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COMPUTERS AND ADULT FIRST-TIME USERS: AN EXISTENTIAL PHENOMENOLOGICAL INVESTIGATION OF TECHNOLOGY AND IMPLICATIONS FOR PEDAGOGY

BY
DALE CLINTON PALMER HOWARD

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

SPRING 1992

ISBN 0-315-73027-7

UNIVERSITY OF ALBERTA

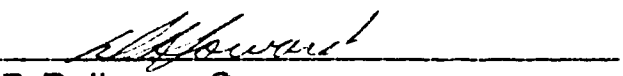
RELEASE FORM

NAME OF AUTHOR: Dale C. Howard

TITLE OF THESIS: Computers and Adult First-Time Users: An Existential Phenomenological Investigation of Technology and Implications for Pedagogy

DEGREE: Doctor of Philosophy

YEAR THIS DEGREE GRANTED: 1992



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THE UNDERSIGNED CERTIFY THAT THEY HAVE READ, AND RECOMMEND TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH FOR ACCEPTANCE, A THESIS ENTITLED COMPUTERS AND ADULT FIRST-TIME USERS: AN EXISTENTIAL PHENOMENOLOGICAL INVESTIGATION OF TECHNOLOGY AND IMPLICATIONS FOR PEDAGOGY

SUBMITTED BY DALE CLINTON PALMER HOWARD IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DR. J. W. OSBORNE

DR. L. L. STEWIN

DR. M. SZABO

DR. T. CARSON

DR. S. HALLING

DR. G. KYSELA

DATE: Nov. 8, 1991

DEDICATION

This work is dedicated to the memories of H. E. "Babe" Howard, Marie Estel Howard (Dore), and John William "Bill" Howard.

ABSTRACT

In our everyday use of technology we are often not aware of the mediating character of technology. This existential phenomenological study examines the computer experience of the adult first-time user in an attempt to better understand the encounter with technology. Eight in-depth interviews revealed four major themes and eighteen subthemes of the experience. Becoming familiar with the operations of a computer is memorable. The experience is often accompanied by mixed feelings of excitement, anticipation, frustration and disillusionment. Adults find themselves experiencing the "new." They find themselves engaged in genuine learning. Also, new users are constantly measuring and being measured through arbitrary standards of computer literacy. In many ways, they are being measured for "fit" into the technological culture. At a more subtle level the adult first-time user experiences the computer as other. In one sense, the user "faces" the computer and becomes aware of self. Adults feel a sense of vulnerability until they experience some control of the machine, until they trust the machine. In a second sense, the user becomes

part of the computer-world, where new avenues of experience are opened and others closed.

In closing, this thesis discusses implications of the technological experience for educational practice. When computer technology is reified or becomes defined only by its use, the characteristics of the technology may become the characteristics of pedagogy.

ACKNOWLEDGEMENTS

Many people play a part in one's successes. I could not possibly acknowledge everyone's contributions to mine. However, I owe a debt of gratitude to certain individuals for their assistance in developing this thesis. I would like to thank the following:

Dr. John Osborne, for his guidance and patience as my thesis advisor.

Dr. Len Stewin, Dr. Michael Szabo, Dr. Gerry Kysela, Dr. Terry Carson, and Dr. Steen Halling, for their participation as members of my examining committee.

Troy Bartman, Mary Ann Bibby, Ylonda Jordheim, Barbara Luckhurst, Darrel Maier, Al Pols, David Thompson, and Ann (not her real name), for their participation as co-researchers.

Peggy Howard: for her support, encouragement, and editorial assistance.

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Chapter 1. INTRODUCTION

In 1976 I received an undergraduate degree and began a career as a teacher. For the next five years I taught a variety of subjects over a broad range of grade levels. In 1981 I was hired as a college instructor to teach communications courses to the students enrolled in the Department of Trades, Science and Technology. I also taught the academic component of a vocational training program designed for developmentally delayed adults. It was through my experience with the college special education program that I was introduced to the computer.

My interest in computers came about more by accident than by design. I did not have a computer science background, and until the availability of the microcomputer, my familiarity with these machines was confined to general newspaper accounts, science fiction descriptions, and one industrial contract, where I was asked to photograph a newly installed mainframe. I saw my first computer in operation while I watched a colleague tinkering with a few machines he had acquired for his classroom. I remember watching him play a rather primitive rendition of "Breakout" and "Space Invaders." As well, he demonstrated a few education drill and

practice programs he was using in his math class. I was impressed.

I had my first hands on computer experience during the Christmas break of 1982. I can still recall the feelings of apprehension and excitement as I watched others, mostly children, playing a game on a small microcomputer - part of a holiday display at a local department store. I had seen video games before, and in fact, the previous Christmas I had bought a TV video game for my son. I had never thought of my son's toy as a computer. But the Christmas display game was different. The monitor had been connected to a keyboard. Rather than using a game controller such as a joystick, the users were typing word commands and the screen was displaying messages in response. It was this "communication" that intrigued me. The clerk, noticing my interest, asked me to try "it" out. I was hesitant. In fact, I declined and left. I was uneasy, and felt a little embarrassed by the whole experience. However, I was incredibly drawn to the machine. The following week, I returned to the store and bought my first computer.

I remember how carefully I unpacked the machine and how adamant I was in instructing my children not to touch it. The hook-up was rather simple, and before long the TV screen turned blue and

flashed a message indicating the computer was ready for use. This initial experience was like a first date. I was eager and uncomfortable at the same time. I typed in a few words. The computer returned "SYNTAX ERROR." I experimented some more, but with the same result. I finally relented and turned to the instruction manual. Painstakingly, I went through the instructions until I was able to enter a little program. I pressed the RETURN key and stood back in admiration as the display said "HI DALE." The simplest things seemed so profound, and I recall the excitement in the rest of the family, as they crowded around the machine, watching their names flash on and off. It all seems so silly now.

I do not remember ever being frustrated with the computer. From the beginning it was a challenge, more like a game than an adversary. Actually, I spent hours and hours, sometimes until two or three in the morning, teaching myself how to program. I bought every computer book and magazine that I could find, especially those relating to my particular kind of computer. I soon joined a computer club and became what some refer to as a "hacker." I began using the computers at the college where I worked and started applying some of my new interest and information to my teaching.

