a close friend of ours, who is living with breast cancer. Yuka encouraged her to write about her experience, edited her work, and help to get it published in two Canadian Japanese newspapers. When our friend was depressed about a reoccurrence of the cancer, Yuka took it on herself to develop a web site to republish the articles and keep the writing momentum alive (<http://achieve.utoronto.ca/sadako>). Of course this has served not only to encourage our friend, but to also ignite interest in women's health issues among the Japanese community, and the 1000 visits to the site monthly has lead to the publisher of at least one of the newspapers, the *Nikka Times*, to realize, and admit, that there was a lot of interest in women's health issues by the Japanese community, and to undertake to provide more resources for the issue. The site has recently been recognized as one of the best Japanese language websites on Breast Cancer. This is some of the work which I am most proud to have participated in, despite my peripheral role.

OISE Day One (1994-)

I would like to turn to 1994. I had a choice: go to OISE to study environmental issues, and hopefully land the pre-service job at FEUT. I went to OISE into the Transformative learning program in the department of Curriculum Teaching and Learning, the closest thing to environmental studies available at OISE at the time, but with my eye to computers. I was going to study MOOs and look at what I remembered from Apex.

Just like my time at Datacrown, as well as all through school, my method of interaction was the same. I started thinking I was the least intelligent and capable student, and that everyone else knew what was going on. Just like every time before, the eternal child thought that with the doctoral program, he would finally find himself joyously floundering amid high powered intellectuals and doers, and if he could just keep up he might learn something. With fear and trepidation I made it to my first classes with the usual self depreciation. I think it was in Joel's class in which, when it came time for us to give our names and self introductions, I said, "Hi I am Jason. I am a flake." But maybe it was Ed Sullivan's class. On proofreading a draft version of this thesis, Gary Babiuk told

me that it was both, “I know, I was there.” By the time the introductions had gotten to me, I think I realized that I was again in the same sort of learning environment I had had all through my life. One in which I could gaze out the window, say whatever came to mind and be well rewarded for it, at least by the students, and some of the staff. Joel unfortunately listened to me, so he could trip me up, so he was someone to whom I had to submit work with the expectation of some attention to details.

OISE courses quickly collapsed for me in terms of being a challenge, but it definitely is/was a rich learning experience. Most of the learning happened in the hallways, administration offices, and of course the pubs (Eisner, 1985). And strangely enough, not in my chosen program of “Transformative Learning” or even within the Computer Applications program, but through just thrashing about with the core curriculum folks.

In 1994, OISE was then still a semi-independent organization before it was consumed by the University of Toronto in 1996. I was startled to learn that the computer I would have access to was an aging VAX machine. I never wanted to learn how to use it, being comfortable with my stable of tools on the platforms I already knew. To my delight, I found that OISE had recently obtained a new Unix machine called Tortoise, and had, what was to me then a ‘state-of-the-art’ system. I quickly enrolled in two computer courses, and started to work to learn about education and computers in the first computer courses I had taken since my high school experience, breaking my vow to Mr. Payne that I would never take another course in exchange for being passed in my grade 11 Computer Concepts course. One course was fairly technical and the other was an online course that was mostly conceptual and philosophical. I was a bit shocked to learn that I knew more than just about everyone in the course, except the instructor. He of course had vast experience on the conceptual side of education using computers, and on the technical side, which was changing at every step, he always remained at least a month ahead of me.

While he was teaching students how to create Gopher sites, I was already to jump onto the WWW, and convinced him to allow me to substitute a web site for the gopher sites that everyone else was doing. I may have been the first student at OISE to create a web site for an assignment. It was not that groundbreaking, I guess, but it was for me. The graphical web browser Mosaic had been out for a couple of months, but there were

no real resources out there to learn how to do things. No manuals, no style guides, and certainly no specialized programs with which to make web pages.

I browsed the few pages out there and found that I could look at the source code and guess what the function of the tags were. By trial and error, I started to make a page, then link my pages together, and finally link to external resources. The first page was “The Dark Side of the Internet” which I described above (<http://noisey.oise.utoronto.ca/gbut>). I wish I had it in its original form. It would be a very interesting document. I was doing everything ‘wrong’. I was misusing some tags, and ignoring others. But the pages worked, and the course was a joy. Most of both courses involved helping others and getting help from others. I found that my greatest joy did not come from my ability to make web pages, but in revisiting the role I had at the CAWC, helping others work through their problems, learning by helping.

The other course I was taking at the time was a mandatory course in Curriculum. I really needed it, having no experience at the graduate level in education, unlike many of the other doctoral students. I hoped to do a computer-based project for the course, and suggested it to the class, as we were starting to discuss projects. Unfortunately the only people who wanted to work with me on the project were so overwhelmed with technology, they had nothing but love for it, and I, through my last decade of experience was somewhat more critical. I did not want to worship the net, but use it for something useful.

One other group was planning a project in community and learning. Gary, a principal from Alberta, and Lilja, an educator from Iceland were joined by Tracy, an enthusiastic educator. They needed one more member to complete their group. I quickly dumped my project on the people who had joined me, and went to this non-technical camp. It was a stroke of genius on my part. They were interested in what I was interested in, how communities of learners form and develop. And more importantly the role that education and learning should take in a community. We all agreed that learning needed to be ‘delinked’ from schooling and that the learning environment *must* be at the centre of any community (Cayley, 1992; Illich, 1970). We talked at length about how we would like to structure an entire community, a real town or village, such that it was centred around learning and the bringing up of children. The curriculum of community was our focus,

and it fit in with everything I had discovered on my own. I knew that I wanted to see how communities developed online, and how I might construct a community in a MOO. This turned out to be my single most important course at OISE, because of this clarification and solidification of my somewhat random ideas under the influence of these three. I now knew what I wanted to do with a MOO, and why I should bother with it. I could experiment with and model the ideas that we four discussed in a way in which we would never be able to in a real community.

My earliest notions of what I wanted to accomplish in working with people in MOOs was based on what these three had taught me. What they taught me was that education as a community and communal act that should not be divorced from real communities. The four of us spent hours in various pubs drinking beer and constructing models of community-based learning that tried to be inclusive of all elements of learning that a community required in order to maintain its own existence. We played with notions of a community that was self-sufficient in its own learning, from prenatal learning, through delinking traditional schooling from professional administration and returning it to the community context and needs, through to adult and geriatric learning environments. I do not remember the specifics of the discussions, but I remember how we envisioned a community that was itself the total classroom, with the traditional classroom dissolving into a supporting structure for the entire membership of the community. The classroom was extended, in our thinking, to the homes, stores, streets, offices, farms, fields and playgrounds of the community, and no aspect of the community experience was divorced from participation in the learning of its members. As such, school-aged students would move freely from learning about abstract topics of mathematics, language skills, sciences and technologies immediately into the community contexts in which those new learnings could be contextualized and solidified into real life experiences; at the same time returning to service in the work done throughout the community.

This seamless sense of what we envisioned education to be able to accomplish was in once sense Utopian, and describing how it would work would be a dissertation in itself. Gary and Lilja had attempted to enact elements of this model within their own teaching environments; Gary as a junior high school principal who recontextualized his whole school experience in a holistic paradigm, and Lilja worked with her students over three

year periods, bringing them into her life and home at times, and entering into her student's development in a way that firmly contradicted the compartmentalized and corporatized administration of learning in which the rest of us taught.

While we all *dreamed* of both living and teaching within the imaginary space we created in our conversations, we all recognized the systemic and structural limitations inherent in trying to realize such a vision. I however was struck by the congruency between the community we imagined and the virtual spaces I had visited in various MOOs. I could see how the MOO space conducted itself like a self-contained community, though a space that was connected by members to other MOOs through various mechanisms. I realized that I might be able to experiment within MOOs with the notions of holistic learning community as we had collectively envisioned it. To play with a total learning community. This could be a way to learn about how individuals might start, grow, function and govern itself as a community¹⁷ (Nolan, 1998; Nolan and Weiss, In Press). “*Virtual communities* are social aggregations that emerge from the Net when enough people carry on... public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace.”(italics in original) (Rheingold, 1993, 5). And witness, as a participant, how the community might succeed or fail based on the members' willingness and ability to encounter learning throughout the virtual space.

I was looking for a way to start up a MOO. I had temporarily run one from my own account, just to see if I could do it, and had tried it on two other machines. My professor at the time did not seem to show any interest in synchronous communication or MOOs, but was more than accommodating of my requests. I was not sure, however, that I should be looking at MOOs, as times had changed, and perhaps technologies had too. On reflection I was probably just covering my butt by making sure that there was nothing better out there. I read everything I could find about Muds, MOOs, Mushes, and Muse on various FAQ files. I also frequented the IRC (Internet Relay Chat) which I had tried a few times while at York, but had not pursued, since it looked so ‘silly,’ inhabited by undergraduate male students trying to pick each other up while half of them were

¹⁷ I take up the idea of online learning communities in a more sustained manner (Nolan, 1998; Nolan

pretending to be female. I did find one channel, as they are called, that I participated in for about a month called *Thirty Something*. It was an interesting community. Two women, one in Europe and the other in Australia ran the list, and it was primarily women centred, but males were welcome if they were able to keep their hormones in check. Most males were adult, many single parents or married. None of them were on any hostile ranting mission. It was a quiet place to discuss things pertaining to being over 30; movies, raising children, or any other light topic. The two moderators served to keep the list open and available, and to boot out any trouble makers such as showed up regularly. Though I liked the openness of the list, as well as the regularity of the members, I felt that I had trouble with the environment itself. It was too flat, merely text floating across the screen. It was a chat line; linear, chatty, and not really the place for more than light conversation. There was no room for depth of the conversation, nor development of the environment itself. IRC is not *user extensible* (the user could not easily expand/extend the environment) in any sense of the word, though you can construct IRC-bots for various purposes, as well as form your own channels, and even run your own server (Leonard 1997). I felt, personally, that the discourse was as flat as the interface was plain. This did not mean that intelligent and important communication cannot happen in an IRC or Chat space. But I do mean that if it happens, it is not as a result of a feature of the space itself or a participant's development of that space. The discourse must be driven continually from events outside of the space, and as long as the energy is applied externally, then the communication will be maintained. Remove the external stimulus and the communication dies with it.

There are no internal referents with which to drive communication or community. There is no self-generated discussion that brings into the discourse a discussion of the space itself. An IRC chat space is not a virtual environment so much as a digital one (Nolan, 1999). The communication may be facilitated by a server and exist in 'chat rooms' but the lack of life of the 'room' itself suggests that these are metaphoric spaces, not virtual ones. Henri Lefebvre's question of whether language creates or describes a space can almost be playfully answered on the negative on both sides by looking at the

interactions I experienced on IRCs (Lefebvre, 1974; Wertheim, 2000). The metaphoric digital space is one where the space is given a pretense of existence in order to aid navigation and use by a person. The IRC channels could just as easily be phone number-like, numerical referents. I do not want to go too far into MOOs at this point, but the virtual space in general can be described as one that is no more or less metaphorical than reality. Suffice it to say that the IRC held my interest for about a month, then no more. Whereas MOOs had already held my interest for years, and the time was coming for interaction.

A MOO of One's Own

As have mentioned already, I did set up some MOOs just to see if it could be done. I was able to, very easily, download the software and the database file from a computer at Xerox (<ftp://parcftp.xerox.com/pub/MOO/> now <ftp://ftp.lambda.moo.mud.org/pub/MOO/>), and load it on to Tortoise. The instructions were easy to follow, and within an hour I had a MOO running. I was scared to keep it running for long, as I did not know if I would get into trouble, or if the stress that the MOO was putting on the system was going to be noticed. I remember being given an account on two other computers, Porpoise and SDAC3, for a while to play with the MOO for a bit, but there was no indication that this would be a production MOO at this point.

I had wanted to have my own server to run the MOO on, as I did not feel comfortable with the machines I had access too. Tortoise was not meant for my sort of use, and the other machines that Computer Services had access to, and were willing to let me use, were not suitable.

After about 8-10 months of playing with the MOO, and getting help from the MOO-COWs email list I was ready to invite people in.

This is a story about three people who became interwoven into MOOoise (the first name for MOOkti) during a time of great trauma and worry for me. I know that none of them actually, or virtually, ever met each other throughout this weekend, but they swirled around me and MOOoise in a rather remarkable display of community.

About the middle of the spring during my second year at OISE, I was contacted by a masters student. She was doing her thesis on Second Language Acquisition, in this case

French as a Second Language, and she wanted to see if it was possible to use MOOise as one of the locus of research. We met, and I agreed. It has turned out to be the only graduate thesis done on a MOO at OISE except this one you are reading of course.

What her plan involved was the bringing together of a group of young students at OISE on a Saturday. The students would participate in two activities. One was for them to carry on a conversation with another student for about 20 minutes in the presence of a tape recorder. Students were expected to speak to each other in French. The other activity was to repeat the activity in a virtual space with a virtual tape recorder. Students were expected to type to each other as a text-based conversation.

The student and I had discussed the fact that I saw text-based synchronous communication as a hybrid between written and spoken communication. We were, in essence, writing spoken communication, versus just writing, or speaking written forms of communication in the MOO. I saw this, having been a second language teacher of English on and off for over 8 years, as a novel and important learning situation specifically because of this hybridity. In some contexts students have skills in one form of communication and challenges in another. With Israeli students I worked with at York, they had excellent speaking skills in English, but problems with their written skills. Japanese speakers of English, on the other hand often end up with written skills that far exceed their ability to communicate orally. I thought that text-based environments such as the MOO would allow both types of students to use their strengths while working on their weaknesses.

We set a date for the research, and I got everything ready. I had to build a number of rooms, one for each student pair, and got conversation/data recorders ready and installed and tested in each room. That done, there was nothing left for me to do except to sit back, enjoy the show, and get some free pizza.

That was until I was unable to connect to the MOO all of a sudden. I think that this was Wednesday night. Having access to the MOO knocked out by some divine act does not bother me much any more. It happens too often. But this was my first server and first MOO. I was traumatized. I trucked on up to OISE first thing Thursday morning to find dozens of people milling about. There had been a fire! The building looked fine from the outside, I thought. And people were lined up at the door. As I made my way to the front, I

was stopped and told that only faculty and admin staff were being allowed in. I quickly mumbled something about my server, and was told that the fire had been in a transformer room, knocking out power to the building, and no one had any idea when it would come up again. Devastation. How were we going to get the research work done? I caught the eye of Avi Hyman, and he got me past security and I told him that I needed to be able to unplug NOISEY (my server) in case it was damaged by a power surge when the electricity came back on.

After I got up to the office, past a dozen or so teenagers ferrying 20 liter cans of diesel fuel up 13 flights of stairs to keep the emergency generators going, with the aid of security with flashlights who were both helping people through the dark halls, and making sure everyone got only what they needed and got out, I got into my office. NOISEY was too heavy to move. It had arrived on 2 skids and weighed about 70kg. I unplugged it and left. As things were a little calmer when I got downstairs, I was able to catch Avi and a few of the computer people taking a break. I told Avi, and all who would listen, about our plans for Saturday, and asked for help. I thought that if I could find a place to move NOISEY to, and get help moving it, and then reconfigure it to the new local LAN, I could get it back up and running. But that did not help the research student. She had 20 kids coming in and we needed a classroom with computers too. Avi went to talk to the boss, Bob Cook, who had been head of computers at F.E.U.T. when I was there causing trouble. On this day he was wearing shining armour. Without batting an eye, and amid the insanity of fire damage control, I was told not to worry. Bob got on the cellphone, called Tim (a guy who was in the teacher's college program with me) and after getting assurances as to his availability told me that he would arrange to have the computer room at FEUT opened Saturday and a room reserved for Heather, and as long as I could figure out how to get my computer moved over, I was back in business. I was overjoyed and left thanking everyone profusely and making plans. I have since come to realize that Bob excels at solving these sort of immediate problems.

I immediately got home and onto the Internet and got ready to post my story of what happened to MOO-cows, the email discussion list for those who administer MOOs (<http://www.the-b.org/moo-cows/>). While walking home, I realized that instead of figuring out how to move NOISEY down 8 flights of stairs and over to another building,

that I might be able to beg some MOO space from someone on the Internet and conduct the research there. I thought that this would be an excellent opportunity to test how the supposed open community of hard core Internet programmers and MOOers responded to a crisis. What I was asking was not, I thought, minor. For someone to help, they not only had to give me access to their machine, I could get this at any public MOO. They had to be willing to provide me access, and also permission to build objects and link them in a way such that the research participants were isolated from the distractions of the general MOOing public. I had to be able to set up accounts for 20 research participants, all owned by me so that I could set their connect location (their home) to the correct research room. All this and I needed active help in accomplishing the task because my research plan exceeded my ability to implement it.

I contacted the student and told her what had happened at OISE. Of course her panic exceeded mine, though not by much. She had gone to great lengths to get permission to conduct research on these kids and coordinate with their parents everything necessary to get them delivered to the research site and picked up again. There was no way that she would be able to just reset the date. But when I told her what I was brewing up she caught my fever. If we could pull this off, then it would be quite wonderful. I quickly got off the phone, assuring her that I would get back to her as soon as I had an answer from the folks reading MOO-cows.

Well, I got many responses immediately. Offers of access and support. I was certain that someone would come to my aid, as what I was asking in terms of help was not that difficult, just beyond my capacity. One was from someone at the University of Toronto! Someone named Chris Teplovs. He had a small moo called EcoMOO and was willing to give me wizard access if I wanted it. This was excellent. Local access, no longer needing to try to connect to a MOO on the other side of the planet. And to discover someone else at the university who was interested in what I was interested in. I quickly posted a thank-you to everyone on the list for their support and offers of help, and got to work on EcoMOO.

The rest is somewhat anticlimactic. I rebuilt the rooms we needed, and Tim opened the F.E.U.T. computer labs, and I helped the student conduct her data collection. And that was that. She told me that her research showed that the students communicated more in

the virtual space, and that this communication was more complex and varied. But I felt sure that this was due to Hawthorn Effect; the novelty of working on computers in virtual spaces created a situational motivation effect where by the novelty of the context motivated them to try to do more work and produce better quality work than they would without the external motivation of the environment itself. But then again, I think that the Hawthorn Effect is just another excellent teaching tool, and as I like to say to researchers, “maximize Hawthorn and maximize motivation.”

I remember it taking about a week to get Noisey back up and running, and all the damage at OISE repaired. But for me the damage was longer lasting. I had once more had my preconceptions of the technology community skewed in favour of a view that they were a bunch of mindless *altruists*.

Cosmo, Cosmites, and Aquamites: the Spammy Bits

One night a person named Cosmo showed up on the MOO looking for one of our casual extra-OISE participants. This person was struggling to set up a songwriter’s forum that never really got off the ground. She was not there, but I was, and so was Dave. We chatted with this Scott Snyder person, and seemingly that evening he was hooked. He got his character, Cosmo, and started building and learning about the MOO. He was a natural. He loved the theatrical nature of the space and the dynamic nature of the interactions. He loved to play. We quickly formed a bond different from what I had with the other MOOers. We would write little bits of code that would shoot forth interesting messages and do funny things. Cosmo is a much better programmer than I am, though he and I are more interested in the ‘spammy bits’, functionality that is playful and creative, rather than the more formal database and infrastructural work that Leigh and Traveller excel in. He fleshed out most of Chateau MOOkti for me, filling it with pubs with robotic bartenders and drinking objects. One pub has a bartender called Merrill Lynch with the head of a bull who pours himself a beer anytime anyone orders one for themselves. He also built a ship that traveled between the MOO proper and the Icelandic subsection, providing a sense of travelling to a different space.

Of all the people I worked with, Cosmo seemed to show the greatest joy when he was made a Wizard. I think that he really takes the experience and position seriously, though

nothing we do together is really that serious. Many of the projects that he has undertaken have been very important to my work in education, however. He implemented the sketchy designs for the EcoMOO field-study simulation, and later modified it to become the Aquatic fisheries simulation. We called them Cosmites and Aquamites. But with Cosmo I found a kindred spirit interested in making the place seem more full and richly imbued with life. Of course the fact that Cosmo was working on his MFA in theatrical design and acoustics probably had something to do with this. And he was able to combine his experience with MOOs and graduate work into his present position as an acoustic designer for Accolade, a major producer of video games. Cosmo is also part of the Achieve project, helping me corral our 'spammy bits' into a useful context for use by the various projects. And he will be active throughout the life of Achieve working directly with project participants providing them with the bits of code they need to manifest their designs.

The Division of the Environment of the University of Toronto, DivEnv as we call it, has been breaking ground in the use of technology largely through the efforts of Chris Teplovs, now working with the CSILE project at OISE/UT. He invited me to the Division in 1996 as a consultant in web based learning materials. The next year, I was hired as the Associate Educational Coordinator, teaching a third year course in Common Pool Resource issues. Working at the division gave me the opportunity to develop my teaching at the undergraduate level, and also experiment with various knowledge media in a teaching environment.

I noticed, about this time, that technology had a certain expediency that could not be passed up. The realization started back in the fall of 1994 or 1995 when my high school friend was an executive with the relatively new Discovery Channel in Canada. He invited me in one day, as an Internet expert, to discuss with the powers that be the direction that the station should go in terms of its viewer outreach. I was there representing the Internet, and on the other side of the table were the guys who marketed those little boxes you see in bars that are hooked up to TV screens and allow you to answer questions and do quizzes. That day, I argued that the world wide web was the only way to go for interactive user content, and that anything that did not meet users head on in an interactive manner would be dead before it reached production. The Internet won the day,

and I was asked how much an Internet Director for the station expected to be paid. Having been prompted by my friend, I said that anyone who would accept less than \$65-85k for the job would not be worth hiring, but that regardless, I was not interested in the job myself. This was for two reasons. I realized that as soon as the net is working in a corporate environment, it is more often than not a job for accountants and middle managers, not a congenital loose cannon like me. As well, I realized that as soon as you drop the word 'technology' in front of an idea, and say that you are going to use computers and Internet technologies, people's eyes glaze over, they froth at the mouth and start giving you a pile of resources (OISE/UT being the major exception here.). I knew that I could not do anything legitimate here, just more fancy web pages, chats, and an underhanded attempt to subvert the Internet from a *prosumer* environment to just another passive, top-down, geewiz extension of the TV set. *However*, I was not so thick that I did not realize that I could slide in legitimately novel curriculum and learning ideas into areas where they might not otherwise be accepted if you buttered it up with a healthy dose of technology to make it look all shiny and new. Technology **is** my medium of subversions. At least for this and the coming decade. I can take up issues of the environment and curriculum and any other thing I want if I am willing to slap a graphic user interface on the front and couch it as a new use of technology. And though I am now tiring of MOOs (you heard it here first) because of the specific inherent problems of governance, I remain convinced that using technology to subversively direct a curriculum agenda is the high tech equivalent of candy coating medicine for kids.

With the Division I was able to bring MOOs into my teaching for the first time. The first experiment was with an aquatic fisheries simulation called Aquamites (<http://www.cquest.utoronto.ca/enc/env321y/97-98/aquamite.html>). This project was a virtual simulation of a technique for estimating fish populations. The second project was the development and testing of the Virtual Assignment Server. This server was an engine for the creation of web based templates which the students used for a multi-media assignment on urban design (the template is at noisey.oise.utoronto.ca:9996/3078 (login id required), and the products are at: www.cquest.utoronto.ca/enc/env321y/97-98/mod4). All students were given identical assignment templates that they used to input data in the construction of their group project. All materials were maintained on a central server,

allowing them to access their work from any of the three CQUEST (<http://www.cquest.utoronto.ca/>) computer sites around the University of Toronto campus. When students completed their work, they had to only click on a submit button at which point the instructor, me, would be emailed a message stating the exact time that each project was finished. At this point the project was immediately mounted on a public server, and the students were no longer able to edit their work. The key advantage was that students were given the opportunity to conceptualize their evaluative projects as public documents that were published. This was hoped to provide students with a sense that they were involved in creating meaningful documents for public use, rather than the traditional sense that essays were produced for the consumption of the instructor evaluating them, and were worthless beyond that point.

The funding I recently received from this year's ITCDF (Instructional Technology Courseware Development Fund, also called the Provost's Fund) was for me to take this pilot project and develop a full standalone version of this Virtual Assignment Server Environment (V.A.S.E.) that would enable any instructor at the university, or anywhere for that matter, to create their own assignment template and make this template available to students for their own projects. This is being tested presently in Achieve, and will be released this fall. All the bits come together in the end.

I realized much later that Chris, who had provided me with the MOO to use during the OISE fire and later hired me at the DivEnv, had heard about me from someone and was on the look out to meet me. I assume that this interest predated the fire. But I am not sure. What is interesting is that Chris wanted me to take over the EcoMOO project, initially providing funding for EcoMOO. This funding allowed us to do the first generation of the MOOoise/MOOkti graphical interface as well as build the field study utilities (the core intention of EcoMOO) and the MOOcaJava applet¹⁸.

Chris and I started communicating more regularly after the fire, and he was rather interested in MOOs. He was, at the time, the Educational Coordinator of the Division of the Environment, an undergraduate multidisciplinary program at the university. A doctoral student had approached Chris with the idea of creating an environmentally

¹⁸ An applet is a small Java-based mini-application that usually runs inside a web browser.

focussed MOO and they had gotten as far as laying out some of the topology of the space and describing the project's functionality. Chris wanted us to take over the project and finish it up. He offered us \$10k from his Hypermedia Modules Development Fund to do the work. I jumped at the opportunity, as it was much easier to go with this than to go through the process of getting money from a source such as Schoolnet. Later experience with the Achieve project showed me just how true this thought was.

In retrospect, I suppose that Chris was looking for the opportunity to dump the project on someone who had a hope in getting it completed, but at the time, I thought that he was actually interested in collaborating. I think he termed the situation "throwing good money after bad" in the hopes of completing work that he had taken on without fully realizing what was involved. Regardless of the motivation, things got underway and we divided the money between Leigh working on the MOO core, Dave continuing work on the MOOcaJava applet, Traveller developing web based editing tools and Cosmo doing the actual development of the EcoMOO site. We quickly realized that this opportunity had a dark side. The actual virtual simulation was insanely difficult to implement. The project involved simulating the process of estimating species population through the technique of trapping, marking, releasing and recapturing members of a group and then calculating the results. The hard part was creating this population and getting it to move around the research plot in a realistic manner. But Cosmo and I were as dogged as we were, initially, ignorant of the problems to be overcome. I think it was a major learning experience for us both. But we got the job done; Cosmo doing almost all of the coding, and I doing most of the conceptualizing, testing and encouragement. And everyone else in the background laughing and encouraging and helping out.

To my knowledge, EcoMOO has never really been used, though we are brushing it off and porting it to the Achieve project as a potential project for students to work with. We were more successful with the next phase which started after I started working at the Division myself. In 1996, Chris hired me on as a contract curriculum consultant and web designer. This was a wonderful time where I played with html and JavaScript and got to experiment with a variety of different ways of presenting html material, as well as playing with MOOoise. The following year I was hired to teach a course, ENV321Y, a third year course in Environmental Issues, focussing on Common Pool Resources (see

International Association for the Study of Common Property, www.indiana.edu/~iascp/). This is a course I still teach.

We had the opportunity, and a little more money from the Division of the Environment to adapt the EcoMOO project to a course specific application for ENV321Y. We developed the Aquamites, an implementation of the EcoMOO that used ponds and fish, instead of insects, to coincide with the fisheries section of my course. All 40 students ran the simulation over a couple of weeks, measuring fish populations in their individual ponds, and estimating fish populations. Then as a class, we presented the results and discussed issues and problems encountered by fisheries scientists in estimating fish population, and the impact of their estimates on the decline of Cod in the East Coast Fisheries.

Overall, the Aquamites simulation was successful, but for me, I saw it as something of a failure. I realized that to get students to work on such a simulation, without a fair bit of experience in working in a virtual environment was just too confusing for most students. On the whole, they saw the activity as confusing and stressful. I think that the lack of an integrated and intuitive virtual environment was just too complex. And even with my tutorials and extensive support of student interaction, the environment itself was just not ready for this level of involvement. I took this experience as guidance when considering the Achieve project, resulting in my insistence on creating a graphically sophisticated and intuitive environment out of this prior experience.

At some point I started feeling uncomfortable with my work with MOOs at OISE. This was particularly with reference to the areas of OISE that were involved with computers and computers in learning. There was always a sense that though everyone put up with me, and did help me solve many problems, for which I am of course forever grateful, there was a profound ambivalence with not only MOOs but my work with them. One professor on my committee could not be interested in MOOs in any manner that I could discern, I eventually, and amicably let him off my committee later. The folks who ran the computer services, now the Education Commons, who were so helpful on a day to day basis with little things, were not as helpful in an administrative sense. Numerous times I applied for funding from the ITCDF which required that all proposals be ranked by one's home department. I continually ranked last, with the unofficial response that

OISE did not consider my work important in terms of the overall funding and curriculum strategy of the institute. This response was despite the fact that I did have a faculty member as the primary name on the second proposal. I might jump forward a bit to say that my most recent ITCDF proposal, submitted through the Faculty of Arts and Science was funded, giving me \$4900 of the \$5000 that I requested.

At the time, I was frustrated beyond belief, at this apparent lack of support, especially since I got support from OISE for technical matters. I decided to change the name of MOOoise to reflect this situation, and in the end adopted Cosmo's suggestion of the name MOOkti, based on a Sanskrit word Mucti meaning to release or set free. I do think that the ambivalence was not personal, but situational. One senior OISE administrator hauled me to the carpet over the SchoolNet proposal that resulted in Project Achieve because I had not gone through the proper channels, and I was a student to boot. It was difficult for me to find a place at OISE that did not conflict with its traditions, power and administrative structure.

My fortunes changed one day when a professor, Lynn Davie, sent me email expressing his interest in using MOOkti in a couple of his courses. He had had experience with MOOs in the past and thought that he would like to extend this opportunity to his students. I was thunderstruck, "All is not lost for OISE!" I remember thinking.

I quickly asked Lynn to be on my committee to fill the gap left by his less interested colleague, and he tentatively agreed. Lynn was exactly what I needed. He allowed me to participate in a number of his classes over the next couple of years, and we ended up collaborating on a couple of papers as well (Davie, et al., 1998; Davie and Nolan, 1999). The latter paper forms the basis for the section on the theatrical nature of teaching in MOOs presented in a modified form in the next section below. Lynn's experience with adult and online education is extensive and he was a prime influence on my conceptualizing my dissertation proposal in terms of teacher education and experience in virtual spaces. Lynn had an ongoing project called Project Cool (<http://noisy.oise.utoronto.ca/projcool/>), 'cool' standing for 'cooperative online learning', and he was able to provide support funding for the building of the broken PC we rebuilt as NoisyII to replace the original Noisy computer I had had on loan from

IBM. He was a knight in silicon armour both in terms of support and my own understanding of what I was trying to accomplish with MOOs and education.

With Lynn's students I finally had a large body of regular visitors using and extending the MOO. These students were all experienced teachers, and interested in learning about new technologies, and a few of them even had experience with MOOs prior to visiting MOOkti. I was able to work with them online and face to face on a regular basis over the various thirteen week courses and build a sense of what I might conduct research on for my dissertation. When it finally came time to conduct research, Lynn actually proposed a 'special topics' course in MOOs to allow me to work with 'advanced' students focussing on MOOs for the entire duration of the course. Who could ask for more? The actual research conducted is described elsewhere, but the sense of community and emotional communication that I got from working with so many of these students on MOOs gave me an understanding of what MOOs and teachers could do together, and unfortunately what they could not. They did excellent work, and as far as I can tell found MOOkti to be a valid learning experience. More importantly for me, they forced me to face up to the limitations of both teachers and MOOs at this point in time. The limitations that I saw to be placed on teachers were primarily the amount of time they were willing or able to invest in exploring the intricacies of the MOO environment and programming, and their limited prior experience playing with computing environments. The limitation of the MOO environment rested with the fact that the learning curve required to program had too many elements that had to be learned simultaneously. And realizing that I was not going to be able to change teachers, I would have to change the MOO and educational technology, based on their and my own observations. This led to my conceptualization of the techneducator effect, the modifications of the MOO environment found in Project Achieve, and the development of COLLIDE.

Examining the MOO Research Environment via a Theatrical Metaphor¹⁹

In the spring of 1999, Lynn Davie and I started work on describing our collaboration in MOOkti, teaching his students in and about virtual spaces in a paper presented at an online conference that itself took place within a moo “Doing Learning: Building Constructionist Skills for Educators, or, Theatre of Metaphor: Skills Constructing for Building Educators” as part of the TCC conference in Maui, Hawaii (Davie and Nolan, 1999). Lynn chose the metaphor of theatrical design to describe and situate our experiences within a model that would be more apprehensible to readers, by situating the experience within a metaphor easily understandable to the average reader. And I filled in the theatrical template with all of my notions of what I was trying to accomplish as a student, teacher and researcher. Lynn imbued the paper with his decades of experience teaching adults and educators both online and IRL, primarily through his casting of the MOO experience within the metaphor of the theatre (Andrusyszyn and Davie, 1996; Davie and Inskip, 1992; Davie, Abeygunawardena, Davidson, and Nolan, 1998). I am indebted to Lynn both for his guidance and direction, as well as for his permission to include our collaboration as part of this thesis story.

It was Lynn who really brought my thesis research into high gear when he contacted me to request permission to use MOOkti in his courses. This request brought me into the context of graduate teaching at OISE/UT and beyond, giving me access to research participants. Lynn brought me into the context of his courses and teaching experience in working with adults online. Although my role was nominally one of researcher and technology developer, I see the role to have been one of privileged student of Lynn’s pedagogy and practice. This was particularly beneficial for me, as I had never taken a course with Lynn, and had no sense, before we started working together of what kinds of learning environments he creates, of his curriculum, and his intentions for his students.

Lynn’s work is founded in the traditions of adult education and facilitation of community learning in face to face contexts; environments that I had imagined to be important loci for real community based learning when I had worked with Gary, Lilja and

¹⁹ An early version of this section was presented as a virtual paper entitled “Doing Learning: Building Constructionist Skills for Educators, or, Theatre of Metaphor: Skills Constructing for Building Educators” was presented by Lynn Davie and Jason Nolan at the TCC conference,

Tracy during my first courses at OISE/UT. I took the ideas formed with the help of Gary, Lilja and Tracy with me as I started up MOOoise, later MOOkti, in the hopes that I could see such a community develop among educators and casual members who participated in the MOO community. But on my own, I did not have the position within OISE/UT, being just another student, or the experience in facilitating community to make it happen. As Lynn and I negotiated our roles, with his students, he adopted what we came to describe as the directorial role, and I created the notion of the techn'educator or technical director. I was able to find a position that I was able to embrace to both contribute to the community and learn about how my philosophical conceptualization of how a inclusive model of a community as learning environment might be played out in the symbolic space of MOOkti.

To return to what Lynn and I were engaged in, I think that Lynn was clear in his mind that the intention was to embrace Turkle's (1995) notion of MOOs as symbolic spaces. Aarseth notes the value, although limited, of MOO characters, objects and discourse as "symbolic capital" in the "different types of symbolic exchanges and rituals" of both institutional and subversive environments and a "Derridean *supplément*, an addition to or expansion of privileged modes of social interaction" (Aarseth 1997, 144-146). This notion worked well for us in a restricted educational context, and we were able to describe what occurred within the real life context of the design and management of a theatre space. In this section of my dissertation, I draw very heavily on this paper. The experience of constructing the paper allowed Lynn and I to, for the first time, co-construct our collective notion of what we were both separately attempting to accomplish, in concert with our students. For my dissertation, this work stands as a thick description of what the interaction with OISE/UT students was able to conceptualize and accomplish under the conditions of a graduate course.

In this virtual setting, we worked to help our students learn to communicate within a text-based virtual environment, to work with the concept of navigable spaces, and finally to build MOO objects, some of stunning complexity. The educational goals were normally to think about the cognitive and affective educational impact of virtual

environments and to learn to construct information-rich learning environments. Our use of the CVE moves beyond simple discussion to the enactment of constructionist learning spaces. Papert (1991) defined constructionist learning as adding a social component, a public performative element to constructivism:

Constructionism - the N word as opposed to the V word - shares constructivism's connotation of learning as 'building knowledge structures' irrespective of the circumstances of the learning. It then adds that this happens especially felicitously in a context where the learner is consciously engaged in constructing a public entity, whether it's a sandcastle on the beach or a theory of the universe... If one eschews pipeline models of transmitting knowledge in talking among ourselves as well as in theorizing about classrooms, then one must expect that I will not be able to tell you about my idea of constructionism. Doing so is bound to trivialize it. Instead, I must confine myself to engage you in experiences (including verbal ones) liable to encourage your own personal construction of something in some sense like it. Only in this way will there be something rich enough in your mind to be worth talking about. (Harel and Papert, 1991)

This metaphor of the creation of a theatre space has been noted before by Davie and Inskip (1992), and is outlined below. It is a place where we can construct and play out microworlds that allow students and instructors to examine what is and what might be. We invent and learn conventions of social discourse. We capitalize on the ambiguity of the environment to probe into our understandings and our learnings.

Some students and visitors find our learning environment compelling, most find it difficult at some point in the experience, but all find it has broadened their ideas of what it means to teach online and in real life. Our environment has the characteristics of play and imagination--of invention and exploration. Many of our students find the environment freeing and exhilarating. Some find it confusing and trivial. Yet, Lynn and I feel that we have been successful in reaching objectives not easily achieved in any other environment, and this sense is something rare and worth nurturing in the development of learning settings.

In our description of the theatricality of our experience, we first set the stage, developing an understanding of the background and generating a sense of context, continuing with the script, the course activities and challenges we set for the students. Then we take up issues around the roles inherent in our theatre. In performance, our experiences as co-educators leads to a wrap up of our theatrical presentation with a curtain call.

Our theatre work is in MOOkti, an educationally focused MOO designed and maintained by an unfunded group of volunteer programmers, independent of direct faculty control. MOOkti is hosted on Noisey, a patchwork computer made of odds and ends connected to the Internet at OISE/UT. As a virtual environment it contains characters and room descriptions of a wide variety of settings, as with any MOO. However, our classes are not the only occupants of MOOkti. In contrast to most collaborative virtual learning environments, it was intended from the start as a semi-public (as opposed to a semi-private) environment where our graduate education students must learn amid communities of writers, undergraduates, wanderers, and programmers. However, we have constructed a number of virtual rooms that serve as the home base of our educational experiences, a couple of **rooms of our own**, in which we can contemplate virtual pedagogy in relative peace (Woolf, 1921, 1990). Within our educational wing, called Lynn's Learning Lounge, we have an informal space (lounge), a lecture hall, and breakout rooms. We also have galleries, sculpture gardens, museums, pubs, and a wide variety of public and private spaces. In addition, we make provision for each student to construct a personal space that they can use for their own educational projects.

Our room descriptions seek to convey a safe space, welcoming and inviting. Descriptions often include humour and wit that seeks to set people at ease. We want to engage the creative, to unlock the exploring child within us. Or for those who do not wish to return to that period in time, the open-minded maturing adult within us. For example, the description of Lynn's Learning Lounge reads:

Lynn's Learning Lounge

The lounge is a pleasant, comfortable room. In the Northwest corner is a stack of pillows that can be used to sit on the floor. Along the west wall is a conference table with comfortable chairs, and in the southeast corner is a cluster of three couches. The beer cooler is quietly masquerading as a filing cabinet.

Obvious exits: out to Chateau MOOkti Mezzanine, down to Exhibition Space, up to Lynn's Lecture Hall, staff to L³²⁰ Staff Wing, east to L³ elevator, and north to Visual Literacy Gallery Reception (MOOkti, 1998)

People can access MOOkti from any Java capable browser, using our MOOca and MOOcaLite clients, and our web interface. In addition, one can telnet to MOOkti or use a variety of other MOO clients. At present MOOkti has stabilized at a constant size, as this table shows from the output of the @moostats query command entered at Sun Feb 7 17:53:26 1999 EST.

MOOkti was created 3 years, 10 months, 10 days, 7 hours, 15 minutes, and 12 seconds ago.

A new player is created here every 6 days, 4 hours, 20 minutes, and 51 seconds.

A new object is created here every 9 hours, 4 minutes, and 39 seconds.

MOOkti is home to 228 players and 3,726 objects.

We have a relatively consistent turnover of students, and a fairly stable core population of community members. Depending on the number of OISE courses offered in any one term, the population fluctuates between about 225 and 350 users.

Communications

The communal plot varies for each course according to the level and goals of the participants. However each plot usually contains three levels of constructionist skills that confront students as a series of challenges to ensure that they have the opportunity to develop a shared body of experience in the short 12 week period that students will be

²⁰ L³ is computer nomenclature for L³ or L cubed. In this context it represents LLL, an abbreviation of the alliterative name 'Lynn's Learning Lounge'.

working together. Before new participants can walk, we need to learn to communicate with other actors in the MOO (See Appendix A for introductory curriculum). So the first challenge is always designed to help students learn to speak, to communicate non-verbally, and to use the paging system in the MOO. One must learn to see who is online at the same time as we are, to join them and to talk with them. Then one learns to shake hands and to communicate using a wide variety of social verbs, such as waving, hugging, nodding, etc. Then next step is to learn to speak and to whisper, then learn to make sense of a synchronous conversation with its relentless scroll of messages. Next is learning social conventions of when to speak and when not to speak. Some of these lessons are easy and some are hard.

These skills take time to learn. One of the things that Lynn and I have learned in working with students is to leave enough time for them to develop communication skills in order to provide the foundation that will enable students to move swiftly onto more sophisticated tasks. The class generally meets in class once a week, and Lynn and I schedule a number of challenges in the form of discussion topics, generally over a period of three weeks. At the end of this time, most students feel comfortable in the MOO and can move and communicate with some dexterity. We all break classes down into groups of 4-5 students and direct these small groups to discuss topics appropriate to the specific course. Lynn asks recorders to summarize these discussions and to place a report of the discussions on an asynchronous conferencing system.

Navigating

After three weeks, we feel that it is time to work on skills related to the spatial metaphor of the MOO. In a MOO you move from one space to another. We **go** places. When we construct our own personal spaces it is “somewhere” and we go to then and from them. This geographical or spatial metaphor is as essential to the design of a synchronous system as it is important to be able to separate discussions into manageable chunks. If a small group of people could not **meet by themselves**, the resulting class-sized discussion would have too many participants. We subdivide the online participants into separate rooms in which they can communicate without distraction. If you and I are not in the same room, we cannot see each other’s contributions. In order to talk with you,

I must move into the same virtual space that you are inhabiting. Most students, in fact, most people in general, are not used to educational computer applications that use a spatial metaphor, so it is important to provide them with activities that help them to develop skills in negotiating not just virtual communication but also virtual topology.