Initially, my educational interest in computers was narrow. I was unaware of what might be called "computers in education." My use of computers was almost exclusively drill and practice and some simple programming for my own amusement. My perspective did not include the computer as an educational environment nor did I possess a critical eye concerning the impact that computers might be having on me or others. I simply used and enjoyed them. However, my perspective was to change with my acceptance into a Master's degree program. Because of my interest in computers, I decided to focus my degree on computer applications in education. During the next five years I became acquainted with the vast literature in the field of educational computing. My attention began to shift from the technical aspects of computing to the educational implications of computing. My primary objective was to examine how computers might help teachers become more efficient. It was not until my defense that I began to realize just how much my perspectives were changing. I had recommended that computers be used more creatively than straightforward application of computer-assisted and computer-managed instruction. Yet my study, although successful, had accomplished exactly what I recommended was not

the most ideal application of computers in education. My advisor asked me whether or not I was part of the problem or part of the solution. I was bothered by the question.

Shortly after completing my degree I began to teach computers in education, at both the undergraduate and graduate levels. It was during this experience that I began to more closely notice the experience people were having with the computer. Occasionally I would see glimpses of my past self. More often than not, I saw in my students a great deal of frustration, especially in the initial stages of contact with the computer. There was that same mix of apprehension and excitement that I had experienced, but unlike me, these students were not afforded the privacy I had enjoyed in my initial encounter with the computer. I was now beginning to wonder about the pedagogical implications of computer instruction. At first, I passed it off as being uncomfortable with the unknown and the pressures associated with a new learning situation. However, soon I began to sense that the success or failure with the computer had a deeper significance - a significance that I did not completely understand. I began to structure my classes differently. I held more seminars and encouraged more discussion. I began to focus my

evaluations of the class more on student reflection and less on information retrieval. Student logs began to reveal a wealth of information. I began to see the computer from a new angle. This experience was impacting these people. They were "experiencing" the computer. They were not only learning the procedural elements of the computer, they were asking questions, questions about themselves as people, as learners, as teachers. I reread Sherry Turkle's book, The Second Self. She described the computer as a mirror, one in which the computer user sees his humanness in contrast to the machineness of the computer. It was at this time that I began to have an appreciation for the existential implications of the computer.

I had now worked for the same college for eight years and was eligible for a year's sabbatical leave. I began my doctorate program in educational psychology. My initial plans were to gain further expertise in computer-based education and to examine the computer experience. Between the time of my application and my arrival on campus the computer-based component had moved to a different department; however, I decided to try one semester in Educational Psychology with the idea that if need be, I could probably transfer

my program. I was assigned the resident phenomenologist as my advisor. The introduction to phenomenology had an impact on my view of technology. After one semester I chose to investigate the experience of adults using computers for the first time.

1.1 The Issue of Technology

The computer is a technological innovation and as a result, is part of the much broader phenomenon of technology. Technological innovations have had ambivalent repercussions. Despite obvious enhancements of health and prosperity, zealous and expedient application of technology has created an unprecedented threat to life itself. Global warming, depletion of natural resources, and widespread pollution serve as somber illustrations.

How do we make sense of technology that provides with one hand and destroys with the other? William Barrett (1979) suggests that we are often trapped by our own creations, no longer open to the kind of thinking that would redeem us from the world we ourselves have created. Has technology become so much a part of our world-view that its essence eludes us? Are we merely flailing in the dark, in our attempts to control it? Does it have a life of its own? Not all would answer yes. Seymour Papert (1987) describes

this pessimistic position as "technocentrism." He says these ideas are only expressions of those who are unable to distinguish the difference between what machines do and what they, people, do with machines.

1.2 A Question of Context

Leiss (1990) argues that the question of technology is largely a question of interpretation and the meanings we attach to those interpretations. The most common inference made by Western society about technology, he would suggest, lies in the close affiliation of "the theoretical and experimental achievements of modern natural sciences ..[with] our hopes for material affluence" (p. 75), a hope linked closely with a liberal interpretation by Western Man of his Judeo-Christian heritage.[1] This fundamental presupposition, argues Cox (1965, p. 22), rests in the Hebrew "view of Creation .. [which] separates nature from God and distinguishes man from nature." As God, historically[2], became increasingly transcendental, man's reality became increasingly more immanent (Berger, 1969). This perspective, contend Berger (1969) and Cox (1965), provided the preconditions necessary for the development of modern technology and natural science. Nature became an object.

Consequently, Adam and Eve were free to examine and exploit nature without devine sanction.

The idea of man as "inheritor" of the Earth does not rest well with Jacques Ellul (cited in Ferre, 1988). He suggests that technology is a consequence of disfavor, a condition of sin. Before the Fall, humankind was "perfect and finished" (p. 109). From this position, technology is part of the "forbidden fruit," and will surely lead to man's demise.

A more neutral theological notion of technology emphasizes use. Technology, itself, determines nothing. It is neither reward nor punishment. Christ, divinity incarnate, himself a carpenter and tool user, illustrates "practical intelligence shaping material to human purpose" (Ferre, 1988, p. 106). As stewards of the Earth, humankind is responsible for its care. Only in its use does technology have an impact and a value. Only within a social and historical context does technology have meaning.

To address technology theologically, is to illustrate the contextual implications of its meaning. Our understanding of technology will always be influenced by a long heritage of customs, beliefs, and values. However, technology is often understood as a

"thing" (Ferre, 1988). It is considered as tools, procedures, and artifacts for aesthetic and practical application.

1.3 Toward a Definition of Technology

Technology has its origins as a term in the Greek words "techne" and "logos". In the broadest sense "techne" refers to making. Through its Roman translation it became associated with "ars", methods or rules for the application of science, and "instrumentum", pertaining to tools and artifacts (Burch, 1984).

According to Marx (1975), the meaning of technology has "suffered from a kind of elephantiasis in recent years (p. 7)." He illustrates the growth of the term by offering three definitions, as they have evolved. The first, which remains close to its etymology, refers to the knowledge, skills, and equipment people use for practical purposes. The second refers to the bureaucratic organizations that surround this knowledge, skill, and apparatus, for example the rise of automotive, medical, space, and computer technologies, often referred to as industries. A third, and much larger concept of technology, he labels "metatechnology (p.8)" whereby technology dominates and permeates the life of an entire society. The knowledge, skills, and machinery of society are

institutionalized and become part of the national ideology.

1.3.1 Technology as Metatechnology

Technology, for the most part, has been accepted as applied science. It is the major means of providing objects for human survival and comfort (Leiss, 1990). But man constructed tools before he made science. In fact, it might be argued that the tool-making ability of man is what distinguishes him from higher apes (Oakley, 1972).[3] According to Whitehead (1967, p. 96), "The greatest invention of the nineteenth century was the invention of the method of invention." Science, as the ultimate technique, is itself presupposed by something more primary. In this sense technology precedes science. The very existence of science depends on a technological world-view. Science presently receives a "best method" status where "the excellence of science is assumed, it is not argued for" (Feyerabend, 1982, p. 73). To consider technology as a priori is not to consider it as a collection of "overt techniques or artifacts" (Ferre, 1988, p. 66), but to consider it as technological thinking.

The French sociologist, Jacques Ellul (1964), outlines technology as more than technical apparatus. Technique is firstly,

"know-how" or as he suggests, the "means and the ensemble of means" (p. 19) - technical operation. Secondly, technique becomes a preoccupation with the "one best means" (p. 21) - a technical phenomenon. In this sense, technique becomes the quest for the most efficient means "in the absolute sense, on the basis of numerical calculation" (p. 21). Ellul argues that no human activity escapes this imperative and

> when technique enters into every area of life, including the human, it ceases to be external to man and becomes his very substance... In this respect, technique is radically different from the machine. (p. 6)

Technique in this case, is autonomous, has a life of its own. Life becomes the technical life. For everything there is a formula, for every formula a result. Western Man has an obsession for procedure driven by a need for

> power, speed, motion, standardization, mass production, quantification, regimentation, precision, uniformity, astronomical regularity, control, above all control... (Mumford, 1967, p. 294)

From these perspectives technology is a way of life. In some

sense, it explains life. It becomes a "root metaphor" (Berry, 1984). The world is explained as an efficient machine. Humanity is a part of this machine and serves a functional purpose. That function, according to Tillich (1982), is viewed by North Americans as one of production. Americans derive their essence from producing. To produce is to make life meaningful. The question of technology is not, then,

> simply about our use of tools. At a deeper level, however, it is a question about human being and (self) understanding in its technologically mediated relation to the world." (Burch,1984, p.3-4)

Technology can become a way of seeing the world, a way of revealing the world. Heidegger (1977b), calls this technological world-view "enframing." He suggests that technology is a way of revealing (understanding) nature. Humanity has enframed nature as measurable, conquerable, and more importantly, available for man's use. Technology is a way of being-in-the-world. The World and all things in it are measured in terms of their use.

1.3.2 Technology as Action

Ihde (1990, 1979) argues for the primacy of action. This

understanding goes beyond the exploration of the effects of technology. He suggests that we examine technology itself, as "a 'choice' of a possible way of being in the world" (Ihde, 1979, p. xxvi). He recommends that we begin with a phenomenology of technology, whereby the essence of technology can be revealed through practice, the practice of using tools. Technology mediates our experiences. It is not neutral. Even looking through a pane of glass changes what we see. And when it protects us from the elements, it changes what we feel, smell, and hear.

Technology first mediates our experience by way of coming between ourselves and the world. When the technology is an extension of our bodies or perceptions, for example a hammer or telephone, the world retains its immediacy, but our bodily and perceptual experiencing of the world has subsequently been transformed. Ihde (1990) describes this existential human-technology relation as an "embodiment" relation (p. 72). In this relationship with technology certain aspects of the experience are magnified and/or reduced. For example, the use of the telephone magnifies the experience of hearing, but reduces the experience of vision. A second relationship develops when the technology

mediates the world through making reference to the world. For instance, through a gauge or a chart we interpret the world. Ihde refers to this relation as a "hermeneutic" relation (p. 80). A third relationship Ihde outlines as an "alterity" relation (p. 97). In this relationship, as in the case of a favorite sports car, we sense an interaction with the technology. There are certain qualities of dialogue or exchange. The technology becomes the focal point of the relationship. However, it is a quasi-otherness, for the technology has only limited autonomy.

Ihde characterizes the human-technology relations as belonging to a continuum. On the extreme left is the technology experienced as "quasi-me" and on the extreme right the technology is experienced as "quasi-other" (p. 107). In the middle we find the hermeneutic relations. However, outside the immediate attending to technologies, Ihde proposes a fourth relationship he refers to as "background relations" (p. 108). In this sense technology functions in the background, for example a home lighting or heating system. Despite their background positions these technologies have transformational characteristics. Both the focal and background technologies combine to form our technological "texture" (p 112).

1.3.3 Technology as Lived Experience

Technology is ambiguous (Ferre, 1988). We make reference to artifacts and practices as technology and then suggest that technology is what makes these "things" possible. Technology may be both. Our relationship with the world is partly established through technology. It is established through a way of thinking and through a way of practice. We both discover and construct a technological reality. We view "things" as useful and proceed to use them. More explicitly, discovering a hammer reveals the world as hammerable. Discovering a gun reveals the world as shootable. Discovering a computer reveals the world as computable.

From the abruptness of the alarm in the morning until the last "click" of the switch on the night lamp in the evening, we experience the pervasiveness of our technological context. We need only to reflect briefly on our vernacular to get some sense of the technological "mindset." Let's "tighten" that up a bit. He needs an attitude "adjustment." I'm trying to "hammer" that idea home. To understand technology we must attempt to understand its lived meaning.

1.4 Rationale and Method

To reflect on technology as meaning, as a way of being-in-the-world requires a break from the conventional logical empirical way of thinking and a perspective that is preoccupied with the effects of technology. To provide, as Romanyshyn (1989) suggests, another "cool, rational, dispassionate analysis will not suffice, for it will only apply technical thinking to technology" (p.15). Therefore this study is a phenomenological investigation of lived-experience.

Lived-experience is immediate and natural, "a pre-reflective consciousness of life" (van Manen, 1990, p. 35).[4] It is experience as lived, not as reflected upon. However, in order to study an experience, the experience must be revealed and interpreted. It must be examined in retrospect, for its quality, for its meaning. Lived experiences become significant and meaningful through reflection, by "giving memory to them" (p. 37).

Existential-phenomenology, as both a method and as a methodology, is particularly appropriate for this study. As a mode of inquiry, phenomenology is useful in providing a systematic means of eliciting detailed accounts of experience, reflecting upon those accounts, and articulating the meanings embedded in the experience

(Osborne, 1990; Valle & Halling, 1989; van Manen, 1990). As a methodology, however, phenomenology attempts to let the data speak for themselves (Colaizzi, 1978; Merleau-Ponty, 1962). Phenomenology tries to reduce the presuppositional influences of the researcher; it "tries to ward off any tendency ... that would rule-govern the research project" (van Manen, 1990, p. 29). This is not to say that phenomenology is a methodology without tradition, convention, and method, but rather to imply that phenomenology is willing to modify and accommodate change as the data necessitate.

1.5 Scope, Purpose and Significance

This study focuses on the lived-experience of the adult first-time computer user. There are two assumptions in choosing to study adult first-time computer users. Firstly, the computer can be considered somewhat ubiquitous. Millions of computers are sold annually.[5] Their use permeates almost all aspects of any technologically advanced society, from calculating the mass of protons to expediting goods at local supermarkets. The computer is a technology that we relate through, relate to, and that also functions in the background. Secondly, adult first-time computer users experience this technology as an "encounter" (Bollnow, 1972).