A virtual topology refers to the layout of the virtual space as constructed by its participants. The topology of MOOkti was guided by the metaphor of a chateau and the lands around it. It included buildings, villages, mountains, fields, a coastline, and an island. There are no limitations, however, to what form the virtual topology can take. Some MOOs, such as LambdaMOO, in the form of a giant house, are single buildings. project Achieve has no consistent topology, leaving to the various projects the choice of creating a topology local to their own members' choice. There are no de facto restrictions, and an interesting experiment would be a space that did not depend on cardinal points (North, South, East, West) for defining its space, but rather used a mathematical or emotional topology.

Students learn the commands for moving their characters without too much difficulty. What is difficult is navigating, of knowing where there is to go, why you might want to go there, and how to get there. At present there are 655 rooms in MOOkti. At first glance a simple solution would be to provide a map of MOOkti with indications of how to get from here to there. And in fact, there are maps created by some students and placed in the MOO that can be helpful. However, MOOkti is a **user** extensible collaborative virtual environment. At any given moment, anyone connected to the moo can decide to be a builder, creating new spaces, extending, modifying changing MOOkti. A map is out of date before it can be completed and posted.

More importantly, our learning objectives for the students are to encourage exploration, of meeting the unknown. We think it is hard to build, to construct your new knowledge without knowing something of what already exists. So we provide hints of where to go, things to see, things to do. But primarily we encourage self-exploration by setting the challenge of a treasure hunt.

First, we divide the students into teams. This is important since we need to develop the social support system that encourages exploration. We see this treasure hunt as a kind of **Outward Bound** experience encouraging teams to help each other and to go beyond

where anyone in particular would have the time or interest to explore. We ask the teams to find characters (people and bots--programmable robots (Leonard, 1997), to locate spaces, to fetch virtual things. We ask them to map their own virtual universe. This treasure hunt lasts for a couple of weeks, and it is often highly energetic. We deliberately don't specify whether the treasure hunt is to be competitive among teams or not. We encourage each team to work collaboratively, but leave inter-team dynamics to chance. In some of our courses, the teams have been competitive and in some they have helped each other. We see no difference between the collaborative and competitive teams in terms of the learnings achieved. Both kinds of teams developed a high energy, a high degree of bonding among team members, and not incidentally a good grasp of the virtual terrain.

Building

Finally, we come to the collaborative skills of building and extending our virtual environment, a fundamental aspect of educational CVEs. Our understanding of virtual environments is that they can stimulate learning. Rooms can suggest puzzles, or provide information, or set social conventions that allow people to work collaboratively. Objects can be bots (interactive programs with which you can converse), or serve as slide projectors, or serve as recorders, or be virtual galleries. Objects are linked with web pages allowing for text, graphics, sound, or even video clips. Whatever can be coded to a web page, can be a part of a MOO object.

For the final part of each course, we set the challenge for the students to construct collaborative micro-environments that the class collectively agrees are educationally useful according to their own agreed upon criteria. In the beginning courses, these might be museum displays or static collections of objects that can serve as stimuli to learning. In the intermediate courses, we focus on tutorial constructions. Some of these tutorials have taken the form of galleries linked to hypertextual material with self-testing activities. In the advanced courses, we have built full blown educational simulations. The challenge *asks* the design teams to work together to create objects that stimulate learning. Note that we focus away from presentational activities toward objects that intrigue, that interest, that engage the learner. It is this switch from the teacher as presenter to the teacher as guide and designer that we hold so important. This is the reason for the MOO.

These learning micro-environments are added permanently to MOOkti. In this way, the work in the courses is not just temporary constructions designed for an instructor, but rather collaborative efforts that add to our mutual collaborative virtual environment.

These three challenges are carefully sequenced. Each challenge is at a level that builds on the skills achieved in the previous level. There is a challenge and effort required to expand what is known and can be accomplished within each level. And we provide the support for meeting the challenge. We try to help the students know that they are not alone, but that help is a collaborative activity in our MOO. We ask students to help each other, to teach each other and to learn from each other. In addition, there are many different kinds of people on the MOO who can help. You might meet a Wizard (one of the semi-volunteer programmers who administer the MOO) to help you with a particularly difficult problem, or you will almost certainly find one of the authors of a particular part of the MOO online and in the MOO to help.

The Roles

Maintaining our theatrical metaphor, we can specify a number of roles, the cast, that support our production. The participants have roles equivalent to the director, technical director, drama coach, and actors. As with the roles in a real theatre, each of our roles contribute significantly to the activity and learning of the collaborative virtual environment. Although the names of the roles are familiar, there are special meanings for each role in our theatre.

The Director (aka Lynn)

We can look at the instructor for the course as a kind of director. His role is not a technical blocking of where everyone will stand and how they will deliver their lines. Choices of where to go are mostly the responsibility of the actors as is how the lines will be delivered. Our director looks after the overall setting of the experience. He provides the challenges to the class, encourages, sometimes disciplines, but mostly talks to the actors about motivation. He works with the actors to help them understand the goals behind the activities. He links the experiences to the real world and helps the actors reflect on the meaning of the activity, the depth of their learning.

Our director leads by example. He models behaviour. He sits with those having difficulty. He praises those who have made significant progress. He helps integrate the behaviour in the collaborative virtual environment with our understanding of how adults learn, with the research related to knowledge building communities and other forms of collaborative learning. He is also responsible, finally, for the product, the performance, and the evaluation of that performance. In this sense, he is also perhaps the educator as critic.

The Technical Director (aka Jason)

The technical director (TD) is the expert in education in CVEs. He maintains the MOO. He knows how to find things in the MOO. He collaborates with the actors as they try to solve technical problems. But his role is not that of a technician. The *director of the technical* must first be able to direct and fulfil some level of the roles for which the director is responsible, but primarily when these functions are tied to technical issues. He provides links to thinking about the use of collaborative virtual environments. He is instrumental in maintaining the team of volunteer programmers (stagehands, in one sense, and the creators of the theatre itself, in another).

The Acting Coach

We were extremely fortunate to have had several different coaches during our work with the MOO. These individuals worked with students in the laboratory. They helped people learn to use the software, and they provided knowledge and skills about collaborative learning. They were essential emotional and intellectual supports for people challenged by the new environment. However, the role of acting coach goes beyond the specific teaching assistants. Any actor worth her salt will sooner or later accept the mantle of acting coach. This is perhaps the essence of this particular constructive aspect of the theatre, that we are all actors, but everyone who stays throughout the performance will end up with a coaching duty to perform.

The Actors

Anyone who takes part in MOOkti is an actor in our metaphor, just as ‘All the MOOs a Stage’. Certainly, the students are actors, and the rest of the participants cannot have

any efficacious interactions without acting at some point. They have their own motivations for participating. They perform actions, their characters develop over time. Each actor's character has a description and optional special functions. The actors meet each other in the role of citizens of MOOkti. We walk (or navigate) through the set, talking, hugging, waving, bowing, helping. We try to model the behaviour we wish to stimulate, the roles we have chosen to act out. And finally, the many other people who join our community everyday are unwitting actors in our production; though we may also be unwitting actors in theirs as well. The unwitting actors are casual visitors or members of MOOkti who are not part of any course. MOOkti is a public space, open to anyone in the Internet who comes by. Sometimes these other actors are simply background, but at any moment, they can become a principal actor in our ongoing drama. They might stop to help you learn how to do something having switched into the role of an acting coach, or they might ask you for help. This constant interaction is an important part of making the MOO a dynamic virtual microworld instead of a sterile designed educational simulation. We feel that the variety of actors brings a sense of involvement to each of us who work in MOOkti.

The Performances

Time in a Bottle

We have learned from our experiences that the virtual experience of time and how we sense time varies from one person to another. This is more than time having a different meaning. Time has a different emotional loading for different people. The constructionist learning we undertake in the MOO requires a relaxation of the stranglehold time has on most of us.

Though learning to make and script a 'bot' may take many hours, the successful animation of your imagination can be extremely satisfying--time well spent. Yet the problem rests with our understanding as a society that time is a commodity. We say that we keep time, we spend time, we waste time. Too seldom do we say that we share time or that we invest time. We find that to truly learn you need to relax the boundaries of our time keeping. If we allow only a short time, we will be able to learn only shallow things.

Deep learning and deep meaning require us to suspend our constant accounting of time to follow our puzzle, to seek our understanding.

The commodification of time in education is a function of how learning is governed and regulated by administration, rather than a function of how learners make meaning (Foucault, 1991). The notion of sticking to a task until it is complete is fundamental to a CVE in which you construct knowledge and meaning, as well as in an environment where the learner is having to negotiate the learning curve of a scripted and programmable environment. But our own self governance does not allow us the flexibility to engage in a learning activity that does not have externally observable temporal limitations. For the k-12 student, the length of the period is the limiting factor. With the graduate student, education, career, family, and just being an adult in the modern world leaves little time to embrace a learning moment.

Yet working in a collaborative virtual environment (CVE), especially a user-extensible one such as a MOO, requires almost a meditative, reflective engagement with the environment. You must **spend** time, or as our director says, “Invest Time”, in order to gain a sense of place — a sense that you are in a place, not merely looking at a computer screen — and later purpose, and finally practice. The CVE must be muddled through, puzzled through, and pondered. This requirement is nothing that reality has not already been thrust upon us, but reality gives us time, from the age of 0-5 when school’s administration of school begins, to figure out what’s going on in reality. But of course, the administration of learning and the self-administration of learning by adults makes no such allowances. In this instance, MOO and CVEs do not represent a more temporally efficacious use of learning time, but one that is very much like reality in terms of the requirements of time invested for a meaningful outcome.

Pacing and Patience

Our experience has sensitized us to the need for attention to pacing. In our enthusiasm, at the beginning, we went too fast. What seemed simple for us to do, took more time for our students. While we were eager to get beyond the beginning steps to the things that seem far more interesting, we too often moved too quickly. It took us some time to understand just what a radical shift in perception working in the MOO was for

some of the students. If we moved too quickly, anxiety was increased and a sense of powerlessness set in. If we moved too slowly, a sense of frustration was too prevalent. Our solutions are two-fold: First, to design open ended problems so that the design problem could be solved at a number of levels. For the beginner, there was a solution at an elementary level. For the person who had advanced skills the solution could be at a more complex level. The second solution is to have patience and to monitor what was happening with the students. While we had a broad timetable for the experience, we did modify it as necessary, based on the progress of the students.

Role of the Technical Director

During our work, the need for a technical director (described above) has become clear. We make an important distinction between our concept of technical director and the more usual roles of help desk, or technician, or programmer. There may be a need for all of those functions, but the role of TD has some unique features. First, he or she is the nexus for conceptual development, the intersection between the educational world and the world of programming. Just as the TD in the theatre can bring a visual and spatial reality to a play based on an interpretation of the script, our TD brings a vision of what can be done in the MOO. He engages the actors in an imagining of possibilities not yet seen, and supports the actors as they develop MOO structures that accomplish their creative imaginations. A TD in the theatre has mastered the tools of the theatre, i.e. lights, scenery design, sound systems and can construct an illusion of a reality based on these tools. Our TD also has mastered the tools of the MOO (or knows where to find people who have the mastery) and he can work with the director to bring the illusion of the MOO reality to fruition.

What Have We Learned from Students? Techn'educators: Oh Strange New World, That Has Such People in It!

We recognized, as did our students, that the primary purpose of human-computer interaction in the 21st century is putting people in touch with other people. Technology is therefore primarily social and a communicative act, not a communications technology. People come first, their fears, joys, learning curves, plans and journeys. The TD's only purpose is to facilitate the manifestation of these personal and social events. Neither a

slave to the technology, nor the whim of the user, the TD is first a teacher, a director of collaborative virtual learning in this instance, and second a technician whose sole mission is to overcome the limitations that the requirements of technology place on what can be done.

The TD must prefer people to machines, and this is an issue taken up more directly in Chapter 5. This is something that we thought was true, but something that is less visible in the realm of online learning. We players on the virtual stage must become our own Technical Directors. We must be able to push the limits of the technology so that we may bring forth the ideas and learnings of our students.

This is not something left in the hands of Technical Support personnel. They should not be dictating what can and cannot be done, what software will be installed, when and how. Our students quickly realized that we were rewriting software based on their previous week's comments. That we were not merely users with more experience than they, but actually willing to spend endless hours with volunteer programmers to bring forth the new props and stage implements on which their pageants would stand or fall on opening night. This is, of course, what we had planned, but we had not realized how they would perceive it. What they saw was a new model for learning using technology. Through our agency, the technology was modifying itself to meet their needs. The educators were forcing the learning environment to meet the needs of the user, rather than fulfilling the traditional role of showing the student how to modify his or herself to adapt to the requirements of the technology. We did become co-educators and co-learners, as we learned how to ensure that our technology reflected the needs of our students while students themselves learned how to navigate through the new forms of learning and expression our theatre offered.

The Curtain Call

As cyberspace and virtual reality moves beyond Hollywood's purview, we need to relocalize it within our notions of learning for the individual and the community. And as computer technology gains in sophistication, we need to stretch our sense of what it means to communicate beyond the duality of synchronous and asynchronous into a polysynchronous experience that more closely reflects the diversity and complexity of

possible experiences found in real life (Nolan, 1998). The only way in which educators, researchers, and most importantly students can write their own acts into the ongoing productions of cyberspacial stage is for educators to. If the future slips through their grasp and into the grasp of corporate agendas the virtual community agenda will become a One Act template for interaction rather than a 'fringe festival' of learnings and interactions.

We hope that three years of observing how our students, who are themselves educators, learn and work in MOOs has readied us for the next move forward. In partnership with Canada's Schoolnet, and the Division of the Environment of the University of Toronto, we are embarking on Project Achieve, a three year experiment and research project that will make a MOO available to learners across Canada, and beyond. Our goals are to foster a sense of purpose and community through student-centred, developed and implemented projects. Our requirements are that students be able to use one of our templates to design any project of their choice, and then we will provide the infrastructural support to help them complete it. But it is up to them to set their own timeline and determine when they have completed the phases of their project. It is our hope that some participants will want to participate in a project that involves learning what it takes to run a MOO of their own. These MOOs they may create are not isolated places, but new locations for new communities to perhaps develop. And if students and their teachers create and run their own MOOs, they will have taken over the responsibility of governing and administering their own learning environment. As participants set up their own theatres of interest, action and invention we hope to learn more about the choices that people make and the goals they set for living, learning and working virtually.

"Today's children are growing up in the computer culture; all the rest of us are at best its naturalized citizens" (Turkle, 1995). The result of this 'state' is that many educators find it difficult to couch themselves as professionals, experts, or even educators, in the face of the experience that youth have in computer culture. And the other responsibilities placed upon educators makes it difficult for them to deeply involve themselves in new learning technologies. As the Internet has changed our culture, and specifically our educational culture, educators must seek to understand and become involved, or risk

losing their position as the social group responsible for 'teaching' the next generation (De Kerchove, 1995). However, if they choose to participate, this participation will challenge them to embrace notions of an educator/learner relationship which differs from what is normally found in formal learning settings.

The Techneducator Effect

The techneducator effect brings together the lessons I have learned from the past two decades, as described in the preceding narrative. I think that the problem that teachers have with technology is multifaceted. The problems stem from the nature of the profession itself, the present state of being a teacher in terms of the requirements and time involved in just doing the job, and the state of technology itself. I have always been somewhat affectionately hostile to the teaching profession. I think this has something to do with my being a dropout and my less than positive experiences as a student throughout secondary and post secondary school. So, my perspective may be strictly personal, but I think that much of what I think is generally transferable. As the stereotype goes, teachers are first and foremost successful students. They, for the most part, buy into the notions of what teaching and learning are in the post-Dewey world (Dewey, 1938; Dewey, 1990 (Originally 1902); Dewey, 1991 (Originally 1910)). They subscribe to the notions of the institution of modern education which is still primarily based on the transference of knowledge and experience from the teacher to the student, even when the curriculum is itself experiential and exploratory. Even in these cases it is the teacher who has the knowledge of these curricula which the students are to master. This is a legitimate position to take because the educational system is predicated on the administration of learning and education. And the educational system is inherently corporate, rather than communal, as I hope MOOs continue to be. I jokingly call Dewey the 'antichrist' of modern education for his work in bringing education within the corporate model, intentionally or otherwise. And though it is easy to admit that Dewey may have been doing what seemed best for his clients, the under-educated children of the modern work world, he formalized the ground work laid in the Nineteenth Century for education to be divorced from the communities in which children developed, placing it instead in the hands of trained professionals in professionally administered institutions. Illich helped

me to realize the corporate versus community tensions in modern learning (Cayley, 1992; Illich, 1970). And by combining his notions of de-schooling society, or as I have come to realize it 'delinking learning from schooling', I found constructionism and MOOs to be the philosophical and technological location in which to place myself.

This notion of education and administration is something that students, who later become teachers, are acculturated into. It is then solidified into cultural norms which are passed down through subsequent generations of teachers. It is accepted practice, for the teachers that I have had the opportunity to work with, that education and learning is a controlled act that can take place within knowable boundaries and with known and preconceived outcomes or summative evaluation. As a result, I see the teachers that I have worked with as students embracing the modular or corporate notion of education as a discrete set of acts and experiences to be diligently undertaken, not as an unending and interrelated continuum of experiences that weave chaotically around the developing psyche of the individual. Perhaps this is only my problem, but I find this profoundly problematic. My complaint is that there is no room for exploration, play, experimentation and 'wasted time' spent just mucking about with things, within the profession itself. Perhaps all teachers want to break out from this state, but those who do break out stand out in sharp contrast.

Teachers continually ask me how come I know so much about curriculum, or theory, or technology. This makes me laugh. Many of them are obviously smarter than I, and most of them have more experience as teachers. But, as you have read through the narrative of this chapter, you can see the trace of my learning and experience. It is chaotic, in the dynamic systems definition of the term (Finke & Bettel, 1996; Gleick, 1987). It is not random or haphazard. It is a series of continually bifurcating experiences that repeat themselves at different levels and contexts, each informing or prefiguring the others. As I wrote the preceding sentence I was taken aback to realize that I am not only describing an outline of a chaos theory of education, I am describing something of the allegorical tradition that Northrop Frye describes in the tradition of biblical literature from the old to new testament and through the program of the western literary tradition that he describes in his book *The Great Code* (Frye, 1982). He describes the cyclical structure of the whole corpus through prefiguring of events in one context being revealed

in the next. I see my own education to be this continual cyclical prefiguration and revelation over decades. I am reminded of a paper I wrote at teacher's college describing my self education in a farmer's field next to my primary education. I counterpoint what I was learning on one side of the fence about life and the world around me with the static administered education that was imposed upon me on the other side of the fence in a paper titled "I Never Knew Why I Was There! A reflective Narrative Account of Teaching: Education Beyond the Curriculum". Here I am going through the same self interrogation process in this narrative of my last 20 years of interaction with technology. The cycle runs full circle again and what was prefigured in that experience is being revealed in this one.

The whole notion of learning as a process of play and experimentation, of a project of constructionism, is something that I see lacking in corporately administered education and its adherents. And this made the MOO a confrontational environment for many of the teachers. I felt that many of them want to play, but found the transition insurmountable for a variety of reasons.

Aside from the dictates of the profession itself on the acculturation of teachers, the context in which teachers are trained, the present state of the profession has its own blinders it puts on teachers, and it was the realization of this state that moved me from blaming teachers to feeling sympathetic for their state. Teachers are under siege. They are suffering from a crisis that does not seem to abate. The public questions their ability to teach youth what they will need to 'compete' in the next century. At the same time they are continually having their professional control over the act of teaching undercut by imposed curriculum changes by successive governments and movements. They are continually seeing their workload increased as new responsibilities are loaded on them, while at the same time they have less and less time to develop their own professional practice. Many educators participate in this overloading by taking on more and more duties as the weight of educating a whole populace is increasingly concentrated in the educational system. I think some sort of bunker mentality must develop under this continual bombardment, and the result is that teaching becomes even more controlled and corporate, and their own professional development degrades into just taking courses and accumulating credits. There is not much time for anything else. And I think people lose

the sense that there is a better way to do things. Most people do not have time to explore alternative directions in a meaningful manner.

When people in this condition jump into a MOO there is a real confusion as to what they are supposed to accomplish. MOOs need to be interacted with as a child interacts with the world around it, or as an immigrant localizing her past world experience in this new one. The MOO, or any virtual space, must be played with and explored and broken and fixed through interactions with the environment and other people in it. My initial frustration that this was not what was happening turned out to be wrong. People did want to, and were starting to interact with MOOs in this manner, but there was a sense of frustration on their part that they could not easily do this work. As I grew as an educator with technology, I turned from my frustration with teachers, to the structures and governance of the profession and finally with the administration of learning itself over to the realization that the MOO could stand outside all this. Thus Project Achieve came to be. There was a place for CVEs in education, if I could do it right.