An encounter is not characterized by accommodation, but rather, by confrontation. The encounter "shakes" us, increasing our awareness, making us more sensitive to ourselves, preparing us for the "new." It is hoped that this increased sensitivity will elucidate the meaning of technology.

It is the business of phenomenology to describe phenomena and to discern essences. "Phenomenology explicates those features of any given object without which it could not truly be said to be the object[6] that it is" (Schmitt, 1972). However this study does not presuppose the possibility that a phenomenological investigation is able to reveal an unchanging essence of a particular experience through a system of phenomenological reduction (Husserl explained in Merleau-Ponty, 1962). It will follow an existential hermeneutic perspective suggesting that essence is essence becoming (Heidegger, 1962; Merleau-Ponty, 1962). What something is, is what it is in time (Heidegger, 1962). Although there may be a reality that transcends consciousness, the world for an individual is the world she perceives. The rationale for beginning with the "things themselves" is to begin with that which is most familiar (the immediate experience) and to question what it is that makes that

experience possible - in effect, to reveal the underlying structure from which that experience can be experienced. This phenomenological strategy presupposes a hermeneutic context of interpretation (Palmer, 1969), for both researcher and co-researcher. It presupposes that experience always arises from a particular orientation to the experience and interpretation leads to further orientations and a deeper and richer understanding of the phenomenon.[7]

To provide a phenomenological description of experience may help others to better understand the meanings attached to technology and, in particular, computer technology. It may reveal in some way what it is that presupposes the very existence of the computer. But, human science research does not stop at this point. For to do so would be to lose touch with the lifeworld (van Manen, 1990).[8] This research is also an attempt to act upon the meanings of the experience by providing an assessment of how this understanding of the computer experience impacts our practices as educators and human beings. As well, this study is personal and is an endeavor to express the interest of the writer, in being responsive to the motive that initiated the research - the motive to

be a better educator through a better understanding of the phenomenon in question.

1.6 Order of Presentation

Chapter 2., REVIEW OF THE LITERATURE, aims to illuminate the hermeneutic context of the computer. It is an attempt to provide a cultural setting[9] for the computer experience. Various interpretations of technology emerge from this context. They help establish a frame of reference within which a phenomenological question is formulated. Due to the pervasiveness of technology and the extensiveness of the literature, this chapter briefly introduces the following themes: (1) The computer as revolution - the information age, information economy, (2) The computer as slave - automation of the work place, (3) The computer as master - the negative side of computer technology, (4) The computer as educator - differing uses of the computer in schools, (5) The computer as literacy - what schools and business think about computer literacy requirements, (6) The computer as mind - artificial intelligence and, in particular, the development of expert systems, (7) The computer as meaning -computer attitude research, and (8) Computer as Phenomenon - research conducted in an ethnographic or

phenomenological vein.

Chapter 3., METHOD, further addresses the general philosophical orientation of phenomenology and establishes its relationship to method. The chapter outlines the procedures used to select and interview participants in the study. It also provides a description of data analysis procedures. Each participant's data is displayed in tabular form. One participant's data is presented in detail to illustrate the successive ordering of themes. The remaining participants' data is presented as a final ordering of themes. The chapter concludes with bracketing[10], a brief presentation of the personal presuppositions of the researcher.

Chapter 4., THE ADULT FIRST-TIME COMPUTER EXPERIENCE, is the focal point of this study. This chapter is a narrative presentation of the interpreted data. It is intended to provide the reader with a vicarious experience of the adult first-time computer user. Essentially, it can be considered a presentation of the results.

Chapter 5., DISCUSSION, fulfills the obligation of the researcher to act on the findings. It is an appropriation of the researcher's understanding of the meanings evident in the selected literature and the data. As well, it will address the concepts of

validity and reliability of the research findings.

The APPENDICES include a brief background description of each participant, the participant release form, a graphical presentation of the methodology, some illustrations of the computer program, HyperQual, used to facilitate data analysis, a sample of "raw data," and a few examples of participant comments concerning the validity of the description.

Chapter 2. REVIEW OF THE LITERATURE

The investigation of the computer by scientists, philosophers, futurists, and "armchair" speculators has produced a vast literature. There have been numerous attempts to make psychological, sociological, and pedagogical sense of the implications that surround both the prevalence and transparency of computer technology. This review will provide an interpreted context from which to examine the computer experience and the meaning of technology.

2.1 Computer as Revolution

There appears to be little question that the microchip will be used as a historical marker. Some consider the age of microelectronics an adjunct to the Industrial Revolution (Friedrichs & Schaff, 1983). Others characterize it as a new era, differentiating it as an age where the majority of the work force is engaged in a systematic production and distribution of information (Evans, 1979; Naisbitt, 1984; Toffler, 1981). It is an age where human capital is emphasized and where economic growth is measured by the speed and efficiency by which that capital can be developed (Johnston & Packer, 1987). Furthermore, socialization is no longer the sole responsibility of tightly knit organizations such

as the family, but becomes a more eclectic process involving service and recreation institutions (Landauer, 1988). The workplace and the racquetball court, rather than the home and family picnic, are viewed as primary stores of cultural development for the individual.

The United States is seen as a leader in the information economy.[1] The growth of both computer technology and communications networking have assured anyone, with a terminal, unprecedented access to data (Dertouzos, 1988; Johnston & Packer, 1987; Naisbitt & Aburdene, 1990). However, some suggest that for America to continue as a vanguard in the information industry, training and education of both the young and the old must be accelerated (Luehrmann, 1980; Molnar, 1978; Naisbitt, 1984; Useem, 1986). Expressed more emphatically, if a bright future is to be realized, "students will have to go to school longer, study more, and pass more difficult tests covering more advanced subject matter" (Johnston & Packer, 1987, p. 117).

Whether or not the emergence of an information economy is a reality, is secondary to social perception. An urgency to provide people, especially students, with more information, particularly technical information appears to be a current trend. The information

economy is not an economy of just any information, but emphasizes the kind of information that supports and encourages the growth of technology. An exchange of technical information between nations is concomitant to the economic health of nations. Time is of the essence. Speed and efficiency fuel the information economy. As technology becomes more powerful and efficient, the need to stay current increases as well. Information technology is often interpreted as the means to political and economic leadership.

2.2 Computer as Slave

The computer is a laborsaving device. It facilitates more production, faster production, and cheaper production. For instance, computer-integrated manufacturing (CIM)[2] makes more efficient use of facilities, raw materials and labor. As a result the cost of production decreases.

Some argue that increased computerization leads to increased specialization, reduced variety, and increased work intensity, which in turn will lead to increased isolation for workers. The overall result is a decrease in job satisfaction (Edwards, 1989; Evans, 1983). However, where exposure of workers to dangerous and noxious work is reduced by the introduction of computers and robots,

workers generally experience less stress and willingly invite automation (Edwards, 1989; Savage, Magidson, & Stein, 1984).

Industrial automation frightens unions; however it is unclear whether or not automation will cause large scale unemployment - it may simply alter the type of employment workers have (Hoyt 1987; Kidd, 1988). Of course this may only hold true where it is still too expensive or yet impossible to produce machines that self-monitor (Edwards, 1989; Kidd, 1988).

Computer and electronic technology have alleviated much of the time it takes to "shuffle paper." Word processing and desktop publishing capabilities enable today's office worker to substantially increase the speed, volume and quality of text and graphics. Quicker customer contact is facilitated through telecommunications such as fax machines, teleconferencing, and electronic mail. Filing cabinets are being replaced by electronic databases making information retrieval only a fingertouch away. Analysis and organization of information through the use of spreadsheets and desk managers increase the efficiency and expediency of managers to accomplish managerial tasks (Athey & Zmud, 1988; DeNoia, 1987; Long & Long, 1986; Lucas, 1986; Savage, Magidson, & Stein, 1984; Slotnick,

Butterfield, Colantonio, Kopetzky, & Slotnick, 1989).

The computer has increased the efficiency of both the office and the factory, and to some degree enhanced the conditions of work for both labor and management. However, electronic technology is relatively new. We may not have sufficient longitudinal data to make accurate judgements concerning its impact on industry.[3] Nevertheless, technology is welcomed for its speed, efficiency, and promises of increased affluence. Electronic technology stands for commercial and industrial progress.

2.3 Computer as Master

Although technology may enhance productivity and contribute to an improved life style, it is not always viewed as benevolent. Some see today's automated information environments as impersonal (Ayres, 1988), a producer of more obscure information (Holbrook, 1986), an information blizzard - most of which is irrelevant (Weiner & Brown, 1989), and as a place where efficiency may be sacrificed for quality (Baldursson, 1989; Hass, 1989). For others, technology represents decreases in social interaction, relevance, and quality. It means physical and psychological illness, as well as social and individual vulnerability.

2.3.1 The Computer and Health

As society becomes inundated with new pressures and increased choices, the tensions created in this new age can be crippling (Toffler,1981). The computer has been accused of contributing to this stress. One report claims that one third of the college and university student population avoids computer technology and as high as 12 percent are computerphobic (Rosen, Sears, & Weil, 1987).

Long hours at video display terminals (VDTs) may lead to physical ailments. Reports of eye-strain, back pain, headaches, fatigue, and skin inflammation have often been attributed to prolonged use of computer terminals (Evans, 1983; Hembree, 1990; Smith, 1987). However, reports of health hazards are at times inconclusive. The jury is still out on the effects of display terminals on office workers. In the mean time the debate has resulted in formal health legislation regulating environments where VDTs are present (Amick, 1987).

Some physical discomfort associated with the use of terminals may have psychological antecedents. Repetitive strain injury (RSI), "believed to be caused by repetitive movements of the

hands and arms" (Kiesler & Finholt, 1988), p. 1004), became an epidemic among Australian female office workers who use keyboards. However, further research could not account for: (1) why RSI was an epidemic in Australia and not in other countries; (2) why women were struck more frequently than men with similar jobs; (3) why such differences in reports occurred in similar office environments and in other seemingly comparable workplaces; (4) why reports had increased in this decade; and (5) why rehabilitation has such poor prognosis. Kiesler and Finholt concluded that physical illness associated with the use of computers may be related more to general job dissatisfaction than with the physical operation of the technology. The physical illness was possibly a manifestation of psychological stress - possibly a reflection of too much technology too fast.

Brod (1984) termed these afflictions "techno-illnesses," a modern illness brought about by a person's under or over adaptation to technology. People unable to adapt to technology experience varying levels of anxiety. This may pose serious emotional and physical problems for those who have work environments heavily dependent on technology. On the other hand, technocentered

individuals, usually programmers and other professionals, appear to take on some of the characteristics of the technology itself and begin to show a low tolerance for ambiguity and little empathy for their fellow man. Technocentered individuals, in more serious cases, may develop aberrant and antisocial behavior. However, Shotton (1991) found many of these so called "computer addicts" were intelligent, interesting, and hospitable. Individuals were not transformed by the computer, but were drawn to the machine environment because it suited their personalities. For many, it was a way to do what they wanted to do.

The issues of health raised by an increased incidence of physical and psychological problems associated with the new electronic technologies, will likely depend on the extent to which people are able to adapt to the technology and how well technology is made to adapt to the human condition. According to Smith (1987), "while the potential for serious health impact is high, the ability to control the problem is also high" (p. 251). New technology is often placed in conventional environments where existing desks, chairs, and lighting are inappropriate for comfortable use of the new equipment (Schleifer, Sauter, Smith, & Knutson, 1990).

Consequently, we are apt to see an increased interest in ergonomic research, as well as more interest in "techno-illnesses." In the interlude, technology for some, represents threat.

2.3.2 Social and Individual Vulnerability

The real or perceived dependence on data has apparently created some significant issues in relation to individual and social vulnerability. We are warned that dependence on electronic information systems increases the probability of a society being dominated by centralization and bureaucracies (Lenk (1983). Privacy, according to Naisbitt (1984), is a concern of many major corporations as they regularly "clean up" their employee files. Apparently, with little effort, anyone can acquire information from supposedly private data bases (Francis, 1988). Even electronic mail (E-mail) and other private electronic communications have been the target for surveillance (Betts, 1991; Nash & Harrington, 1991). Many office workers are becoming paranoid that both their communication and productivity are being electronically monitored.

People and organizations may place too much faith in computer generated information. In the case of social welfare, because of the demand for "hard" data, human service managers seldom recognize

that technology does not guarantee the quality of the data. Fast, efficient electronic information may obscure rather than clarify case records (Holbrook, 1986). Businesses utilizing computerized generated communications have fallen prey to poor system design, poor use of the system, or both. Some businesses have run into severe customer relations problems when people have been reminded to pay bills already paid, asked to pay bills where previous communication had been established but ignored by the computer, and where improper billing amounts resulted in automatic cancellation of services (Ayres, 1988).

Government and business are also vulnerable to computer crime and accident. Not only is damaged and stolen technology responsible for losses in the hundreds of million of dollars, but theft and destruction of data by information terrorists leads to the total collapse of nearly 45 percent of American businesses where this crime or accident occurs (Perdue, 1989). One particular crime in the United States resulted in damage estimated as high as $90 million (Takach, 1991). This catastrophe was the result of a computer virus called a "worm" let loose in the Internet computer network.