Doing it right would entail the construction of an environment that continually strove to minimize the administration, and administrative control, over the creation and use of the learning space. The goal is to return administration to a subservient, supportive position; a position that does not dictate or proscribe the nature of the space or the types of interactions taking place. As well, every attempt would be made so as not to restrict the kinds of interactions possible. If the administrators of the CVE endeavour to create new kinds of interactions, adding new media (audio, video, streaming, etc.) in response to user needs and requests, they would take on a valuable position in the learning environment. Concomitant with this support situation is the role of creating a more inclusive administrative environment that undercuts the embedded technocracy of technology-based environments. This goal may be achieved by including the *user* in important decisions relating to the governance of the environment, but this is only an intermediary step. The next step is to familiarize the user to the various aspects of social governance of the community. The final important step in creating inclusivity is to actively educate the users in the technical and programming skills required to safely govern the software of the virtual environment. This is a difficult process, and many administrators are not educators willing to undertake the task. To date, half of the

administration staff on Project Achieve started as casual users of our environment; most of them were already educators. And our goal for Project Achieve is to turn over the entire social and technological governance to the user community at the end of the project; bringing more users into governing roles, to displace the existing group who initiated the project.

But looking back to where I was while I worked with the OISE/UT students, the idea “Why teacher’s can’t do technology, and why it is not their fault” expressed my frustration. I started by being frustrated with the teachers themselves. The work that they did was good, but not one of them ever really pushed the limitation of MOOs, and with the exception of a few of my research participants, none of them ever got close to actually programming in the MOO environment. Perhaps this was an unrealistic expectation. On reflection, and with more experience, I realized that it was not them personally I was frustrated with, but the intersection of technology and the teaching profession itself. They were at odds, and I could not easily see a solution. MOOs and teachers only seemed to work when I placed myself as the catalyst right at the nexus of this intersection; a MOO could not function with teachers as they stood in their development without the positioning of a ‘Jason’ in the middle. I called this situation the ‘techneducator effect’. It was not enough to have a technician, nor was it enough to have an educator, but you needed someone whose heart and mind was that of an educator, but who was sufficiently dexterous with the technology to fill in the gaps between the two. And I concluded that for MOOs to succeed, what must be incorporated within the MOO is the ‘techneducator effect’. I have described all of the elements of what makes the techneducator in bits and pieces from page one of this dissertation, and I formulated the process in the conclusion. It is enough to say that I am a techneducator. I am the working model of how one develops, grows and is applied as a techneducator. This is why this dissertation turned from a consideration of the collected data itself to an exploration of the evolution of a particular person. And despite my reservations, this has turned out to be the *right thing to do*.

The particular examples presented here highlights the need for a wider and more inclusive conceptualization of the conditions under which a techneducator comes into being. Perhaps it will lead to a pedagogy or curriculum of the techneducator. This thesis

is leading towards an analysis of how technology might be able to simulate the techneducator in a meaningful manner. This is the form of the COLLIDE Engine.

Chapter Five–COLLIDE: Objects that go Bump in the Night.

Prelude

I was sitting in some multimedia lecture hall listening to Chris Teplovs' talk, "Knowledge Building and the Pedagogy of Instructional Design," part of Ian Graham's mini-conference, "Pedagogical Issues and Computer-based Instruction" in June, 1999. Soon after, I emailed Ian in part with reference to a thought I had at the conference: "the mini-con helped me coin a new acronym 'COLLIDE: Collaborative Object-based Lifetime Learning Interaction Design Engine' through a realization that the 'solution' to instructional technology can only come, not through *featuritis* or ubiquitous appliances but through a 'tabula rasa' engine on which can be glommed any number of Open source features. Intrinsic to the features would have to be self-configurability, dynamic... shit, I'd better get this all into my thesis before I write it in my email" (Nolan, 1999). I realized that I need to make sense of this epiphany, as it seems like many of the thoughts that have been lost in the labyrinth of the virtual learning environment of my brain finally coalesced into a rapidly rotating 3D model of what needs to be done to realize a new instructional design environment. It seems to me as if the entire 20 year cycle, half of my life to this point, has been leading to this conclusion. And this conjecture is actually manifest in my life in a manner that far exceeds what can be contained by this dissertation. I see elements of this thesis and COLLIDE growing from or reflecting how I interact with the world, the courses I took as an undergraduate, the novel and cookbook that have been on the back burner for the last 5 years, my social life, marriage, even my own personal sense of self-worth. All these elements weave together and surround the COLLIDE, which is not so much a piece of software, but a manifestation of a slice of my life, of which this thesis has just told one part; a conceptualization of myself as a creator of learning settings. In this context, this section on COLLIDE is very much a narrative extension of chapter four. But it is not a narrative of past events, but a narrative of a future possibility; a mapping of a curriculum path to be run, a description of a course in which the form is presented, a sketch of what the actual content might be.

Purpose

The purpose of COLLIDE is not so much to build an ultimate program that is compendious and all powerful. It is perhaps possible that COLLIDE could be

implemented within existing server/client technologies. But COLLIDE is a conceptual orientation to Instructional Design technologies and the creation of learning settings that rethinks the locus in which this design takes place; an user-centred design, a metaphoric design, a use-driven design. On the most simple level, COLLIDE moves the locus of construction of the learning environment to the pedagogical or metaphorical domain. At present, educators have some slight choice between canned technologies presented to them by advertising, administrative fiat, or, if they are very lucky, by instructional design specialists like Ian Graham or Chris Teplovs, as we have at the University of Toronto. There is some level of choice, a choice of poisons perhaps. The pathway is mostly top-down, received wisdom, transmission-based adaptation of technology (Cooper, 1999). And there is little chance that you can use technology to overcome top-down, received wisdom, transmission-based teaching and learning through technology when this is exactly the way in which you have the technology imposed on you. Technology is corrupted at the fundamental level by its own method of adoption by the educational community²¹.

Colliding Features in the Engine

I can imagine COLLIDE as being a compendious engine of options and alternatives, a catalyst for any and all types of interactions. An example of what COLLIDE could do is described below. The key shift is that now the issue is one of *how* possibilities are presented to the educator, not *if*. When the focus is on the educator's understanding of her own pedagogy and curriculum, not to mention subject matter, the responsibility of the engine is to be able to power just the particular elements of all possible elements that the educator sees as matching the needs of the environment she hopes to create. Ancillary to this is the requirement that the engine also has the flexibility to withstand reconfiguration of components and redesigning of the environment *on the fly* as the needs and understanding of the learning environment unfold. This ability to compile a specific environment from various COLLIDE components allows for basically an infinitely reconfigurable foundation on which a plethora of pedagogies can be realized without the instructor's intentions for the environment being governed by the capacity of one specific

²¹ Educators are the focus of this dissertation, but COLLIDE is a general tool for all users.

type of interaction or instructional design model. The initial blank slate that is constructed into an environment for a specific learning or pedagogical intention must be able to find its reason for existence and genesis within the teaching and learning paradigm, not the technological one, and as such COLLIDE must fundamentally be able to respond and configure itself to the educator, not, as the situation is now, the other way around.

In order to accomplish this Herculean task, COLLIDE must be able to respond to its environment, specifically so that the educator does not have to. I do not mean this as cognitive self-awareness, but rather in terms of a design metaphor where COLLIDE must be able to capitalize on its own strengths and be able to deal with its own weaknesses without recourse to the user. It is not the educator's job. Educators are not required to be able to build slide projectors, or blackboards, or chalk, or, especially, develop software. They are, however, required to be able to manipulate these elements within a learning environment, which is more or less a classroom environment. They should know how to drive the engine to their pedagogical ends. What we find, when we look at the real life environment, is that the learning environment is something that is immediately apprehensible to the new teacher and useable at the start, but eternally reconfigurable such that the accomplished educator can never fully work out its permutations. Even a new teacher can work within a classroom because of the embedded knowledge and expertise she has developed over decades as a student. The educator can 'drag and drop' elements into this real life learning environment at will, and these elements are in a way self-configuring, requiring only the curriculum and pedagogy to contextualize them, not a series of convoluted configuration files to be set up and steps to be completed. An environment, if it is to be useful, must allow for incremental learning, so that the educator can make more sophisticated use of what the environment affords and further develop that sophistication over time. Just like the average classroom, a COLLIDE engine must be able to incorporate modules and technologies external to itself, as well as COLLIDE specific modules or objects.

Colliding Elements: Objects that Smash in the Night

The object nature of a 'module' is fundamentally important because it allows for the continual addition and deletion of new elements to the environment as required by the

educator. Object-oriented, as a computer concept, describes a situation where a program is constructed from reusable parts, objects, that have specific functions and abilities (Dictionary.com, 1995). Objects save a programmer time by removing the need for them to, for example, continually write a 'print' function into a program. A program can just call the 'print object' and talk to it, and the 'print object' does the work. The object is a reusable basic function that can be called by the program, but which can be external to the program, and can be modified to a certain extent without having to make changes to the program that is calling it²². The 'print object' can have new functionality added to it, or an entirely different 'print object' can be substituted, as long as basic rules of communication are followed, certain protocols.

A sophisticated learning environment is a place of colliding objects (physical objects, administrative, pedagogical and curriculum tools) and ideas, just as with an atom smasher with which the physicist smashes elements together to create new existing objects often with only a theoretical expectation of the results, elements in the learning environment can be brought together to create new situations and interactions unanticipated by the individual objects. Within the classroom environment, most of the objects you find therein function in this way. The chalk object interacts with the blackboard object, and any other object that it can interface with according to the criteria inherent in the chalk object; that is, any surface that can scrape off and hold chalk particles. Some objects, like brick walls can hold chalk particles, but do not interface well with the eraser object. It is easy to get chalk dust on the wall, but hard to get it off. There is a vast and fluid group of relationships that are employed in the classrooms with existing technology. Often objects that have a specific purpose can be reconfigured on the fly to new purposes that were never envisioned by the creators; the dusty eraser becomes an artist's tool and the brick wall becomes a palate. That is one reason a classroom can become a worthy learning environment under the influence of a creative mind and a stifling one under a more mundane mind; it is not what you have, but what you imagine doing with it. The object-like ability of COLLIDE components to emulate this sliding interfunctionality of real life

²² In many type of programming environments one program *calls* another in order to interact with it.

learning environments is paramount for enabling instructional design environments to free the educator from the fetters or yoke of the technology.

As I envision it, a COLLIDE object has certain functions that will enable this interfunctionality to occur. Presently, few computer based programs are entirely self-configuring. This is of course the goal of ‘Plug and Play’ technologies (technologies that are promoted as working without any need for the user to configure them prior to use) that is almost never met. My new USB (Universal Serial Bus) scanner claims to be plug and play, as do all technologies that use USB (www.usb.org). It almost succeeds, except that you still have to install the software on the computer and reboot, after which you need do nothing and you can plug in or unplug the hardware without any restrictions. The COLLIDE Engine would *ex officio* be self-configuring, self-updating and self-maintaining. By self-configuring, I mean that the COLLIDE Engine would be able to function as a server of whatever options the educator chooses to use. It must be able to undertake all the processes involved in configuring any and all technological environments.

COLLIDE.org: Open Sourceness in Educational Technology

To move beyond transmission based learning is to move beyond strict commercialization of learning. The model I want to explore is called Open Source²³ (<http://www.opensource.org/>) (Raymond, 1999a; Scoville, 1999). The open source movement 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.

Open Source Versus GNU

Open Source and the GNU Project are two organizations influenced by specific individuals; GNU by Richard Stallman, and Open Source by Eric Raymond. They are now the champions of Free Software Foundation and the Open Source Initiative respectively (Scoville, 1998). In general terms, they both want to promote software that is

²³ The term “open source” describes both a general concept and an organization. To differentiate between them, the concept is written in lower case “open source” and the organization is written in caps as “Open Source.” Sorry for the confusion, but I cannot think of a better solution.

free, freely available, and open to the Hacker²⁴ community. These projects both support the traditional notion of sharing resources among members of a community.

The two main camps, the Free Software Foundation and the Open Source Initiative, seem to be matters of personal taste to me, but they do have practical differences. According to Raymond, his “Open Source Initiative is a marketing program for free software. It’s a pitch for ‘free software’ on solid pragmatic grounds rather than ideological tub-thumping. The winning substance has not changed, the losing attitude and symbolism have” (Raymond, 1999a; Raymond, 1998). Raymond’s project has the upper hand, I think, in that it is not tied to an explicit political or philosophical agenda, it is moving toward a standardization of what the idea of sharing software and code means in a manner that is palatable to industry, and it has a *cooler* name. Accordingly, it also has more commercial support especially by Hacker publishers like O’Reilly who publish many books on free and open source software <http://opensource.oreilly.com/> (O’Reilly and Associates, 2000). The Free Software Foundation, on the other hand, is older and broader based in terms of how it can be used. I can, and have put my own *invention* V.A.S.E. under a Free Software Foundation GPL license. I did not need to ask for permission. I only needed to download the text that would identify this license in my code, and abide by the license myself, in relation to this code.

What are GNU and Public Licenses: GPL and GFDL

The Free Software Foundations’ GNU General Public License (GPL) was first brought forth in 1991, and the preamble says it all,

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

²⁴ Hackers, the people who break into computers like Noisey and Achieve, are technically Crackers; a term coined by the Hacker community in the 80s (e-cyclopedia@bbc.co.uk, 1999). Hackers are people who *hack* code to improve it. Hackers create things, while Crackers destroy things. “There is a community, a shared culture, of expert programmers and networking wizards that traces its history back through decades to the first time-sharing minicomputers and the earliest ARPAnet experiments. The members of this culture originated the term ‘hacker’. Hackers built the Internet. Hackers made the Unix operating system what it is today. Hackers run Usenet. Hackers make the World Wide Web work. If you are part of this culture, if you have contributed to it and other people in it know who you are and call you ahacker, you’re a hacker” (Raymond, 2000).

software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we

have made it clear that any patent must be licensed for everyone's free use or not licensed at all. (Stallman, 1999; <http://www.fsf.org/copyleft/gpl.html>)
Newer on the scene is GNU Free Documentation License or GFDL. Version 1.1 was released in March, 2000. Its preamble builds on the GPL tradition:

The purpose of this License is to make a manual, textbook, or other written document "free" in the sense of freedom: to assure everyone the effective freedom to copy and redistribute it, with or without modifying it, either commercially or noncommercially. Secondly, this License preserves for the author and publisher a way to get credit for their work, while not being considered responsible for modifications made by others.

This License is a kind of "copyleft", which means that derivative works of the document must themselves be free in the same sense. It complements the GNU General Public License, which is a copyleft license designed for free software. We have designed this License in order to use it for manuals for free software, because free software needs free documentation: a free program should come with manuals providing the same freedoms that the software does. But this License is not limited to software manuals; it can be used for any textual work, regardless of subject matter or whether it is published as a printed book. We recommend this License principally for works whose purpose is instruction or reference. (Stallman, 1999; <http://www.fsf.org/copyleft/fdl.html>)

Both the GPL and GFDL are useful tools for making software, and now text documents available to a large community without having to take the trouble to control distribution, or maintain responsibility for how they are distributed. But the whole GNU project is on the political side of the spectrum, while Open Source is trying to pass itself off as a corporation friendly ideology. While GNU is for anyone, Open Source is much more like a level of certification, and to that end they have tried to register Open Source as a trademark to increase marketability of the concept. At present, one is expected to register in order to claim the right to use the Open Source "OSI Certified" mark (Raymond, 1998).

But the roots of GNU and Open Source movements go back almost as far as the Net itself. When, after Woods tracked down Crowther at Xerox Parc, Crowther gave Woods

his source for Adventures, as it was originally called, it was in a way part of the same Internet tradition of sharing code for the general improvement of the environment in which everyone worked (Aarseth, 1997). Adventure, as I describe in more detail above, was the first big game event, and was also an open source event, and numerous other games grew up from the same code. It was this free movement of code and ideas that crystalized in the early hacker, and open source movements.

What is Linux?

The Linux operating system on which Noisey and Achieve have run, is, to me, both a software and a conceptual revolution that has changed computing in a way that I cannot have imagined. Because of its success, it is also an important pedagogical signpost, showing an alternative direction for the commercialization of online 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 education can follow, through vehicles such as the GNU, to allow educators to maintain academic ownership, while freely sharing of their work with a larger community.

Linus created Linux while a student at the University of Helsinki in Finland. “He began his work in 1991 when he released version 0.02 and worked steadily until 1994 when version 1.0 of the Linux Kernel was released. The current full-featured version is 2.2 (released January 25, 1999)” (Online, 1994-2000) <http://www.linux.org/info/index.html>. While Linus Torvalds is world famous, he does not directly make money from his Linux Kernel. He works as a programmer for a company in California (Raymond, 1999b), though he no doubt cashes in on the talk circuit, as a consultant, and being on boards of directors for various companies.

Due to the very nature of Linux’s functionality and availability, it has become quite popular worldwide and a vast number of software programmers have taken Linux’s source code and adapted it to meet their individual needs. At this time, there are dozens of ongoing projects for porting Linux to various hardware configurations and purposes (Online, 1994-2000).

Most major computer companies have recognized the importance of Linux. Dell, IBM, Apple and other have Linux compliant hardware, and there are versions of Linux specifically designed for the Apple operating system such as MkLinux. Intel, who makes the CPUs for the Windows operating system, actually owns a large amount of stock in RedHat. RedHat is the most popular version of Linux, and is the version that Linus himself admits to have on his computer at home (Raymond, 1999b):

Linux is developed under the GNU General Public License and its source code is freely available to everyone. This however, doesn't mean that Linux and its assorted distributions are free -- companies and developers may charge money for it as long as the source code remains available. Linux may be used for a wide variety of purposes including networking, software development, and as an end-user platform. Linux is often considered an excellent, low-cost alternative to other more expensive operating systems (Online, 1994-2000).

How do You Pronounce Linux?

Visit <http://www.tuxedo.org/~esr/faqs/linus/english.au> to find out. It is the official pronunciation as defined by Linus Torvalds. It is in fact an audio recording of him making this statement. "Although many variations of the word Linux exist, it is most often pronounced with a short "i" and with the first syllable stressed, as in LIH-nucks." (Online, 1994-2000; Raymond, 1999b) (<http://www.linux.org/info/index.html>).

The rise in importance of the Linux operating system (www.linux.org) is predicated on the fact that it is an open source operating system. The dynamic potential of MOOs is fundamentally due to its 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 its own purposes under relatively flexible conditions as laid out in the license. The result is that many thousands of users are motivated not only to modify and add to Linux for their own purposes, but also to share what they have created with the entire Linux community. The strength of Linux comes from the openness of the system and the community that surrounds it. This does not mean that Linux is necessarily always free, but that it is freely available. One of the most important companies in the Linux

movement is Redhat (www.redhat.com). Redhat repackages Linux and creates its own flavour and support which they then sell. Though all the components are freely available from places like www.redhat.com, www.linux.org and other sites, even the entire Redhat release can be downloaded for free, it is easier and more convenient for me to spend the money for their packaged version on CD-ROM. And when an upgrade to my old RS/6000 computer's AIX operating system cost about \$1800.00, the complete new version of Redhat Linux 6.0 only cost about \$40.00. And it is cheaper for me in terms of time and resource usage to buy it than take the time to download the gigabytes of code from the Internet.

A direct result of the Linux explosion of interest in open source software, which has of course been around with other names and slightly different philosophies for longer than I can remember, has been tremendous. Apple, once one of the most proprietary of software companies, has 'open-sourced' their new OSX (Operating System version ten) in the hopes that it will gain a Linux-like support from the user community and thrive on the fecund and dynamic development of the system *by* the users who have bought it. Netscape has done the same with its web browser (www.mozilla.org), creating two browsers: Netscape and an open source version called Mozilla.

There are obvious advantages of hundreds of independent and corporate programmers adding their little bit to a product that can then be both made available without charge online and compiled and variously packaged by any company to be resold to those users who want to purchase a particular *distribution* such as Redhat, Corel and other companies offer. In this scenario we are moving beyond the present notion of consumerism, a shifting series of intersections between programmer, distributor, and user where an individual or company can be participate in one, two or three roles simultaneously. They become, many of them, *prosumers*²⁵, both consumer and producer in concert with the company like Apple or the Linux meta-organization which is itself no longer merely a producer, but also a consumer of the products produced by its users. This circular

²⁵ Prosumer is a term that I have learned casually, but it has a more august lineage in Alvin Toffler. Apparently, "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).

relationship is obviously appealing to me, if my earlier chapters have any bearing on my true thoughts.

Though education itself could only be an Open source endeavour if it is in the form of source code and the executable product, it can be Open source in theory, and released under one of the GNU schemes mentioned above. And it would thrive in this context. I have heard that some school boards have attempted to take ownership of all their teacher's curriculum, as journalists fought the print media giants who tried to extend their ownership of journalist's work in the online realm. Open sourcing curriculum would be a way of maintaining ownership while making material available. Some people might think that what I am really talking about is putting text under some sort of general public license, as you could do with narrative text. However, curriculum is somewhat different. Written curriculum has more to do with code than the classics. One teacher's course curriculum is like uncompiled code, that is compiled and interpreted²⁶ by another teacher, and differently by each individual teacher's own compilation and interpretation mechanism. In my mind the actual classroom performance is the execution of the curriculum. According to this metaphor then, curriculum is something that can be Open sourced. And perhaps it can even be COLLIDEd at some point. I just realized that though we have SGML, HMTL, XML, UML (Standard General Markup Language, Hypertext Markup Language, Extended Markup Language, Universal Modelling Language are ways of describing the layout of pages of electronic text, web pages and processes.), perhaps we need to have something like CML (Curriculum Markup Language) that allows for the infinite expression of curriculum and pedagogy within a format that allows it to be communicated across the expanse of learning environments, as well as integrated with various technologies, compiled and interpreted as required. I think this thought should be slotted under the rubric of *directions for further study*. It would be possible to COLLIDificate CML, just as I have COLLIDEd the human/computer interaction. By this, I mean that it would be possible to integrate curriculum described using a CML model with other learning environments and information technology using a COLLIDE engine.