A worry for some skeptics is the increasing reliance on technology and the growing ease with which people often relinquish their personal responsibilities to the machines they use. Weizenbaum (1976) cautions that machines make decisions amorally, and as we rely more on machine intelligence, we too may become less moral. He cites the military as an example, suggesting that it seemingly has become easier and more acceptable to destroy because of the psychological distance that machines provide between actions and repercussions. Destruction becomes sterile, no longer a messy business. Clegg (1989), warns of the increasing tendency toward technological elitism. As machines become more powerful and more "expert" we are apt to unwisely give the machine and machine designer far more privilege in our lives than we will some day desire. "Many designers behave as if the humans in systems are sources of error and unpredictability that therefore need automating out" (p. 401). This feeling is supported by Postman (1979) who says that many people just do not have the intellectual abilities to understand the "assumptions of the technical thesis" (p. 100). He fears that by allowing stewards of information to control information and by allowing machines to do our thinking, the very

essence of humanity, creativity, will be reduced.

Dependence, appears to be the operative word. As individuals and institutions rely more heavily on electronic data, destroying or tampering with that data has increasingly more catastrophic consequences. The more dependent society is on electronic information the more society bestows prestige and power upon the custodians of the data. Technology, in this context, represents power and control, vulnerability and subservience.

2.4 Computer as Educator

Some envision a day when a computer will sit on every desk (Bork, 1987; Bork, 1985; Papert, 1980). However, in an applied field such as education, fads come and go and the staying power of an innovation is measured by its practical application (Cuban, 1986). According to Taylor (1980), computers have made an impact in schools as tutors, tutees, and tools. As tutors, computers do all or part of the teaching. This is referred to as computer-assisted instruction or computer-assisted learning (CAI, CAL). As tutee, the computer becomes the student, and the user teaches the computer. The most obvious example of this is computer programming. As a tool, the computer serves the student or teacher through application

programs, such as word processors, spreadsheets, or databases. The production of assignments or records is made more efficient. More sophisticated applications actually manage the instructional process. Using computer-managed instruction (CMI), educators are able to electronically monitor student performance.

2.4.1 The Computer as Tutor

Teaching machines are not new. For instance, Roman soldiers practiced their combat skills against a quintain. This machine was comprised of a post and a revolving crosspiece. The crosspiece held a target at one end and a sandbag at the other end. A misplaced blow or improper battle stance could result in a nasty "wack" to the soldier's body. Modern teaching machines, however, often model the precepts of Programmed Learning (PL), initiated by Sidney L. Pressey (Hergenhahn, 1988). Although Pressey's ideas were not popular at the time, several years later, they were adopted by B. F. Skinner (1958). He believed that by presenting a learning task in small steps, in a way that would produce overt responses, which could be immediately reinforced through feedback, learning could be significantly accelerated. Programmed Learning was further extended by Fred Keller (1968) in what is called the Personal

System of Instruction (PSI). Key elements of PSI center around defining, organizing and categorizing specific subjects or topics into segments. Criteria are also developed to measure mastery of each segment. More impotantly, students are allowed to move through segments at their own pace, thereby eliminating many of the factors that cause test score distributions. In other words tests are more likely to be taken when the learner is most prepared to take them. Further support for programmed instruction was garnered through the development of task analysis, behaviorial objectives, criterion-referenced testing, systems approach models of instructional design, and formative evaluation (Reiser, 1987).

Self-pacing (Johnson & Ruskin, 1977; Keller & Sherman, 1982) and the role of student response (Anderson & Faust, 1973) are central to both PL and PSI. (Johnson & Ruskin, 1977; Keller & Sherman, 1982). Programmed instruction presupposes an empirical approach to learning (Glaser, 1978). A student is more likely to learn from overt responses than from covert responses. Actively constructing a response serves as reinforcement to the learning. Although cognitive theorists view learning as something that takes place in a person's head (cognitive information-processing model), it

can be

> inferred when a change or modification in behavior occurs that persists over relatively long periods during the life of the individual [not those behaviors modified or changed through maturation]. (Gagne, 1988, p.3)

This thinking provides the theoretical basis for many applications using instructional technology, generally in the area referred to as instructional design (ID) (Dick & Carey, 1985) or Instructional Design and Development (IDD) (Soulier, 1988). The principles of ID and IDD are often incorporated into the design and development of instructional programs to be used on computers (Alessi & Trollip, 1985; Weinstock & Bork, 1986).

Although not prevalent, computer-based instruction (CBI) is becoming more common, and a body of research has been accumulated that indicates that CBI is modestly more effective and substantially more efficient than conventional delivery systems (Bangert-Drowns, Kulik, & Kulik, 1985; Kulik, 1983; Kulik & Kulik, 1987; Kulik, Kulik, & Cohen, 1980; Kulik, C., Kulik, J., & Shwalb, 1986; Okey, 1985). Ross and Morrison (1989) suggest that better research design is necessary before much optimism can be expressed concerning the

potential effectiveness of CBI. They cite external validity, media replication, and learner control as issues to be addressed. Also, Bresler and Walker (1990) caution that there is some inherent complexity in determining the effects of CBI on achievement.

> Factors such as teachers' and students' attitudes, extent of integration into the curriculum, and user interface with hardware and software, determine the impact of technology on achievement no less than the technology itself. (p. 66)

The use of computers means that education can be delivered procedurally, taking advantage of all the effective developments in instructional design and development. Student achievement can be monitored electronically and content can be modified to suit the needs of individual student. Technology in this context means more expedient and efficient training. For some, this may influence the meaning they have of education in general. However, there is a more subtle meaning associated with computer use in the classroom. The computer means order, sequence and procedure. The computer serves as a metaphor for appropriate instruction and for procedural thinking by both the teacher and the student.

2.4.2 The Computer as Tutee

The computer has not only been applied as teacher, it has in some instances served as a student.[4] Seymour Papert (1980) has been one of the most adamant advocates of computers as thinking tools. He sees computers as "carriers of powerful ideas and seeds of cultural change" (p. 4). The act of programming a computer creates an environment in which one thinks about thinking. Individuals take an active role in developing their own intellectual frameworks. Papert suggests that this could result in "a renaissance of thinking about education" (p. 37). This has become a controversial idea in the field of computers in education.