²⁶ Compilers and interpreters are also computing mechanisms for creating executable code and massaging it for the particular environment in which it will be used.

MOOkti and the Nexus of the Collision

It occurred to me that what I am trying to create with the COLLIDE engine is a software environment that replicates the type of interaction and role that I have played in MOOkti, particularly in terms of how I interacted with Lynn's classes. The role outlined in Chapter Four on the theatrical nature of the virtual learning environment and what I describe as myself as techeducator both describe how my own work filled the gap between the educator and the environment. I was part facilitator, part technical, often janitor, and finally the negotiator. Very little got done in MOOkti that I did not have a hand in. However, almost all that was done was not really my work. Except with Lynn's special topics course where I did do a fair bit of actual programming, that job fell to Leigh, Traveller and Cosmo. Most of the building, after the basic site was set up by the MOOkti staff, was done by students and participants. But almost nothing went on where I did not fill a role as intercedent between the programmers, teachers and the virtual environment itself. And it seems to me that the role that I found myself in was one that at this stage cannot be inhabited by the educator or the programmer. But it is a fairly repetitive and mundane, though infinitely complex role. Just the sort of role that could be taken up by software. And this is just the sort of role that computers can take up.

Many people have said that computers are best suited for the complex, repetitive and mundane. The role no one wants. Hmm... perhaps this is also the reason that the idea of creating a COLLIDE type environment has not been done yet. Neither does it hold a position of power or glamour, rather the position is one of allowing others to shine and giving away power. I am reminded of the original meaning of the term Robot, a Czech term originally meaning a 'drudge' depicted in the brothers Capek's play R.U.R. (Capek, 1971 (1923)). COLLIDE must be a drudge, a mindless but powerful little robot that does all the bits required for an environment to function smoothly, so quietly and efficiently that you will soon wonder how you ever lived without it, just before you forget that it is even there.

What will COLLIDE actually Do?

Simply put, the COLLIDE engine, if constructed, would be designed to anticipate the problems that a user comes across when trying to use computer technology. Most people

know the frustrations that come when they are stopped dead in the middle of trying to accomplish something because the computer itself does not know what to do; neither the program, computer or user has information, needed to accomplish a task. There is always the need to know a login ID, a password, a TCP/IP number, where a missing file is, or something in the system does not know how to open your document. The computer tells you '*you can't get there from here*' and stops dead until you can figure out what it thinks it wants, find the information from a book or some technical support person (like me), figure out how to get it in the right format, and hopefully move on. And why should the individual have to know the proper questions that need to be asked, or the proper syntax of IP numbers just to get the computer doing what it is supposed to do? We are not expected to know such things about our car or TV, and only consult an expert for scheduled maintenance or repairs. When ironing, does the iron expect you to know the burning or melting point of your fabrics in degrees Celsius? No. It expects you to turn the dial to match the fabric you have, and read enough instructions to realize that you pour water in to get steam. Though you do have to know what cotton or wool is, you do not have to recourse to a fabric specialist to iron your clothes. In an abstract sense, you have to have a clear sense of what you want to accomplish, the intentionality of ironing clothes, and the task dedication to get it done. That is all. And the technology needs to take care of the rest.

What is being described is not a design to ignore technology at all. With few exceptions, the readers of this thesis do not really *understand* technology. I barely do. As I have mentioned throughout this thesis, I have written *some* code, set up and managed a few servers on the Internet, created a few thousand web pages, low level formatted and partitioned hard drives, used disk editors to rebuild erased documents by searching through the hexadecimal/ascii representations of drive sectors, and lived for years with system administrators and programmers who really do know their area of the *technology*. I still consider myself an *advanced user*. You will have to decide for yourself where you think you fit in. And I do not think that my level of understanding of the technology is or should be necessary for the average educator. But at this stage in the development of computing and Internet technology some approximation of my level of sophistication *is* still necessary to really be able to transcend the consumer/prosumer barrier, transcend the

hegemony of the technocrats, and be able to conceptualize the creation of learning environments in these newly developing spaces.

As I have hinted, the present unbalanced situation is the result of the sheer infancy of computing and Internet technology; a technology that is not even able to take responsibility for its own incompetencies; a technology that will only mature when it reaches the level of sophistication of being able to integrate itself into our world and stop trying to integrate us into its domain. So, how is COLLIDE going to bring computing up to the level of ironing? I will tell you.

COLLIDE

The following is an overview of the processes and steps necessary for the completion of a COLLIDE process. This scenario would cover any of the following needs:

1. User setting up a computer;
2. User connecting a computer to a network;
3. User connecting a computer to the Internet;
4. User has a file that cannot be opened with the installed software;
5. Software is out of date or is in need of an update;
6. User tries to integrate two disparate technologies so that they can communicate in a single technological environment (e.g. making Knowledge Forum interact with MOOkti).

There is a potential for failure as indicated in a number of steps in the Use Case expression below. I may have gotten things a bit confused as I am fairly new to Use Cases. But there is always clear and usable information returned to the user who is then able to decide on what should be done next. The user makes decisions; decisions are not forced on the user by the environment. Of course, there is a serious start-up cost to COLLIDE, as a significant threshold of solutions must be in place before COLLIDE begins to function in a meaningful manner. To accomplish this, a pre-initiation phase must be completed to develop enough solutions that every user query is not met with a lengthy delay before a solution is found. As well, a solution development environment must move forward in conjunction with software vendors so that the solutions matrix can accomplish its task.

COLLIDE Engine Use Case

The following Use Case covers the generic configuration required to run the COLLIDE Engine in relationship to the user of the engine (Cockburn, 1996-2000; Cockburn, 1997a; Cockburn, 1997b):

A use case captures a contract between the stakeholders of a system about its behavior. The use case describes the system's behavior under various conditions as it responds to a request from one of the stakeholders, called the primary actor. The primary actor initiates an interaction with the system to accomplish some goal. The system responds, protecting the interests of all the stake-holders. Different sequences of behavior, or scenarios, can unfold, depending on the particular requests made and conditions surrounding the requests. The use case collects together those different scenarios. (Cockburn, In Press).

Use Cases are models of how a user uses a system, producing “an easily used, scalable, and recursive model ... the goals and *goal failures* can be explicitly discussed and tracked” (Cockburn, 1997a; Cockburn, 1997b).

The plan, which extends beyond the scope of this thesis is to build a series of Use Cases in order to outline the project, and then to build a complete model of the COLLIDE Engine using the Universal Modelling Language (UML) to cover the more specific elements of the Engine in a form that programmers can implement (Alhir, 1998). The following Use Case scenarios are meant to be read as a branching narrative where all possible permutations of specific steps in a larger process are covered. The entire system of which these scenarios are but a single component is made up of a finite but uncountable number of Use Cases that allow the entire system to function. Over time, Use Cases will be added, modified, superseded, abandoned in favour of others. However, the integrity of the overall system remains intact and able to successfully encounter more and more diverse situations into its functioning parameters. This example highlights the key functions of the development and implementation of new modules into the overall system that are not only not part of the existing local environment, but not even in existence at the point where this particular Use Case iteration is initiated.

In this instance the User is designated as an Educator. The integration is between the User, the computer and online environment. This example does not cover the use of the COLLIDE Engine to integrate disparate environments or software. This Use Case would cover all the aspects that an average user goes through in setting up a computer on a LAN (local area network) or the Internet. The additional Use Cases necessary to integrate two or more existing technologies would include the identification and implementation of various translators and converters necessary to enable the different technologies to communicate with one another as the user requires.

Scenario 1.0

System: Scenario 1.0 will use the COLLIDE Engine to accomplish the task described above to integrate a user's computer with a LAN or Internet environment.

Primary Actor: The User is the Primary Actor, needing to set up some aspect of her computer environment.

Secondary Actor: The COLLIDE Engine will solicit information from the User, the computer itself, and its own libraries.

Goal: The COLLIDE Engine will configure User's Computing Environment.

Conditions: The Scenario will be successful if it is able to configure the Computer. This condition will trigger Scenario 1.7 in which the COLLIDE Report Generating Utilities responds with detailed information as to what has transpired.

The Scenario will be unsuccessful if it is not able to configure the Computer. This condition will trigger Scenario 1.7 in which the COLLIDE Report Generating Utilities responds with detailed information as to what has transpired, and suggest future steps beyond this scenario.

Outcome: The computer is configured, or the User is provided with choices and information as to why this is not the case in clearly defined language.

Précis: After User has a new computer out of the box and plugs the components together and turns it on, the COLLIDE engine takes over

the responsibility for integrating the components required to enable the User to use the system. Components could be everything from installing and updating software; establishing and configuring the system according to user preferences; configuring the computer in relation to the local area network (LAN), printing and Internet services.

Steps:

- 1) The User wants to set up a computer environment and initiates the COLLIDE Engine to do so. More than likely, the COLLIDE Engine will be self initiating on system start-up.
- 2) The COLLIDE Engine solicits information from the User interactively in order to get as much information as will allow COLLIDE to meet the User's needs.
- 3) The COLLIDE Engine verifies available information and anticipated goals of User, making suggestions and providing information as requested.
- 4) The COLLIDE Engine tests for correctness of information provided, and solicits more information, using what is given and making notes of what is still required.
- 5) The COLLIDE Engine organizes the missing information and proceeds to access it through various means.
- 6) The COLLIDE Engine acts to gain missing information by moving through the following sub-processes. At this point, the User has provided all the information she has, but may be asked new questions as the COLLIDE Engine has new or more specific questions.
 - 6a) After probing the computer and online environment, the User is prompted for missing information.
 - 6a1) The User provides missing information and the COLLIDE Engine recursively repeats the process to continue setting up and customizing the environment. Where the User is unable to provide information, the COLLIDE Engine will continue to the next step. When all processes have been fully completed. The COLLIDE Engine will initiate

Scenario 1.7 which is the development of a report.

- 6a2) The User does not provide missing information, and the COLLIDE Engine must spin off a new task to look for the required information.
- 7) Engine initiates an scenario (1.1) to search for necessary information
- 8) Later Scenarios initiated by Step 7 above provide the necessary information to complete this Scenario.

Scenario 1.1

Trigger: This scenario is triggered by Scenario 1.0, Step 7.

System: Scenario 1.1 will use the Internal COLLIDE libraries to attempt to accomplish this task of configuring the system.

Primary Actor: The COLLIDE Engine is the Primary Actor, needing to find information that is not available from the User.

Secondary Actor: The Internal COLLIDE libraries are the Secondary Actor, used by the COLLIDE Engine to accomplish the task of this Scenario.

Goal: The goal is to find missing information required to complete Scenario 1.0, and to pass it back to Scenario 1.0, Step 6.

Conditions: The Scenario will be successful if it is able to obtain the required information and pass it back to Scenario 1.0 Step 6.

The Scenario will be unsuccessful if it is not able to configure the Computer. If so, then a further Scenario is initiated through a return to Scenario 1.0, Step 6.

Outcome: The information required is found and returned to Scenario 1.0 Step 8.

Précis: After getting all the information it can locally and from the User (or from some other function), the COLLIDE engine still cannot find some of the information that it needs. The COLLIDE engine searches its own libraries of information for directions on how to find the existing information. The COLLIDE engine may have to try many protocols in order to successfully complete the task. This sort of function exists in many types of computing environments already.

Steps:

- 1) The COLLIDE Engine initiates an internal search of the Internal

COLLIDE libraries to find the information not provided by the User in step 1.0.

- 2) The COLLIDE Engine uses internal protocols to identify which protocol is designated to find the missing information.
- 3) The COLLIDE Engine finds protocol and initiates protocol.
- 3a) The found protocol is successful and information is found.
- 3b) The found protocol directs the COLLIDE Engine to contact a human agent, such as a local network or system administrator. The process of enacting this protocol is taken up in Scenario 1.3 below. Scenario 1.3 will return its information to Scenario 1.1, Step 6.
- 3c) The found protocol works and is able to provide the information. Process is ended here, and the information is returned to Scenario 1.0, Step 6. The COLLIDE Engine can continue to configure other elements of the computer system starting at Scenario 1.0 again.
- 4a) The identified protocol does not work.
- 4b) The COLLIDE Engine tries other protocols via Step 5a
- 4c) Other protocols succeed. Process is ended here. The COLLIDE Engine can continue to configure other elements of the computer system starting at Scenario 1.0 again.
- 5) The COLLIDE Engine repeats Steps 1-5 until a protocol is found that succeeds, or COLLIDE continues to Step 5a.
- 5a) Engine does not find other protocols, or the protocols do not work. This Scenario continues to Step 6.
- 6) Engine initiates a search for new protocols which it does not presently have locally in Scenario 1.2. Scenarios 1.2 and those that it calls lead to the COLLIDE Engine downloading a new protocol which is used to obtain information which is passed on to Scenario 1.0 Step 6.

Scenario 1.2

Trigger: This Scenario is triggered by Scenario 1.1, Step 6.

System: The search for new COLLIDE Engine protocols.

Primary COLLIDE Engine

Actor:

Secondary Actor: The Secondary Actor is the Meta COLLIDE Server.

Actor:

Goal: The goal is to identify and download a new protocol to satisfy Scenario 1.1, Step 6.

Conditions: No protocol exist on the local computer running the COLLIDE Engine.

Outcome: The Meta COLLIDE Server is able to satisfy the need for a specific protocol for Scenario 1.1, Step 6.

The Meta COLLIDE Server *fails* to satisfy the need for a specific protocol for Scenario 1.1, Step 6. This information is returned to Scenario 1.0, and becomes part of the report.

Précis: At Scenario 1.1, Step 6, the COLLIDE engine comes to an impasse. It has not been able to find the protocols or information structure that it requires to complete its task. Rather than stopping dead, it initiates another procedure in the hopes of getting what it requires. This new procedure is to contact the Meta COLLIDE Server which is accessed through a web server. The COLLIDE engine is run by the company that created and administers the COLLIDE system, and would have access to more diverse and newer resources than may be available on an individual's computer. This Scenario describes the COLLIDE Engine passing its requirements onto the Meta COLLIDE Server, and the Meta COLLIDE Server providing it with the information it needs.

Steps:

- 1) The COLLIDE Engine contacts Meta COLLIDE Server and requests information about new protocols that meets its needs.
- 2) The COLLIDE Engine provides information and specifications for required protocol.
- 3) The Meta COLLIDE Server has the new protocols and makes them available to the COLLIDE Engine to down load and use them. This information is passed on to Scenario 1.1, Step 6.
- 4) The Meta COLLIDE Server does not have the required protocols and

determines that they do not exist within its realm of information.

- 5) The Meta COLLIDE Server attempts to determine if the information is available from other software or hardware vendors (in the form of software updates, bug fixes, new hardware), or if the requirements are novel and require the creation of new protocols from scratch. Scenario 1.4 covers these processes.

Scenario 1.3

Trigger: This Scenario is triggered by events in Scenario 1.1, Step 3b.

System: Scenario 1.3 will attempt to obtain required information from human agents, such as a local network or system administrator.

Primary Actor: The COLLIDE Engine is the Primary Actor

Actor:

Secondary Actor: Various human actors may be involved here.

Actor:

Goal: The goal of this scenario is to obtain information that is unknowable by either the COLLIDE Engine or the User, such as login IDs, passwords, and network configuration information that cannot be found by probing the Local Area Network internally.

Conditions: The required information may exist in the Local Area Network (LAN).

Outcome: The required information is obtained and returned to Scenario 1.1, Step 8.

Précis: This scenario entails the identification of information that is not obtainable except through a human agent in the User's institution or company, or the provider of Internet services to the User. The process is to generate messages that can be sent to the human agents and to request a response in a format that the COLLIDE Engine can use without requiring the User's intervention.

Steps:

- 1) The information that is needed is identified by the COLLIDE Engine.
- 2) The COLLIDE Engine identifies its own protocols which are used as templates with a list of the information required from the human agent.

Obvious contact addresses are:

Postmaster@foobar.com
 Root@foobar.com
 Sysadmin@foobar.com
 Help@foobar.com
 Support@foobar.com

The contact address can also be generated by the 'whois' command in a standardized format that can be parsed. For example:

```
<whois://yukazine.com>
  Registrant:
  Jason Nolan (YUKAZINE-DOM)
  33 Willcocks St.
  Toronto, ON M5S 3E8
  CA
  Domain Name: YUKAZINE.COM
  Administrative Contact, Billing Contact:
  Nolan, Jason (JN8311) jason.nolan@UTORONTO.CA
  Jason Nolan
  33 Willcocks St.
  Toronto, ON M5S 3E8
  CA
  416-978-5656
  Technical Contact, Zone Contact:
  Hostmaster (HN307-ORG) hostmaster@9NETAVE.CA
  9 Net Avenue Canada Inc
  11 Kodiak Cres.
  Toronto, ON M3J 3E5
  CANADA
  416-630-1100
  Fax- 416-630-7100
  Record last updated on 19-Aug-1999.
  Record expires on 19-Aug-2001.
  Record created on 19-Aug-1999.
  Database last updated on 19-Apr-2000 22:21:42 EDT.
```

- 3) The COLLIDE Engine generates a response conduit (response identification number) to enable the return of the required information, and sends a request to the human agent using email.
- 4a) The human agent returns the required information in a format that the COLLIDE Engine can parse and use to configure the computer. This information is returned to Scenario 1.1, Step 6.

- 4b) The human agent *does not* return the required information in a format that the COLLIDE Engine can parse and use to configure the computer.
- 5) The COLLIDE Engine repeats Step 3-4 using standard variations of the anticipated contact addresses.

Scenario 1.4

Trigger: This Scenario is triggered by events in Scenario 1.2, Step 5.

System: The System initiated is the Meta COLLIDE Engine (www.collide.org).

Primary Actor: The Primary Actor is the COLLIDE Engine.

Actor:

Secondary Actor: The source of information and/or protocols are various programmers

and software/hardware vendors.

Goal: Retrieve information necessary for configuration of local COLLIDE Engine and Request for and retrieval of information.

Conditions: Information may or may not exist, or not available to the Meta COLLIDE Server.

Outcome: The resulting information is passed on to Scenario 1.1, Step 6.

Précis: This process takes place on the Meta COLLIDE Server at (www.collide.org). The goal is to find the necessary protocols to meet the needs of the COLLIDE engine from sources not related to the User or the Meta COLLIDE Server.

Steps:

- 1) This protocol determines if source is most probably human or electronic.
- 2) The Meta COLLIDE Server decides that the source is human.
- 2a) An email template is sent out by the protocol from the COLLIDE Engine requesting the information. The same rules and formats as described in Scenario 1.3, Step 2 is used, unless the Meta COLLIDE Server already has a contact for the programmers and software/hardware vendors it anticipates may have the solutions. In this Scenario, the Meta COLLIDE Server would know the key players in the industry and would know who to contact at Apple,

Microsoft, Redhat, Sun Microsystems and so on. This would not be a random act, but based on the request information from the User's COLLIDE Engine.

- 3) The Meta COLLIDE Server decides that the source is electronic.
- 3a) Source is contacted directly as laid out in protocol. As with Step 2a above the Meta COLLIDE Server would have a method of contact probably developed in conjunction with the product vendor or maintainer.
- 4) Response from either Steps 2a or 3a and the information is parsed and forwarded to the COLLIDE Engine at Scenario 1.2, Step 3, and archived for future use in the Meta COLLIDE Server.
- 5) No response from either Steps 2a or 3a, or a response is given that indicates that a solution is not forthcoming.
- 6) Source responds directly to electronic query, and the Meta COLLIDE Server passes the process on to Scenario 1.5.

Scenario 1.5

Trigger: This Scenario is triggered by events in Scenario 1.4, Step 6.

System: The System initiated is Meta COLLIDE Engine (www.collide.org)

Primary Actor: Nexus Raster Matrix (NRM) (See thesis section on NRM below. NRM is not part of this Use Case Scenario.)

Secondary Actor: Newsgroup/Collide Staff/Vendor/Tender

Goal: If possible, a new protocol(s) must be created.

Conditions: A protocol that fits the requirements is not available.

Outcome: A protocol that fits the requirements is created and returned at Scenario 1.2, Step3.

Précis: In the event that it is determined that absolutely no protocol exists that can be used, either one must be created, or the User must choose to abandon the process (covered in Scenario 1.6).

Steps:

- 1) Appeal to Collide Open source community for the creation of the

protocol. If a response is made that satisfies the requirements the resulting protocols are returned to the COLLIDE Engine at Scenario 1.2, Step 3, and archived on the Meta COLLIDE Server.

- 2) Appeal to software vendors for info or the creation of the protocol. If a response is made that satisfies the requirements the resulting protocols are returned to the COLLIDE Engine at Scenario 1.2, Step 3, and archived on the Meta COLLIDE Server.
- 3) Purchasing of protocol code written via tender paid for by User. If a response is made that satisfies the requirements the resulting protocols are returned to the COLLIDE Engine at Scenario 1.2, Step 3, and, if an agreement is worked out with the User, archived on the Meta COLLIDE Server. This step triggers Scenario 1.6 requesting that the User decides if she is willing to pay for the production of the required tools.
- 4) Programmed internally by Collide.org. The resulting protocols are returned to the COLLIDE Engine at Scenario 1.2, Step 3, and archived on the Meta COLLIDE Server. This Step would require a completely different Scenario tree in order for Collide.org to decide if it is willing to pay for this work to be done internally.
- 5) Unsatisfied protocols requirements are archived on Collide.org for future consideration. This event triggers Scenario 1.7.

Scenario 1.6

Trigger: This Scenario is triggered by the archiving of the unsatisfied protocol requirements from Protocol 1.5, Step 3.

System: The System initiated is Collide Engine.

Primary Actor: The Primary Actor is the Collide Engine.

Actor:

Secondary Actor: The Secondary Actor is the User.

Actor:

Goal: The Goal is to give the User information to make a decision.

Conditions: Because the protocol needed to complete the task must be created, the

User must decide if she is willing to finance this process in order to speed its creation.

Outcome: The Outcome is for the User to make a decision about what will be done.

Précis: Because the protocol needed to complete the task must be created, the User is given the opportunity to finance this process in order to speed its creation.

Steps:

- 1) A complete report of Collide completed tasks and list of all non-responses provided to the User via her COLLIDE Engine. Explanation of the reasons for the failure of COLLIDE to complete the process is given in plan language.

COLLIDE could not get a response from an agent through Scenario 1.4.

COLLIDE could not generate the protocols necessary because no one was able to complete the task (Scenario 1.4).

COLLIDE could not generate the protocols necessary because no one was willing to volunteer to do it (Scenario 1.4).

COLLIDE could not generate the protocols necessary because no one was willing to pay for the completion of the protocols (Scenario 1.4).

- 2) Suggestions are then made as to how the User may wish to respond. The user can choose to let the matter drop, put the matter on hold until what is needed has been created by someone else, choose to pay, or identify someone in her organization who should be contacted by the COLLIDE Engine who might be willing to finance the project.

Scenario 1.7

Trigger: The success or failure of Scenario 1.0 will trigger this Scenario.

System: The System initiated is the COLLIDE Report Generating Utilities

Primary Actor: The Primary Actor is the COLLIDE Engine.

Actor:

Secondary Actor: The Secondary Actor is the User.

Actor:

Goal: The Goal of this Scenario is to provide the User with feedback and a log of what has been completed, what processes are pending, and what was not completed.

Conditions: The Conditions are the successful or unsuccessful configuration of the Computer.

Outcome: User has complete and useful information as to what has been done on her behalf.

Précis: When the COLLIDE Engine has recursively worked through all the configuration steps needed to *set up* the User's computing environment, the User is told in both general and specific terms what has been done, what is pending and what has not been done.

Steps:

- 1) The COLLIDE Engine provides a report and interactively helps the User to understand what has transpired.
- 2) The User is provided with options as to how the report is to be stored, used, passed on to others.
- 3) Scenario 1 is complete. The computing environment should now be working, or the User has a very clear picture of why it is not working and what needs to be done about it. The User is in control of the environment because she has the information she needs in a form that she can use.

COLLIDE: the Nexus Raster Matrix²⁷

This section will describe the mechanism by which the actual translation process will be enacted, with an eye to the development of the translators. The goal of the Nexus Raster Mechanism (NRM) is to quantize the translator components into discrete units that

²⁷ Nexus Raster Matrix is a term I coined to describe the processes described in this section. Nexus is taken to mean the centre to which all things turn, Raster is the process of making image visible on the

are interoperable as objects and do not require the programmer to deal with the myriad of translation possibilities.

There are two options that I can imagine at this point for the COLLIDE translation matrix, one I call the *many to many* matrix, and another I call the Nexus Raster Matrix. The many to many matrix entails the development of translators between each format, and NRM uses a central common format to and from which all translators process the data.

One to one translation requires that a translator exists for each interaction. To translate from format A to formats B, C and D requires the following:

A	to	B
A	to	C
A	to	D

And to translate between all formats, we need translation between all formats:

A to B	B to A	C to A	D to A
A to C	B to C	C to B	D to B
A to D	B to D	C to D	D to C

We also need programmers who understand a variety of formats, as a programmer who wants to be able to translate format A, must know all the other formats to which she wants to program translators. This is problematic when you are hoping to open source the project. Open sourcing requires a more unilateral approach to software development that COLLIDE hopes to capitalize on. And an interesting solution might be found in the Nexus Raster Matrix.

The NRM tries to break the translation matrix down to a discrete series of steps such that the translation process does not entail the creation of an infinite number of translations from * to *. This many to many format implies that for a new wordprocessor or graphics format to become part of COLLIDE that must have translators written to and from every other format. This is slow, unwieldy and expensive. The NRM approach has three advantages. Primarily, there is a faster development cycle, no requirement on the

part of the developer of the translation module to know other formats, and the ability for asynchronous or non-co-ordinated module development.

The NRM solution is to develop a central or nexus matrix. Word-processor or graphics format A needs only to have a translator *to* and *from* the NRM format to function. For our example, we wind up with four translators:

A to/from NRM format

B to/from NRM format

C to/from NRM format

D to/from NRM format

We have twelve translators reduced to four translators in a form that allows the developers to work independently, thereby supporting the individual initiative model of COLLIDE. A programmer working alone can develop and create her own translator to translate from format X to the NMR format. The COLLIDE people need only to develop the NRM format and develop the context platform on which the various NRMs sit.

When a user needs to go from format A to D, COLLIDE would initiate the following process: Translate A to NMR format; translate NRM format to D. This two-step process may have been problematic in the past because of the requirement for two processes with an intermediary format, but with the increase in computer speed this will probably not be a noticeable problem for the user. COLLIDE's NRM is basically taking the extra time required to develop translators for the many to many model and shift the processing burden to COLLIDE. But computer speed is advancing faster than the increased speed in which programmers write programs so this seems to be a reasonable shift in burden. And in some cases, software developers may start using the COLLIDE NRM format to save files, especially creators of smaller programs, shareware and the like.

And Where Does this All Leave Us?

What COLLIDE and its various components is showing is two-fold. In relation to my own journey it represents the terminal point in one cycle and the start of another. And in relation to the location of governance or control over technology as it relates to educators, COLLIDE is an attempt to describe a realizable mechanism for relocalizing governance with the individual (user, prosumer, educator, student). These points are the same to me.

They both represent the end of the road for an old way of doing things and the opening of another path. I have to give up my claim that I hate computers. Though I will certainly never love them, if they are going to become the blackboards and chalk of the 21st century they should be given the same casual lack of regard that is reserved for classroom utilities.

The collision of education and technology is nothing new. In terms of both content and curriculum they have been linked for millennia, but over the past couple of decades, as no doubt has happened numerous times in the past, technology has moved ahead, and education has lost itself in a game of catch up, rather than spur and rewrite each other. My journey has been an exploration of one method of regaining the balance; not one that I would recommend. COLLIDE is another method—let technology take care of its own. As the COLLIDE Use Case shows how the whole paradigm of *user-friendly* technology needs to be stood on its corporate head, it also opens exciting new vistas for education. In MOOkti, and to a lesser extent Project Achieve, I am the COLLIDE engine. I am the go-between, the educational-technological Pandarus. This is the nexus of COLLIDE, just as it is the nexus of teaching and the facilitation of learning by educators. Ignoring all the bullshit that surrounds the profession, educators have the duty to facilitate learning. Just like the postal worker delivers the mail. It is our *raison d'être*. So? As I have said, digital technology wrecked the balance that allowed us to carry on our appointed duties. The scenario has twisted from facilitation of learning to the implementation of curriculum; this is as much a result of technology as it is of governmental fiat. We carry out curriculum as predicated by the dictates of the software and user's manual; in the political realm it becomes the Ministry of Education's CD-rom.

A Future Scenario

COLLIDE is the narrative, perhaps fanciful, of a possible way out of the growing morass of the latest flavour of *teacher-proof curriculum*. As I mentioned above, one of the instances in which collision would be useful, is when a user “tries to integrate two disparate technologies so that they can inter-communicate in a single technological environment (e.g. making Knowledge Forum interact with MOOkti).” Think about this *future scenario*, this *ought*, this *return to service*: Jason is a grade 11 teacher of

environmental education at a semi-rural high school somewhere on the shores of Lake Huron. He wants to teach a unit in aquatic plant ecology, and has been making notes in a CML (Curriculum Mark-up Language) capable word processor. This is not his area of specialization, but he likes to take the students down to the wetlands that separate the school from the inlet on which the town is situated. I have not included, in this narrative, his problematization of the curriculum he is working with, not contextualized it in current theories of environmental education pedagogy or curriculum theorizing. The assumption that this would take place is perhaps presumptuous of me, but I think that this work would be part of a different text.

The school's computers have a variety of functions that he wants to make use of for this unit, some he has used before, and some he has only seen demonstrated. In order to figure out exactly how he is going to do things, he executes the following steps:

- Chooses the word processor menu mark <COLLIDE>²⁸, and selects <New Project>
- Selects, from the menus that appear, the school and provincial curriculum databases. This step will COLLIDE his CML notes and draw from the database's existing plans, references, examples and alternatives, as well as provincial guidelines and requirements. The response generates a hypertextual environment that the teacher can peruse and annotate, select and discard. The database response also indicates possible integrated curriculum links to other classes at the school (mathematics, history, literature and art look promising to him), as well as links to project in other schools, even in other countries (projects in Japan, Siberia and Chile look promising), that are taking up similar issues as he has outlined, and have indicated a desire to link students.
- The teacher selects the curriculum elements, materials, references, contacts and potential integrations and moves to COLLIDE them with the various resources.
- He next selects <administratium> from the COLLIDE menu. This initiates a process that audits the curriculum and generates the necessary steps for department and parental permission, and related forms, allocates resources, and alerts the teacher to

²⁸ The use of angle brackets <option> to indicate variable choices is fairly common as a way of documenting user interactions.

potential problems for which an automated solution cannot be generated (ie. things that require his signature or personal negotiation).

- Finally, with most of the curriculum development underway, he selects <resources> from the menu, in order to bring together the various physical and electronic components. He chooses from the list he has generated, the standard school list, and the particular elements suggested by the COLLIsions in step 2. On the physical side, he must integrate classroom, wet-lab, computer-lab and mud-room (for muddy boots) spaces for various periods and days. On the electronic side he has made a list:
 - One PDA (personal digital assistant) per student group (of three) for note-taking, sketches and digital image capture. Must be waterproof.
 - One digitally capable microscope with projector to accompany the wet-lab's traditional light microscope. Must be able to scan slides.
 - Two unit database server locations for student results: one development and one production.
 - Real-time chat spaces with the ability to spin off new spaces.
 - Digital whiteboard for drawing, plotting and posting images. Must be able to handle video.
 - CVE space for handing data and materials back and forth with other student groups. Must be multilingual and have a function for automatic translation (Japanese, Russian and Spanish).
 - Static web-space for the presentation of the final project. Include standard visitor response kiosks.

Having conceptualized the curriculum and organized the learning environment, he reviews the unit as he has planned it, and makes the additional requisition request for a wireless digital submersible camera that can be linked up to the schools' network. The users, and anyone from around the world can look at what is going on in the wetlands using this "swamp cam." He thinks to himself, "Hey, if this works, maybe I can get enough interest to get the board to spring for one of those new micro submersible bot-cams that can be driven from the Web." and Jason presses the <Just do it!> button and leaves the computer to pull the bits into an integrated and functional whole, folds up his

wireless PDA and pockets it as one of his students call to him from across the forest, eager to show what her group has found.

To paraphrase Elliot's (Elliot, 1922; Eliot & Macpherson 1936) *The Wasteland*, this is the way that technology's ascendancy over education ends. Not with a whimper, or a bang, but with acquiescent compliance. The future is just a COLLIDE away.

COLLISION

COLLIDE is described through the example of setting up a computer within a larger technological environment. And it tries to accomplish this by breaking down the process into a series of scenarios comprised of small steps. In doing this, it is possible to discern, perhaps for the first time for the reader of this dissertation, the true complexity of the technology environment which has up to now been mainly a black box scenario. In a sense, it attempts to demystify the otherwise arcane and opaque world of programming and technology that the educator often thinks she understands, not realizing the abyss beneath the apparent totality which is actually merely a surface. But doing this does not render COLLIDE or technology simple. It does, however, make the complex system less opaque as a system of interactions.

The narrative of COLLIDE is perhaps more of a way station on a journey than the ending of a story (Cole, 1994; Drake, 1992; Drake, 1993; Polkinghorne, 1995). It is the description of the design of a piece of software prefigured by the preceding chapters, and deeply influenced by the creation of, and inquiry into the development of, learning environments. But most of all, it represents a set of conclusions about educators and technology predicated on the personal emergent experience of one educator. In a sense it is an example of what Schön (1983) describes as "Design as a Reflective Conversation with the Situation" (76) and a potential product/solution of a program of action research (Bogdan and Biklen, 1982). My act of conceptualizing and describing COLLIDE is, in part, the design of a new learning environment. But it did not spring fully formed, like Minerva from the head of Zeus. COLLIDE formed as the result of recursive reflective interaction and conversations between myself and the research/learning environment. COLLIDE, then, is both the result and solution that I tentatively put forth as the product of my action research inquiry. It is a work in progress, with a life beyond that of the

dissertation. It is also a work about *process* and *design*, a reflection-on-action that speaks to/reflects the creation of previous learning environments such as MOOkti and prefigures the creation of future environments (Schön, 1983; Schön, 1987).

What makes Chapter Five problematic, however, is that it appears to be presenting its conclusions, ending the story, in a format that is potentially as opaque as the technology it seeks to rethink or rework into a context more apprehensible to educators. COLLIDE could be interpreted as merely creating another layer of complexity, rather than liberating the relationship between users and technology from the hegemony of technology over the user.

I would like to confront the notion that it is possible to reduce or essentialize teaching, learning *or* technology into a series of outcomes, rules, maxims or any immediately apprehensible *system*. COLLIDE does not try to do this. It does try to show how a horribly complex system is made up of a large number of simple and understandable components interfunctioning in a dynamic matrix. The overall intention of COLLIDE is simple; the creation of an underlying structure in which an infinite number of potential interactions can be taken up and dealt with in a manner which presents to the user a clear and concise set of possibilities and solutions to complex problems. COLLIDE does not try to create a reduced and simplified interaction with technology for the 'average user', but rather it allows the user to participate more fully in the inherently complex environment of technology as a major player, versus the present situation in which the individual is primarily a passive participant in what is usually an opaque process.

COLLIDE speaks to the complexity of the processes involved with the use, as well as development and construction of virtual and digital settings. It tries to take up issues of control and connectivity that the average user is not usually aware of, except when something goes wrong. The lack of suitable support for the user, particularly the teacher, in negotiating through technology-based environments cannot be solved by training a better user (Cooper, 1999). Rather, by *training* a better technology that understands the user, it should be able to provide the user with a better sense of appropriate technology, again modifying the technology to the user and the task, not modifying the user and task to the technology.

If the Use Case technique is applied to describe a classroom lesson, taking into account all the actual and potential teacher, student and environment interactions, the resulting series of scenarios would dwarf what is presented in Chapter Five. But because of all the prior assumptions and experience that teachers and learners have with respect to a typical lesson, all of the implicit events are not explicitly stated, taken up consciously or described.

COLLIDE, as described, is not meant to be readable *by* a user/educator as a way to understand her own practice with respect to technology. It is meant to be read and to be readable by academics actively participating in the creation of learning environments, particularly technological learning environments. COLLIDE is not a teacher's guide; it is a proposal for a new way of looking at the way we look at technology, and how technology looks at us.

As well, this presentation of a COLLIDE interaction is also potentially meant for software developers. COLLIDE represents the first steps in describing the entire technological environment in a manner that can actually *be* programmed. And a complete description of COLLIDE in Use Case notation would only be the first step leading to its being rewritten in UML (Universal Modeling Language) (Rosenberg, 1999; Alhir, 1998; Fowler, 1997). The UML version of COLLIDE could then be actually programmed, tested and implemented. But these steps are necessarily the domain of a team of educators, HCI (Human Computer Interaction) specialists, and programmers working together, not a single individual technology savvy educator such as myself.

COLLIDE represents an alternative discourse for the creation of learning settings, through its attempt to re-localize or relocate the discussion more firmly within the experience domain of the educator. The notion that 'teachers can't do technology' is a challenge to the creators of technology and technology-based learning environments. This challenge is to relinquish not only control of the direction and use of the technology they create, and, more importantly, also control over the conceptualization and design of technology. As mentioned previously, it is more important for technology to know and respond to the needs and learning styles of the user, not the other way around. This means that technology must emerge that reflects this alternative discourse such that technology responds to the needs of the user *grounded* within the cognitive and experiential

paradigms in which the user is already familiar as a point of departure, rather than being parachuted into unfamiliar territory.

COLLIDE is just the first taste, a preview of where the inquiry into the creation of learning and technology-based environments can, and I believe ultimately should and will go. And this is the direction where I hope to take my inquiry in the future. But the presentation of COLLIDE within this thesis cannot itself make technology and technologically-based interactions and technology-based learning more understandable to the average user. That is not its job here; COLLIDE is speaking to a hypothetical "sophisticated consumer of educational research and inquiry" who already has sufficient experience and education to contextualize my inquiry within their own. The differentiation is between the user of COLLIDE who sees it as a tool contextualized within the familiar, and the conceptual discussion of COLLIDE intended for academic consumption. The latter audience contain the people to push forth the creation of user-friendly technology through their writing and research (Cooper, 1999). And I hope that COLLIDE will appeal to the reader as an exciting new direction for inquiry and as a potential solution to the problem of re-integrating learning technology within the purview of the user.

Chapter Six: The Dance of the Dissertation

Where I am now is a step beyond the thesis, reflecting back on the various steps and movements along the path, on the journey, from a position slightly removed from the action (Drake, 1992; Drake, 1993; McAlpine and Weiss, 2000). The purpose here is to place some of the aspects or elements of the thesis context and journey in sharper relief. From this vantage point, it is possible to discern an overall structure of the production of the thesis and the journey that it encompasses. Taking up how the proposal got altered under the influences of the various circumstances and players highlights the indeterminate nature of inquiry and how the original plan morphed from a pre-ordinate to an emergent design. The production of the text, resituated as an act of narrative inquiry, reveals the emergent nature of the method. I consider the production of the text to be action research because, by situating my understanding of why I could *do* technology, I entered into a discussion of how I created learning environments and how they could be improved. COLLIDE stands as a way forward, incorporating the story of the narrative, the conceptualization surrounding the created learning environment, into a new paradigm that potentially furthers the development of new ways to create learning environments. Further, it may be a way to rectify the inequalities in the power structure under which educators labour in the new world of technology. Whether COLLIDE works or not is secondary to the occasion allowed for discussing the conceptualization of virtual learning settings, a topic under-represented in the education literature.

In this chapter, I am stepping back from the very personal, explicitly narrative presentation of the previous five chapters of this dissertation, to a more formal reflection on the process, as a way to look forward beyond the dissertation to future inquiry. Reflecting back on practice and process is an important and necessary part of the dissertation, or any other, research process both as a way of understanding professional practice and creating closure of the dissertation process (Cole and Hunt, 1994; McAlpine and Weiss, 2000). I view it as action research in itself because of how the shifting reflections on my own practice as a teacher, as a researcher, and as a creator of learning settings collapsed into a reflection on myself as practitioner of inquiry. As Bogden and Biklen (1982) define it, "*Action research is the systemic collection of information that is designed to bring about... change*" (emphasis in original) (215). In this case, the location of inquiry is the thesis.

In order to accomplish reflective action research inquiry it is important to lay bare many aspects of the research *process* that do not make it into traditional research reports, a larger optic described in *Research as a Learning Process Shaped by Indeterminacy and Subjectivity: A Deconstruction of a Research Process* (Berndorff, In Process). This chapter revisits aspects of the graduate course curriculum intended for the subjects identified in my dissertation proposal, and how the proposal was negotiated in the actual implementing of the data collection procedure and the work with the participants in the learning environment. The nature of the struggle with the process(es), and the questions that the struggle and the process led to, stem directly from this negotiation, leading to the reconceptualization of what I was trying to accomplish in the dissertation. Further to these issues, I will consider how the concepts of indeterminacy — the difficulty in determining the location of a thing or event — and emergence — the notion of the developing nature of a situation or experience — moved the dissertation from its formal proposed path into the realms of narrative inquiry. The shift in focus and intentionality in turn lead to a more complex understanding of the nature of the researcher as learner; that the dissertation was not just about teachers working with technology, but about the larger issue of inquiry into the creation of learning environments.

A Tale of Two Metaphors: Musique Concrete and the Ode

There are two metaphors, two organizational structures that can perhaps articulate the structure of this dissertation in a manner I believe to be more revealing than the accurate, but hard to grasp, non-structure contained in the rubric of chaotic cognition, a term that I use in Chapter One in reference to how I make sense of the world around me (Finke and Bettle, 1996). These two metaphors are "*musique concrete*" and the Greek Pindaric Ode. The first comes out of the composition of electronic music. Between 1983 and 1985, I studied electronic composition at York University. This was a studio course, exploring methods of constructing atonal and arrhythmic aural texts using the technique of *musique concrete*; "Electronic music composed of instrumental and natural sounds often altered or distorted in the recording process" (<http://www.dictionary.com/cgi-bin/dict.pl?term=musique%20concrete>). Using found sounds, processed acoustic

instruments and electronic sound sources, compositions²⁹ were created based on studying techniques of composers such as John Cage (<http://wings.buffalo.edu/epc/authors/cage>), Karlheinz Stockhausen (<http://www.stockhausen.org>) and Robert Fripp (<http://www.elephant-talk.com>). Using these techniques, creating a composition required the construction of a self-sustaining internal structure predicated solely on the incidental emergence in the interplay of the sounds themselves, not on a preconceived form such as a ballad, fugue or other musical form.