The majority of the polemic has centered around whether or not computer programming fosters problem solving skills. Some reports recommend caution concerning the claims that computer programming and other computer activities have significant effects on students' ability to solve problems (Krasnor & Mitterer, 1984; Khayrallah & Van Den Meiraker, 1987). Others suggest most criticism does not take into account differences in pedagogy nor the philosophical presuppositions underlying many of the studies (Burnett, 1988; Emihovich & Miller, 1988; Papert, 1987). More

specific studies report improvements in visual-spatial skills, identification of multiple variables, inductive discovery, and general technical-scientific thinking after exposure to computer games (Greenfield, 1987). Computer programming has also been found to enhance some specific cognitive skills such as procedure comprehension and problem translation (Mayer, Bayman, & Dych, 1987).

Whether or not computers or computer programs can be directly associated with an increase in problem solving skill or changes in thinking is still open to debate. However, more and more evidence suggests that computers and computer activities do contribute to changes in students' views of themselves as learners and that the future of computers in the schools should be viewed as a bright one (Burns & Hagerman, 1989; Laboratory of Comparative Human Cognition, 1989; Weir, 1989).

Computer usage in an educational context represents new opportunities. Both students and teachers are able to experience electronic environments with unlimited potential for rich educational experiences. Most importantly, however, the computer represents change. As the computer mediates learning, it changes

the learning experience. As it mediates teaching, it changes the teaching experience.

2.4.3 The Computer as Tool

The use of the computer as an administrative tool may be as simple as keeping class records on a spreadsheet, or it may be a dedicated system of computer-managed instruction (CMI), sometimes referred to as computer-managed learning (CML). Such a system is often characterized by testing, diagnostic, prescriptive, and record keeping components (Alessi & Trollip, 1985; Gorth & Nassif, 1984; Mitzel, 1982). Some systems, also include instruction (Bunderson & Inouye, 1987; Splittgerber & Stirzaker, 1984). More recently, a few systems have included a consulting component or expert system. These programs advise the teacher as to which instructional strategy is most likely to be effective (Hofmeister, 1988; Wenger,1987).

Many reports of CMI are favorable (Brown, 1982; Kellogg, 1983; Morgan & Rhode, 1983). But, critics of conventional CMI caution against an unquestioned reliance on electronic information systems and maintain that there may be too much emphasis on data and not enough emphasis on instruction (Kohl, 1985). The system may

control the user and narrow the pedagogical perspective from which the teacher views the educational situation (Bork, 1985). Some educators just simply experience a loss of purpose and sense a loss of control in the educational process (Lockard, Abrams, & Many, 1987). Prescriptive systems, especially those with lock step procedures may circumvent important educational outcomes, such as those related to aesthetics and intuition (Erlwanger, 1973). The maintenance of some systems is costly and cumbersome (Dean & Whitlock, 1983) and not all systems live up to the expectations of the user (Germundsen & Glenn, 1984). More importantly, however, is the perception that technology inherently promotes particular outcomes, that technology is somehow only capable of being beneficial (Sheingold, Kane, & Endreweit, 1983).

It appears that electronic management systems are generally more efficient and expedient, but not all educators want to use these systems. Technology for some educators means more speed, more efficiency, and more time to spend with students. For others, the technology represents a distancing between the practioner and the educational process. It takes control away from the teacher.

Students also use computers as tools. The most common

student application is word processing. A recent and comprehensive review of word processing in schools indicates that word processing has: (1) encouraged collaborative classroom environments thereby positively influenced and changed the social organization of a classroom (2) improved the composing process through easier facilitation of revision, (3) increased the quantity and quality of student writing (4) promoted a positive attitude toward word processing, and (5) improved keyboarding skills (Cochran-Smith, 1991).[5] However, Cole and Griffin's national survey of American schools (cited in Cochran-Smith, 1991) found that middle and upper class children have more access to computers than do poor children, poor children are more likely to be instructed with drill-and-practice rather than more enrichment software, and regardless of ethnic origin or class, girls are less involved with computers in school than boys are.

The computer as a tool for students means higher production, higher quality, and more fun, but the other side of the coin, suggests that technology also means greater gender and socio-economic discrimination.

2.5 Computer as Literacy

During 1971, a national survey was conducted in the United States by the American Federation of Information Processing Society (AFIPS) and Time, Inc., which suggested that the general population had a computer awareness, characterized by many misconceptions. Data collected in a further survey by the National Assessment of Educational Progress, 1977-78, revealed that elementary and secondary school students had not been successful in acquiring even rudimentary programming skills and as well, did not seem to have a sense of the value computers held for themselves and society (both studies cited in Anderson, 1982). Such assessments gave rise to new concern over, what was perceived by some, as a national computer literacy "crisis" (Luehrmann, 1980; Molnar, 1978).

According to the National Computer Literacy Goals for 1985 Conference as expressed by Deringer and Molnar (1982) of the National Science Foundation (USA),

> The ability to use and understand computing is becoming as important as our ability to understand and handle the written word. A computer-literate populace is as necessary to an information society as raw materials and energy are to an

industrial society. (p. 3)

It appears that computer literacy has been given at least some of the status appropriated to language. It is not uncommon for institutions of higher learning to require a computer language as part of their general entrance requirements, or to substitute a foreign language requirement with a computer language (Peterson's Guides, 1989).

There have been cries from industry requesting that future employees be skilled in the use of the computer[6] (Levin & Romberger, 1986; National Commission on Excellence in Education, 1983; Task Force on Education for Economic Growth, 1983 - cited in Levin & Romberger, 1986). The 80's saw school districts throughout North America buying computers by the thousands (Hunter, 1982). Computer literacy could now be said to be very much a part of school curriculum. Today in North America, some kind of computer experience by young adults is nearly universal. As many as 50% having taken some formal training on the computer (Collis & Martinez, 1989).[7] However, as widespread as this experience may appear, computer literacy still remains, in many respects, only

computer awareness (Adams, 1989)[8].

In response to a growing concern that computer literacy has not fulfilled its mandate, attempts are being made to include computers in a broader context, referred to as technology education. The International Technology Education Association, defines technology education as:

> A comprehensive, action-based educational program concerned with technical means, their evolution, utilization, and significance; with industry, its organization, personnel, systems, techniques, resources, and products; and their social/cultural impact. (Lauda, 1989, p. 2)

Computer literacy may be only the beginning of a broader more general technological literacy associated with the continued perception that a technological society will have to be competent in both the use and language of technology. Knowing a language is arguably the most important component of any culture. To learn the language of technology means becoming acquainted with technological jargon. In the case of the computer, it means learning to communicate[9] with a machine. Literacy, however, means to understand the cultural significance of the communication.

Technological literacy, then, means to understand, appreciate and critique technology. To be technologically literate, is to be better able to participate in a technological culture, to share rights and privileges, to shoulder responsibility for a technological society[10].