The process of creating compositions in this context necessitated a level of intentionality and task dedication far exceeding any experience I have ever had to contend with before or since, up until the production of the MOOkti environment and this thesis. Skills and techniques I learned studying this form of composition have formed the basis of all my subsequent compositions: musical, narrative, pedagogical, hyper-textual and especially academic. Though my published writings and conference presentations usually appear somewhat formal and structured, they are all based on *musique concrete* composition techniques learned during that period, and developed and reapplied since. And this dissertation, more than any other text, represents a manifestation of this skill set; perhaps describable as *inquiry concrete*. What I call *inquiry concrete* is for me what Polkinghorne (1995) describes as the construction of a story as a “meaning-producing operation” through the creation of “a dynamic framework in which the range of disconnected data elements are made to cohere in an interesting and explanatory way” (20). This addresses both the emergent nature of the conduct of the study itself, *and* the written process of constructing its description.

That said, the other structure that metaphorically informs this text can only be discerned by reflecting on the thesis from this point in the thesis right here, right now, as an example of reflection-on-action (Schön, 1987). And the poetic form situates the overall form in which the final product finds itself. And this form, for me, is that of the Greek Pindaric Ode. Most of my undergraduate and graduate education focussed on various forms of verse, from contemporary back to the medieval alliterative tradition and

²⁹ Some of these more accessible compositions are available at <http://www.cquest.utoronto.ca/env/env321y/audio> re-titled as “Basically Wagner”, and “Bifripperating”.

beyond. The Pindaric Ode is a form that was particularly attractive to me because it is based on physical movement; the dance. The major components: the strophe, anti-strophe and epode represents steps in the dance. The strophe represents a sequence of steps, the anti-strophe represents a retracing of those steps. The epode is then a static, atemporal position whereby a chorus reflects back on the dance witnessed.

This form serves to reveal the format of the thesis; the emergent negotiations required to create the learning environment, realize the research, construct the narrative and complete the thesis are made up of a series of strophe and anti-strophe dancing forth and back on themselves in successive waves of action research and inquiry; “a recursive movement between the data and the emerging” understandings (Polkinghorne, 1995, 10). This final chapter stands as the epode. Set back and divorced from the dance, this epode reflects the entire process and seeks to place the dance of the thesis within the larger realm of the dissertation proper. These two metaphors, *musique concrete* and the Pindaric Ode are ways to make sense of what this dissertation is doing.

Data Panic in the Year Zero: How Aspects of the Curriculum Anticipated in the Dissertation Proposal Were Negotiated.

Polkinghorne (1995) notes that the “function of narrative analysis is to answer how and why a particular outcome came about” (19). And it was through the analysis presented in this chapter that I am able to locate and contextualize various key events and directions. As I have mentioned previously, many experiences, conflicts, and discussions lead to how I reconsidered the data. But from this vantage point it is also possible to see how other important elements informed the decision. I reflected back to the original thesis proposal as a means of understanding changes in the format and content of the thesis. As late as July, 2000, year zero, I had yet to voice, even to myself, what went on in the negotiation of the curriculum of the research participants anticipated in my proposal versus what was actually manifest in the two classes I worked with, and on which I collected data. But on reflection, this is an important realization in coming to an understanding of how I became for a while paralyzed by the data and its analysis according to the dictates of the dissertation proposal. To a very large extent, the proposal laid out a structured curriculum for the graduate courses which did not get realized as

expected in the actual setting of the learning environments. Reasonably enough this was due to the emergent negotiations of working in someone else's class with their students. The negotiations, first with Lynn Davie (the course director), and later between Lynn and his students (the participants in my research), made it unlikely for me to engage the participants within the learning environment of MOOkti as I had intended.

The proposal anticipated an emergent element in the research, because of the limited amount of previous educational conceptualization and emergent inquiry into collaborative virtual environments such as MOOkti. At this point, the notion of emergent research referred to the data collected and the questions asked of the data. The depth of the indeterminacy of the entire research project, from the ongoing construction of the environment, to negotiation of the curriculum, changes in the focus and location of inquiry and research questions, to the production of the thesis text and COLLIDE, was not something anticipated. Indeterminacy, when it comes to inquiry, is the recognition of the difficulty in knowing how a situation will play itself out. I thought that I would be able to carry out a traditional research strategy, as long as preparations were made for unanticipated situations in the actual constructed virtual environment itself. Eisenberg (1992), in reference to McLuhan, highlights the emergent relativity of indeterminacy found in inquiry — "*how* we do things constitutes *what* we know" (3) and that "*prevailing* environments are invisible or unperceivable" (3) — suggesting that we must be prepared to deal with situations where a large percentage of the environment is in flux, *and* that we may not be able to see where the main energy of the environment is directed. The idea of the emergent relativity of indeterminacy defines the realization that how understanding of a situation develops over time depends on the relativistic positioning of the person conducting the inquiry; "the understanding of the new action can draw upon previous understanding while being open to the specific and unique elements that make the new episode different from all that have gone before" (Polkinghorne, 1995, 11). As someone involved in action research in virtual learning environments, not only was the indeterminacy of the environment a factor, but also my shifting location within the research environment. As new experiences and understandings emerged over time, I shifted my positions relative to the environment and inquiry. The relativity of perceptions and understandings developing according to the differing locations where I was

positioned, led to new reconceptualizations of what I was trying to accomplish. It became clear that the original proposal was inadequate for the task.

To my way of thinking, indeterminacy is a crucial element of chaotic cognition that recognizes not just the intrinsic inability of an individual or environment to know itself in the sense of Heisenberg's uncertainty principle. I think Heisenberg recognizes that what we see is the result of our interaction with a thing, not the *thing in itself*, "I believe that the existence of the classical "path" can be pregnantly formulated as follows: The "path" comes into existence only when we observe it" (Heisenberg, 1927; <http://www.aip.org/history/heisenberg/p08c.htm>). This is not a revelation, but the articulation of how some of us feel as we interact with the world around us. The "nature of social indeterminacy" that Eisenberg describes is central to technology and information processing. A recent page on *The New Scientist* web site suggests that Heisenberg was less describing a theory of quantum mechanics, than describing a theory of information (<http://www.newscientist.com/ns/980314/info.html>). However, this is at the leading edge of inquiry. Here in the everyday world "we are effectively dominated by a dogma of rational method in all social endeavors... when we view everything in fixed categories conforming to patterns of regularity that we can determine and upon which we plan our life activities" (Eisenberg, 1992, 25). The "notion of a complete, self-sufficient, independent, objectively knowable order simply does not mesh..." (Eisenberg, 1992, 18) with the chaos of my cognition or the emergence of the learning environments I participated in the construction of.

The proposal lacked the flexibility to account for the indeterminacy of the research environment. Nor did it anticipate that in any planned research activity it can be very difficult to conduct its activities faithfully. MOOkti was not a lab situation, despite how my proposal may have, at least in part, unconsciously required it to be. As Eisenberg (1992) notes, things do change, and the dissertation changed to accommodate how the research unfolded, what I learned from creating MOOkti and working with people inside it, and how I grew to understand how I made sense of the world. The researcher is necessarily a learner, and this learning found a home in the intuitive realization of being involved in an inquiry that was less commensurate with technical rationality (Schön, 1983) than based in a different epistemology of practice, a chaotic epistemology (Finke

and Bettle, 1996), in realizing who I am and what my interests are as a conductor of inquiry, and in realizing the subtle nuances of the environment of research. The thesis evolved the way it did because I re-worked the research in my own style and brought the research in line with how I taught, learned and created learning settings; that is, dynamically, responsively, and contextually. It is presented in the form of a story, trying to unite the elements of experience and to communicate that experience is fragmented and disorganized. The story can provide a sense of order that does not reduce the inquiry to the reporting of data, but provides a story or plot structure that “serves to configure or compose the disparate elements into a meaningful explanation” (Polkinghorne, 1995, 18). This was again, an unanticipated emergent event that overtook the dissertation.

The directed curriculum described in Chapter One represents the final form that the curriculum negotiations took. What is missing are my intended steps that were to lead to the participants' actually learning to program in MOOkti (see Appendix A). This final condensed curriculum meant that there was less of an opportunity for the participants to differentiate themselves in terms of the amount and nature of what they could learn and create during their interactions with the research environment and what they could learn about the environment itself. There was some differentiation, as some participants communicated more or created more complex objects and interactions. But the differences were not that great. Very few went beyond the basic creation and description of rooms and some basic objects, and I think none of the participants even approached the first levels of basic scripting of dynamic interactions such as bots (Leonard, 1997), or programming without significant intervention. Without realizing it at the time, this reduction in the complexity of the possible interactions from proposal to implementation no doubt triggered the researcher's frustration with and ambivalence toward the data collected. Furthermore, with the second class of students/participants, the opportunity was negotiated for some of them to choose to not work within MOOkti. Three of the participants did not use the research environment at all for their final projects. With three of the eight participants, in what was intended to be the most important advanced course using MOOs, not actively completing their coursework using the research environment put severe limitations on the complexity of the interactions and objects available for analysis.

That the curriculum intended for the dissertation was not necessarily the curriculum of the course is not an issue about the course, just about the research. Lynn took the students as far as he thought they could or should go. And this is consistent with what I perceive to be his pedagogy as an adult educator. It is characteristic of good teaching to allow students some choice in terms of how they take up work. The choice, however, merely deviated from the somewhat formal curriculum I had created for them; a curriculum that had perhaps been overly enthusiastic in its intentions. We did not go as far as the *proposal* required to allow intentions of the research to reach fruition, so the data was somewhat *flatlined*. But it was only on reflection on the almost completed thesis that I realized that this was primarily because the intended curriculum could not be applied.

About this time when I was trying to come to grips with the data, I had the conversation with Joel, on why I, a teacher, could *do* technology. This conversation folded the thesis back in on itself and myself as locations for inquiry into the creation of learning settings, and in particular, virtual learning settings. Part of the problem that led to the novel conceptualization, "why teachers can't do technology", can be located in the fact that many of the participants were not classroom-based teachers but educational technology professionals in non-school settings. I do not think that the issue of the participants being teachers or not ever became an issue, mainly due to the fact that the proposed research never got to a stage where I could take up such issues. Perhaps the data would have suggested something of interest in terms of the relationship between classroom-based and non-school based educators that would have been of interest, but we will never know.

The (re)Structuring of the Proposed Research

As mentioned previously, the original proposal recognized the emergent nature of the co-construction of the MOO environment. It recognized the negotiated nature of constructionist spaces. But it was embedded, partially, in a discourse that did not turn out to be commensurable with the particularities of the environment being researched. All of the research I had participated in up to the writing of the proposal had a very dominant quantitative component with qualitative data serving merely to enliven the statistical

aspect of the inquiry and the interpretation of the quantitative data (Berndorff et al., 1996; Berndorff, 1999; Berndorff, Unpublished Dissertation). This is very much how I originally conceived of my own program of research. I *knew* what I was collecting data on. The potential objects and interactions were known to me, from years of working with people, educators, programmers and casual participants in MOOki. So, even though I explicitly intended to conduct inquiry into an emergent technology and learning environment that was being constructed and re-constructed on-the-fly by participants and MOOki programmers it did not occur to anyone to consider the indeterminacy and the relative impossibility of a program of research that had the rigidities I had built into the directed curriculum. I had built a program of research into the development of the learning environment I had co-created with so many hundreds of others, but I had not, until I came to the struggle of writing the dissertation story and narrative analysis (Polkinghorne, 1995), taken up the notions of action research in the voice of the researcher and the practice of doing research inquiry.

Considering Narrative in a Larger Context

When viewed under the critical lens, narrative inquiry has its own problems, but the last 30 years has seen its ascendancy in many disciplines, aside from education and anthropology, gaining currency among philosophers, historians and scientists (Kreiwirth, 1995). That virtually “any attempt to describe events or phenomena in time — concrete or abstract, fictional or factual, formal or informal — invariably take a more or less narrative form” (Kreiwirth, 1996, 63) means that narrative is always more than a story of events or experiences (Oort and Iser, 1997). It is a social act, and as such is part of a larger social context, virtually always. The narrative problematic, however, is located in the “current climate of anti-foundationalism... a response to the breakdown of transcendental truth claims” of previous modes of inquiry (Kreiwirth, 1996, 63). The question however, is “why narrative?” As Kreiwirth notes, narrative has become a field of inquiry in its own right, beyond its utility within other forms of inquiry. Narrative is itself now a location for critical inquiry (Kreiwirth, 1995; Polkinghorne, 1995; Trifonas, 2000a; Willinsky, 1989). The issue forces a reconsideration of how Connelly, Clandinin, Eisner, and others mentioned previously in this thesis, critically assess the role of

narrative as a force for meaning-making with relation to emergence and indeterminacy, and locations for further inquiry (Trifonas, 1993).

Though narrative serves to tease forth the storied profession of teachers (Pagano, 1991), and works well to contextualize personal experience within professional practice (Clandinin, 1985; Clandinin and Connelly, 1994; Clandinin and Connelly, 1990; Connelly, 1990; Willinsky, 1989). And, though much of the educational literature on narrative mentioned in this thesis directs us to take up this challenge within our own narratives, the conceptualization of the methodology often does not challenge its own context. This context can be seen to fetishise or essentialize narrative as a new truth in a manner that is local and personal; tied to individuals, specific events and experiences, rather than the political aspect of narrative within the institutions and other contexts in which narratives are embedded (Willinsky, 1989). Does narrative inquiry in the field of education actively encounter and challenge previous or dominant modes of inquiry and meaning-making directly, or does it situate itself in isolation to the dominant institutions and ideologies.

I think that my narrative(s) take up the challenge, after a manner. And they do this by challenging the personal ‘essentialities’ of my story through the development of a paradigmatic narrative (Kreiwirth, 1995) in the form of the narrative of the COLLIDE environment in Chapter Five. The effect is one that balances Foucault’s notions of the “will to truth” as represented in my narrative’s attempt to expose the mechanisms and origins behind the construction of learning environments with the “will to power” represented in COLLIDE that seeks to lay bare the user/technology power relationship through (re)addressing the balance between the user and technology in terms of the geography/topology of the relationship and the observability of the other (Foucault, 1979; Foucault, 1980a; Foucault, 1980b; Willinsky, 1989, 253-254). Juxtaposing personal narrative with the COLLIDE Use Case narrative description of a technology/software environment seeks to challenge the interiority of the personal narrative, while avoiding the temptation to make its own claims of universality; of metanarrative. The attempt is to “weave idiosyncratic narratives of our own success in self-creation” (Kreiwirth, 1995, 69), while avoiding concluding the narrative with the self. Teacher’s narratives, and the theory surrounding them are open to the complaint that they do not appear to challenge

themselves in this manner, missing an important, though not the only, opportunity for anterior validity. The narrative that makes up COLLIDE eschews what could be called metanarrative of narrative inquiry that privileges the particularities of the story itself, over its context (Willinsky, 1989).

The intersection of my personal narratives of Chapter Four, and the COLLIDE narrative of Chapter Five informs my personal story with an alternative pathway(s) to the techneducator, while still keeping within the domain of the “little narrative... defined by their local, contingent, and non-totalizable discursive energies” (Kreiwirth, 1995, 71). While there is a danger that COLLIDE, taken in isolation, could develop into a metanarrative itself, within the dissertation, couched between my personal narrative in Chapter Four and the metanarrative of technology and the monolithic code of software, it stands at a midpoint as a challenge to both paths, as a narrative of its own; a prefiguring story of its own construction. In one voice, it is a tool, story and context for the creation of future stories. COLLIDE can be said to take up Lyotard’s burden of the “social instrumentality of narrative” (in Kreiwirth, 1995, 72) by allowing for my personal narrative a place in future narratives. COLLIDE is a narrative in and of itself; its plot is the weaving of a new technology that bridges the past and future; personal and abstract; self-contained and facilitating. It is also a storying space that forces into the metanarrative of the discourse of technology a new context or environment in which new stories, those of the users of COLLIDE can be created. The stories that COLLIDE most obviously anticipates are the stories of the user gaining control over the technology environment that has previously exercised control over the user.

But COLLIDE does not restrict the stories that can be told, rather it facilitates whatever stories the user chooses to explore, create, or tell in using COLLIDE; as an egalitarian act (Willinsky, 1989) of resituating at least part of the locus of control over technology within the purview of the user of COLLIDE. As such, COLLIDE is a tool of action research, serving as a “deliberate process for emancipating [the user] from the unseen constraints of assumption, habit, precedent, coercion and ideology” (Carr & Kemmis, 1986, 192) of technology. As I have suggested, COLLIDE is not a metanarrative, an overarching theorizing structure, because it contains within its story no meta-voice that seeks to control what stories can be told with or within it. COLLIDE

conversely seeks to liberate *the story* from the hegemony of the metanarratives of technology in a “posthumous moment” (Brooks, in Kreswirth, 1995, 76) beyond the event of its own telling. Chapters Four and Five are a dialectic in my development, describing my path as an historical narrative in Chapter Four and centering the path of the narrative with COLLIDE as an alternative mechanism to reach the similar ends. In my case the end point or goal is that of the techeducator; the educator who is able to exert a controlling influence over technology in the pursuit of her professional practice.

Reflections on the End of an Era

Having described the intersections and emergent understandings that resulted in the realization of both the research and the thesis, it is reasonable to speak about locations and directions for new research and inquiry. The two major directions I anticipate for future inquiry are towards Project Achieve and COLLIDE. Project Achieve, the second generation of MOOkti environments, would be the location in which to study virtual learning environments to see what future research can tell us using the tools, experiences and understandings gained through the research conducted for this thesis. COLLIDE, as a program of research, though leading away from the kinds of technology-based learning environments of MOOkti and Project Achieve, still deals with an emergent technology that is a form of learning environment. I believe they take up much of what has been learned through the inquiry that (in)forms this thesis.

There is potential value in attempting to conduct quantitative inquiry into virtual learning environments such as MOOkti and Project Achieve. What perhaps needs to be accomplished is to conduct inquiry into what goes on in virtual environments looking at a younger group of learners and in a more formal manner. Doing this would require the identification of a number of classes of intermediate or secondary school students, perhaps 200 students in ten classes. Inquiry would follow a specific path to consider research questions in areas of interest, situational interest, motivation and affective/cognitive domain gains. I would envision that this inquiry would begin with a prior learning assessment tool in order to gauge student abilities, interests and knowledge about computers and online learning, and familiarity with both project-based and constructionist learning. A similar tool would be applied to the teachers and the technical

support personal. As well, an audit of the technology and networking infrastructure would help provide a complete picture of the environment in which research participants would be working.

I would choose school students and their teachers for this research only because of the ease of accessing a group with the requisite congruity of skills and experiences. It would be possible to conduct inquiry with a self-selecting group of people found at random on the Internet and brought into the research site, but coordinating data collection, participation and follow-up would be appreciably more complex.

The base-line assessment could stand as a pretest for analysis, to be followed up by a summary diagnostic tool (as a posttest). Following the initial assessment, participants would be given access to the research environment (Project Achieve) for the first stage of familiarization with the environment. The participants would all be given a curriculum that involved learning about the environment and how to construct representations of people, places and things. The next step would be to provide participants with a creative problem solving (CPS) tool such as the one presently used with Project Achieve to develop a project proposal. Participants would then form groups to complete the CPS tool, and then to create a project, based on the plan they developed with the tool. The final product, based on the proposal, would then be presented publicly to other participants. Each group would be given the task of evaluating one other project, based on a criterion developed collectively by a committee consisting of members of each group. Finally, the summative survey would be applied in order to collect data on perceptions, experiences, and attitudes of participants.

Discussions in this direction have been initiated with cognitive science researchers in Australia. However a number of factors: the nature of the environment, the complexity and indeterminacy, has presented barriers that have been difficult to overcome. Particularly, the difficulty in situating the necessary controls and structured program of research have not been successfully addressed, though a much more thorough set of utilities for data collection have been implemented for an ongoing research project on second language learning in virtual environments that I am facilitating for a colleague at OISE/UT.

Another possible direction for inquiry is to locate and work with a group of educators who are as deeply involved in the construction of virtual learning environments as I am. The potential to co-construct collective notions of what it means to be a techneducator and to learn to *do* technology is intriguing. But I have yet to identify a group of educators with whom this direction of inquiry may be brought to light. The data collected would consist of the two diagnostic tools: the project proposals, the objects created as part of the process of learning about the Project Achieve learning environment and project implementation phases. As well, transcripts of all the communications and interactions of all participants during the entire research process would have been collected. This plan of inquiry would hopefully run for a year or more.

A final potential research trajectory is located in COLLIDE. The obvious direction that I have been discussing with a half dozen programmers, educators, technology specialists and venture capitalists around the globe is to try and construct a COLLIDE environment as outlined in brief in Chapter Five. Concomitant with the manifestation of COLLIDE as a viable technology would be the implementation of a program of action research inquiry. This inquiry would follow the development and deployment of COLLIDE from its very roots in this thesis. It would not only provide an emergent documentation of the creation of a new technology, but also actively locate an educator-based research agenda firmly at the centre of the development of a new technology. This direction of action research addresses issues of governance in the co-creation of technologies, rethinking the location from which technologies and related learning environments are generated. But an undertaking of this magnitude would require a small legion of technology savvy educators intimately participating in and conducting inquiry on all aspects of the development process.

COLLIDE, as a location of inquiry, would provide a valuable window into the perceptions of researchers, educators, programmers, beta testers, administrators, and the general user-base to provide a detailed ethnographic picture of the community that surrounds the creation of a technology environment. I think that the method of analysis would be that of narrative analysis (Clandinin and Connelly, 1990; Clandinin and Connelly, 1994; Connelly and Clandinin, 1990; Kreiswirth, 1995; Polkinghorne, 1995); “dialogical productions resulting from interactions between subjects and researchers”

(Polkinghorne, 1995, 19). The form of the storied narrative would probably follow the manner of Glick's (1987) inquiry into Chaos Theory, in *Chaos: the Making of a New Science*, or Regis (1995) in *Nano: the Emerging Science of Nanotechnology: Remaking the World-Molecule by Molecule*, with the added factor that inquiry would proceed in step with the development of the environment under consideration. As well, the researcher participants would be part of the process from the beginning. I would hope that it would be possible to train the key participants in techniques of action research so that the educators, programmers, testers and administrators would have the dual function of also being the researchers conducting inquiry into their own practice. They would collectively co-construct the narrative of the development and implementation of COLLIDE.

Beyond conducting inquiry, their action research would be an integral part of the development process of the technology itself. The observations and inquiry would be situated within the space of the construction of COLLIDE such that the observations would be factored into the software development and deployment. The act of inquiry and creation would be part of a single recursive process of software design and development, and research inquiry.

Other paths include inquiry into narrative as a form of inquiry in constructing learning environments. Learning through the stories we all share is a late addition to this dissertation and my own understanding of educational inquiry. But it is one that I am now actively pursuing through the (co)writing of a novel called *The Teething Ring* and its protagonist, collaborator SarahSmiles, who constructs her world daily online at <http://www.sarahsmiles.com>. This path explores the fictional creation of a learning setting and how the characters make sense and meaning out of the chaotic constructionist world into which they have been thrust by the author. A final strand, and potentially the most exciting for me, is continuing the inquiry into the conceptualization of *space* and how we create, learn about and live in spaces without ever really understanding what they are and what *space* as a concept really represents (Lefebvre, 1974; Wertheim, 2000). All these potential paths away from this dissertation may seem to suggest that no questions have been answered. And perhaps suggests that no answer can be found here. But there

are *answers*. Many of them. And like all good answers they lead to new and often more promising questions for further inquiry.

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Appendices

Appendix A

Actual Curriculum Used for Some of the Research Courses Under Observation

Tonight, we will look at the following:

- What is a MOO
 - MOO Metaphor
 - MOO Topology
 - How do MOOs work in Education
 - Theory
 - Practice
 - Future
 - My Research
 - How to make MOOs work
 - Assignments
-

What is a moo

MOOs are a form of text-based virtual reality. In a MOO, you interact with a virtual environment using text and a basic series of commands that you type to move through MOO space, examine your surroundings and communicate with other characters.

MOOs are an emerging form of educational computer-mediated communication, a text-based polysynchronous collaborative virtual learning environment that allows users to design and program models of people, places and things, and share them with others.

MOO stands for MUD Object Oriented, and describes a server, database and programming language (Curtis & Nichols, 1993). MUDs are Multi-User Dimensions/ Dimensionals/ Domains, and are roleplaying virtual environment (Bartle, 1990).

MOOkti is a learning environment based on the LambdaMOO database and server, version 1.8.0p5 (Curtis 1996). Polysynchronous environments are defined as virtual spaces which closely approximate Real Life environments.

People communicating polysynchronously not only talk synchronously (in real time) but also create temporal objects such as mail messages, newsgroup messages, as well as objects that can be experienced by others.

How do MOOs work in Education

Online learning in polysynchronous environments, moves beyond the present "system of calculation," the substrate of our educational system, to one of "symbolism" (Turkle, 1995). MOOs are symbolic environments; that which is imagined and described is created.

And since there are no constrictions on what can be created in this manner, there is no de facto educational hierarchy in the MOO from which the educator derives power.

For educators to function successfully in symbolic learning environments and within the non-hierarchical context of the Internet, there may be a need to embrace the notion of learning through the co-creation of learning community, and then link these voluntary learning community spaces in informal settings to the formal setting, and in turn revolutionize it.

MOOs are environments for **collaborative, constructivist, student centred learning**.

What examples can you imagine MOOs are being used for in Education?

How to make MOOs work

Command to be Typed	Explanation
home	This command takes you to your home base. If you haven't made a home, the command will send you to the Global Commons at MOOkti.
go [direction]	When you enter a room, you will see a description of the room. At the bottom of the description there will be a list of obvious exits. You can choose to go through any of the exits by typing go and the name of the exit. Or you can just type the name or abbreviation of the exit by itself.
walk to [room or player]	The walk to command finds a path to that room or player's location and

name]	then takes you there.
look [me, self, playername, direction, exitname, object]	The look command, by itself, will get you a description of the room you are in. Look me, look playername, look direction, look exit name, and look object will also get a response.
@rose	This command will show you a compass rose with all of the obvious exits for whichever space you are in.
@who	This command will show you who is connected, where they are, and what their status is (usually blank).
@join [player]	If you know someone is somewhere in the MOO, usually because you typed @who, you can type @join and the character's name and be teleported to the location.

Command to be typed	Explanation
say text	If you want to speak to someone, perhaps to say Hi, you would type say Hi and hit your return or enter key. You would see the message You say, "Hi" . Everyone else in the same room would see YOURname says "Hi" . You can abbreviate say by typing " .
emote text	Emotes are fun. They are a way of entering a description of a certain action. If Tom types emote rolls up into a ball and floats through the window , everyone in the room will see Tom rolls up into a ball and floats through the window . We can use emotes to shrug, or smile, or any nonverbal message we want to send. You can abbreviate emote by typing :
page username with message	If you know that someone is connected to the MOO (because you typed @who), and you want to let that person know you're looking for him/her, you type in page username , and he or she will receive a message something

	like "You sense that Tom is looking for you in Muse's Mews (or wherever you are). If you want to send a message to the person, you could type page Tom Come Quickly! and that message would be sent to Tom.
-username message	If you type in -Tom How are you? others will see Sue says [to Tom] How are you?
social	If you type social you will get a list of all the actions that are available in the MOO. Some examples follow on the next few lines.
bow playername/all	Tom bows to Susan or Tom bows to all.
wave playername/all	Tom waves to all.
jump playername	Tom jumps on Mike.
think me	Try this out and see what happens.
hug playername	Tom hugs Susan.

References for the Educational Uses of MOOs

Visit: The I came, I Mooed, I logged out: Muds, Moos, Mushes, and Moose collection.

This link includes all the MU* stuff previously contained here.

<http://www.oise.on.ca/~jnolan/moo.html>

This is the end of your MOOkti tutorial.

Assignments

There are three assignments:

Find Lynn's Learning Lounge and Breakout Rooms. **Find your own colour room.** Create ONE note recorder **per group** and lock it in your breakout room.

- @create #204 called <NAME>
- drop <NAME>
- @lock <NAME> with me
- @mailme <NAME>

Discuss a topic in the breakout room and mail the transcript to yourself.

Imagine that you are a part of a committee at a college or university charged with the responsibility of deciding whether to recommend the adoption of a computer mediated conferencing system. While the committee eventually feels that they will want to recommend a particular system, they decide to begin by investigating whether a conferencing system could be used to offer courses.

They decide to begin with a comparative study between face-to-face classes and courses offered by computer conferencing. The problem is that the committee needs to decide:

1. What kinds of things are important to compare? What data should be collected to compare one method to another?
2. From whom would it be important to collect data?
3. What kind of data should be collected? (surveys, experiments, interviews, etc.)
4. Use the note recorder to make a transcript of the conversation. Mail it to yourselves, edit it into answers.
5. Send a short note to the instructor with the answers and the transcript to these questions by ??.

This activity is intended to facilitate MOO-based group work and give you the opportunity to develop skills in navigating through virtual spaces.

You must, as a group, complete these 10 tasks based on the clues. The assignment is out of 25, One point for completing each task. One point per task for a description that shows your group's particular experience vividly, and 5 bonus points for Scavenging above and beyond the call of MOOdom.

- Only as guest, as a newbie, **inexperienced**, can you find this place. Bonus if you can get there more than one way.
- Find one bar in MOOkti and get a drink. You will get a copy too. Identify the bar, and give the name of your mug
- Find Olisi's photo gallery (Kirkjubaejarklaustur), and explain which picture you like best. (hint: use the web and look for Olisi)
- Find 5 roBots and identify the date you found them and their location.
- Get from Joe out in the meadows, **one** of what he gives freely. Provide object numbers as proof. <@d objectname>
- Find a personal home of a moo user, and explain why it is the most interesting one you have found. (content, location, design)
- Identify at least two of the three 'bookshelves' in MOOkti, and identify what you read.
- Describe 2 things you can do from the dock: above, below, beyond, and over. (hint: jump)
- Describe what you did, and who you did it to in the Bathhouse (4 options)
- Find 3 of the 4 ways to get into the Catacombs, with a bonus for finding the Mountain King's hideout.

Bonus: Anyone who can describe how they got to /dev/null

Task Three: Making it up yourself!

The task is for you to turn a room on the 3 floor (take the elevator) into an educational display of some sort. The educational objective is to develop an example of a simulated interaction. The technological objective is to demonstrate your group's ability to teach each other using online learning aids.

Suggestions: Visit the museum and *bookstall* ([@museum](#)) and the [help](#) webpages and check out some of the generics available. Examine some of the interactive statues and GRIBs (Joe, Judy, Merrill Lynch, Neko). Consider examples of MOO spaces that you visited for the previous task. Also consider Traveller's BOT (type: <explain index on #170> in MOOkti.).

For ideas:

- Talk to MOOers, especially with those who have mooed before this class.
- Talk with non-OISE mooers.
- Visit rooms of OISE students (In mookti towers AND the elevator from Lynn's Learning Lounge.)
- The best example (beyond the scope of this course) is the [Visual Literacy](#) tutorial done by Tom et al. that links MOO with web elements.

The product should have the **SOME** of the following elements:

- be added to the 3rd floor of Lynn's Learning Lounge
- a different parent for the room from the default
- development of the web page for the room, [red](#), [green](#), [blue](#), [yellow](#), [white](#).
- building a room off the 'breakout room' (this will require help from Jason)
- populate it with suitable objects to reflect your curriculum objectives
- set appropriate web elements for the room. ([help web](#)) (See olisi's example.)

Appendix B

Research Questionnaire

Research Questionnaire

Hello everyone!

Thanks for helping me out with this project.

The purpose of this questionnaire is to develop some data that can be used to contextualize what you did in MOOkti with your self-conceptualization as an educational professional. The more honest your responses are, the greater the likelihood that the data will reflect your professional practice and your MOO experience. I hope that this will lead to an understanding of how teachers learn about Virtual Learning Environments such as MOOs.

There are 3 steps:

- Put your MOO name in the first field. **This will only be used to later link this questionnaire with your ID number. Then name data will be discarded.**
- Read each question and then select your response from the pull-down menu next to it. You must choose a response for each question before the program will submit the data.
- Provide us with some comment about the research tool at the end. Any response you make is acceptable.

If you have any questions about the research, please feel free to contact me by email.

MOO Name:

When did you first MOO:

- 1) How would you rate your level of computer skills?
- 2) Do you teach computers as part of your workload?
- 3) How many computer related courses have you taken?
- 4) How many computer related courses have you taken at OISE/UT?
- 5) Which computer platform do you prefer?
- 6) I think that MOOs represent the following kind of environment:
- 7) How long did it take for MOOs to start to make sense.
- 8) MOOs teach me about constructivist learning.
- 9) MOOs can teach about the net.
- 10) MOOs can teach about programming.
- 11) What was your main source of information on how to MOO:
- 12) Compared to learning HTML/web page design, how do you rate the work involved with learning the basics of MOO?

Please respond to the following questions in the context of your professional practice as an educator.

- 13) I prefer to work with material that is really challenging so that I can learn new things.
- 14) I have no trouble motivating myself.
- 15) If I come across something interesting, I will continue to explore it on my own.
- 16) I prefer to know exactly what I am doing before I start.

- 17) If the material is interesting, I can work through difficult problems.
- 18) I don't like to make mistakes, under any circumstances.
- 19) If I am working on an interesting problem, I sometimes lose track of time.
- 20) I prefer challenging tasks even if I don't do well at them.
- 21) Please describe the extent of your experience with computers.
- 22) How would you describe the way in which you prefer to interact with computers?
- 23) Please describe your initial experience with MOOkti.
- 24) Describe your experience with MOOkti at the end of the course.
- 25) If **YOU RAN THE MOO**, what would you do? How do you envision or conceptualize the use of MOOs in your teaching and learning.
- 26) Would you be willing to participate in an open ended interview about your experiences in the MOO? If so, please enter your name, email address, and state where you would feel comfortable being interviewed.

Appendix C

Raw Data Example

Jul 9 21:45:53 1998 #90 #1609 @participate on
 Jul 9 21:46:00 1998 #90 #1609 x IT has started.
 Jul 9 21:46:13 1998 #90 #1609 What is the file name? /leigh/files/logs/jason?
 Jul 9 21:46:59 1998 #90 #1609 Zen is going to get them. From project gutenberb.
 And she said that she's slice them up into moosize pieces.
 Jul 9 21:47:36 1998 #90 #1609 Do you know gutenberg project?
 Jul 9 21:48:46 1998 #90 #1609 x What channel?
 Jul 9 21:49:27 1998 #90 #1609 x I hope so. I was getting scared.
 Jul 9 21:51:41 1998 #90 #1609 x Oh? really. YOu wouldn't like it
 Jul 9 21:52:22 1998 #90 #1609 xm`trav Leigh has done it.
 Jul 9 21:53:25 1998 #90 #1609 x I've started datacollection on me. So I'll know
 when the utility was first online. Jul 9 21:45:53 1998 #90 #1609 @participate on
 Jul 9 21:59:14 1998 #90 #1609 xm:is really fostering indepth reflection and
 communication tonight.
 Jul 9 22:04:38 1998 #90 #1609 x I just want to see what happens when 30 people
 are all having data collected on them at once.
 Jul 9 22:07:47 1998 #90 #1609 x does it follow permissions of the unix account
 under which the moo ist started? ?
 Jul 9 22:11:11 1998 #90 #1609 xgrin
 Jul 9 22:17:53 1998 #90 #1609 x Now I'm scared to act, knowing that all my
 stupidity will be on the Transcript.
 Jul 9 22:22:11 1998 #90 #1609 x I know. But I'm just getting a feeling for what
 the subjects might feel. So I can tell them to just do it anyway. ;-0
 Jul 9 22:25:57 1998 #90 #1609 x Ive got 10 drafts of my paper, but not the final.
 Jul 9 22:28:47 1998 #90 #1609 x Bedtime for me, I bet.
 Jul 9 22:28:59 1998 #90 #1609 xm:makes tea
 Jul 9 22:29:11 1998 #90 #1609 x Night

Appendix D

Letter Of Consent

Teaching in MOOkti: A Polysynchronous Collaborative Virtual Learning Environment

Jason Nolan at the Ontario Institute for Studies in Education at the University of Toronto (OISE/UT) is conducting a study, under the supervision of Professor Joel Weiss, that will investigate how educators work in virtual environments. Proposed research looks toward developing an understanding of how educators can be trained for and work in polysynchronous virtual environments; to inquire into how educational professionals make sense of and localize virtual learning environments in their own practice; to explore collaborative and constructionist elements of teaching on-line; and to develop a base-line understanding of teacher learning in these environments for future projects.

Participation in this research is completely voluntary. Your instructor will not know who has agreed to participate, and will have no access to the raw data. Participation will have no impact on evaluation or assessment of your studies in any course. You may be asked to participate in a post-exposure surveys and an open-ended interview after the course is finished. As well, a complete transcript of your interaction in MOOkti MOO will be recorded. You will be able to withdraw from participation at any time by typing a command <@participate off> in MOOkti. And you will have the option of having all data on you destroyed. All participants will be noted on transcripts and data collection by a 3 to 4 digit number. Data will be reported using pseudonyms. All data will be stored on a secure password protected server. Specific subjects will be invited to read/comment on parts of the dissertation that represent particular situations in which they are prominent. The entire dissertation will be available on-line as html documents, and you will be invited to read it.

Sincerely,
Jason Nolan

I, _____ (name) **agree /do not agree** to participate in the study. I understand that I may withdraw from participation at any point.

Signature

Date

Appendix E

@participate Sequence and Transcript Data

@participate on

Your commands are already being logged to a transcript file.

@participate off

You have requested to be removed from this research. Are you sure you want to do this?

[Enter `yes' or `no']

yes

Do you agree to allow us to use the data collected on you up to this point?

[Enter `yes' or `no']

no

Your data will be deleted from the transcript file.

Your commands are no longer being logged.

Appendix F

Weightlifting Simulation Code

The following is a one page excerpt of the ten pages of text required to program part of a weightlifting simulation, that I provided for one of the research participants. Leigh Casey was responsible for helping me fix the errors. And the overall design was conceptualized by the participant, and the intricacies were negotiated between the three of us.

```

    exercise = verb;
    if (iobjstr in this.equipment)
        equipment = iobjstr;
    else
        equipment = toastr(" on the floor!");
        player:tell("Hey, next time choose one of the following: flat bench, incline bench,
dumbbells, nautilus, long bar, squatrack, hip machine, calf machine, mat.");
    endif
    if (caller.level == 1)
        reps = 20;
        program = toastr(" Strength Program");
    elseif (caller.level == 2)
        reps = 12;
        program = toastr(" Conditioning Program");
    elseif (caller.level == 3)
        reps = 10;
        program = toastr("Weight-Loss Program");
    else
        reps = 1;
        player:tell(" ");
        player:tell("You start to lift weights with no idea how or why. Perhaps you need to get
a program set up.");
        suspend(3);
        return;
    endif
    if (iobjstr in this.equipment)
        player:tell("You are doing program:", program, ".");
        player:tell("You walk over to the ", equipment, " to do ", reps, " repetitions of ",
exercise, " on the ", equipment, ".");
        player.location:announce_all_but({player}, player.name, " walks over to the ",
equipment, " to do ", reps, " repetitions of ", exercise, " on the ", equipment, ".");
        suspend(3);
    endif
    if (exercise == "bench_press")
        if ((caller.bench_press == 1) || (caller.bench_press == 4) || (caller.bench_press == 7)
|| (caller.bench_press == 10) || (caller.bench_press == 13) || (caller.bench_press ==
16))
            bench_press_msg1 = this.bench_press_msg1;
            player:tell(this.bench_press_msg1[1]);
            player.location:announce_all_but({player}, player.name, " starts ", player.pp, " ",
exercise, ".");
            suspend(3);
            player:tell(this.bench_press_msg1[2]);
            player.location:announce_all_but({player}, player.name, " executes ", reps, " reps of
", exercise, ".");
            suspend(3);
            player:tell(this.bench_press_msg1[3]);
            suspend(3);
            player:tell(this.bench_press_msg1[4]);
            elseif ((exercise == "bench_press") && (caller.bench_press == 2) || (caller.bench_press
== 5) || (caller.bench_press == 8) || (caller.bench_press == 11) || (caller.bench_press
== 14) || (caller.bench_press == 17))
                bench_press_msg1 = this.bench_press_msg1;

```



```
player:tell(this.bench_press_msg2[1]);  
player.location:announce_all_but({player}, player.name, " starts ", player.pp, " ",  
exercise, ".");  
suspend(3);
```

Appendix G

Email Regarding the Naming of MOOs in Iceland

Date: Wed, 15 Dec 1999 21:56:09 +0000
To: JASON NOLAN <jason.nolan@utoronto.ca>
From: "Lilja M. Jónsdóttir" <lilja@rvik.ismennt.is>
Subject: An answer to dissertation questions...

Hi my friend Jason.

I didn't really need to ponder for long, this came back to my mind as I was reading your letter again just now.

--The word we came up with is DULHEIMAR.

This is a noun made up of two nouns. The first being DUL- which means something that can not be seen with your "physical" eyes, but your "mental" eyes only, something that is hidden. This is also something that can be mysterious, mystical, it has to do with mysticism. It can be a sort of a prefix and when I look up some of the words in the dictionary that begin with dul-, they are (without Icelandic characters); dul = concealment

dul-bua = disguise

dul-mal = secret code

dul-nefni = pseudonym

dul-raenn = psychic

dul-vitund = subconscious

So. from this, you might see what kind of a word this is.

The latter part of the noun is -HEIMAR. This means worlds, in plural. So the two nouns put together mean really "The Hidden Worlds", - or whatever you may see fit in English, but catches the above meaning. It has to have the touch of something mysterious, exciting, ancient, not-of-this-world about it. Do you understand what I mean?

Lilja M. Jonsdottir

Lektor (Assistant Professor)

Kennarahaskola Islands / Iceland University of Education Reykjavik, ICELAND