2.6 Computer as Mind

The computer as mind is much more than the speculation of science fiction writers. It has been the metaphor for serious philosophical inquiry, as well as empirical and theoretical research. Pepper (cited in Berry, 1984) calls these metaphors "root metaphors." A root metaphor serves as the underlying assumption for systematic inquiry. It serves as a philosophic system. The computer metaphor is often a foundationalism for cognitive science (Baron, 1987; Minsky, 1986). Minsky (1986), suggests that the mind is not a thing, but rather, is a process by which brains and microprocessors change themselves. For instance, the brain makes memories and subsequently makes changes in the process of thinking. The brain is nothing more or nothing less than an elaborate machine - a computer (Baron, 1987). We will some day understand the basic processes of the human brain, thereby extending our intelligence in a similar fashion to the way we extend the power of

our vision through microscopes or telescopes.

Not all those critical of the computer metaphor argument disagree completely, but contend that the human brain is certainly different from the computers that we know (Weizenbaum; 1976; Searle, 1984). Earlier work in artificial intelligence, the attempt to have the computer mimic human decision making (Colantonio, 1989), proved quite promising, but soon bogged down when knowledge engineers found it difficult to extract exactly what it was that made an expert an expert. Dreyfus and Dreyfus (1986) believe artificial intelligence research is presently at a stalemate because investigators are presently unable to model the intuitive nature of humans. They suggest that there is a fundamental difference between "knowing how" and "knowing that". People often make decisions without the benefit of analysis or rules. Dreyfus and Dreyfus argue that it may be some time until we can teach machines to have "perspective" (p. 48). Searle (1984), would contest the very likelihood that computers will ever be more than manipulators of syntax. To think and understand requires semantics, and machines do not understand the meanings of the symbols they manipulate.

For some the question is one of information processing versus

knowledge processing. Roszak (1986) indicates that people have equated information with knowledge. He warns that too much data can crowd out ideas leaving disconnected, sterile, and shapeless facts. We think with ideas not information, and "information does not create ideas; by itself, it does not validate or invalidate them" (p. 88), thinking does. Baruss (1990) argues such a fallacy concerning the information-processing metaphor, prevalent in cognitive psychology, may result in a functionalist perspective. This view, he suggests, maintains that "it is information from which all else is made" (p. 77). As a result, "full blooded consciousness has been relplaced with information" (p. 77). Nevertheless, the business of knowledge processing is well under way.

Viewing knowledge as "something" that is processed, according to Hoffman and Nead (1983), is the merging of two world views, mechanism (world as a machine) and formism (world as patterns or systems). However mental representations, such as information-processing, all too often become reified. One is apt to attribute "to a mental process exactly those characteristics which the theorist has found useful for the purposes of description (p. 543). For some, computation (what the computer does) and thinking (what the mind

does) has become indistinguishable.

2.6.1 Expert Systems

Expert systems are advancing rapidly and being applied in government and business in an unprecedented way (Richards, 1989). An expert system can be thought of as a computerized "vehicle for collecting, crystallizing, and disseminating expertise in a specific knowledge domain" (Hofmeister, 1988, p. 2). Potentially, expert systems can be employed in any area where a reasonably stable knowledge base exists, where rules have been established to manipulate that knowledge, and where problems have established solutions (Lubke, 1988).

2.6.1.1 Examples of Expert Systems

MYCIN, a system designed to diagnose types of bacterial infections, and ONCOCIN, a system to consult concerning chemotherapy, are examples of expert systems of considerable power. Their accuracy is often considered as good, if not better than a human practitioner (Richards, 1989; Rennels & Shortliffe, 1987); however, physicians are often reluctant to use them.[11]

DuPont has more than 600 expert systems installed and the company is reporting that the effectiveness of these systems

contribute to savings of $75 million dollars annually. Digital employs 50 major systems with savings of $200 million (Meador & Mahler, 1990). AICorp's chairman Larry Harris (1990) suggests that the biggest growth of expert systems will be in marketing and sales. Sales personnel often do not have an adequate knowledge to recommend sophisticated products, especially products such as chemicals. Development will be slower in such areas as health care, waste management and pollution control because of varying differences in philosophies and attitudes concerning appropriate directions for development.

Expert systems are also making inroads into education, where intelligent tutoring systems (ITS) may be considered one of the more advanced applications (Frasson & Gauthier, 1990; Wenger, 1987). Intelligent tutoring requires that the system used is capable, in some manner, to emulate the interactive nature of teaching. It should apply a theory of instruction, adapt to a learner in multiple ways, and learn from a student (Winne, 1989). This does not mean that there need be an attempt to replace human teachers, but that intelligent tutoring systems go beyond the notions of CAL and CML. Several systems are designed to tutor, but many are diagnostic and

didactic. In other words, they instruct from "domain specific information with a pedagogical perspective" (Wenger, 1987, p. 420). The Minnesota Adaptive Instructional System (MAIS) is an example of a system that has a macro-component which establishes the conditions for learning and a micro-component which adjusts instruction to meet moment-to-moment individual student learning needs (Tennyson & Park, 1987).

In the field of psychology expert systems have been used most widely in the area of computer-based psychological testing and interviewing; however, some computer therapy systems have been developed. The results of using computer-based test interpretations (CBTI) have been successful, and because they are relatively inexpensive to administer, they generally have been well received (Joyce, 1988; Moreland, 1987). Computer therapy programs are not as common, but they have been applied in such instances as a therapeutic learning program to help patients clarify problems and resolve conflict, (eg. Nosmoke and Marriage Contract Game). It is suggested that computers perform interviews more systematically and often more thoroughly than humans. Clients are apt to be more frank and truthful with a computer and often are less nervous around

the computer. Computers unlike clinicians do not express bias through nonverbals. Computers also sort and analyze data very quickly (Joyce, 1988).

Unfortunately, some applications of AI are, superficial, emulations of human thinking. Weizenbaum (1976) was particularly concerned with this problem. The case cited was the ELIZA program written to explore human language parsing and was not intended as a substitute for therapy. The following is an excerpt of a conversation with ELIZA later known as DOCTOR. The computer's responses are printed in capital letters.

Men are all alike.

IN WHAT WAY

They're always bugging us about something or other.

CAN YOU THINK OF A SPECIFIC EXAMPLE

Well, my boyfriend made me come here.

YOUR BOYFRIEND MADE YOU COME HERE

He says I'm depressed much of the time.

I AM SORRY TO HEAR THAT YOU ARE DEPRESSED

It's true I am unhappy.

DO YOU THINK COMING HERE WILL HELP YOU NOT TO BE UNHAPPY

I need some help, that much seems certain.

WHAT WOULD IT MEAN TO YOU IF YOU GOT SOME HELP

Perhaps I could learn to get along with my mother.

TELL ME MORE ABOUT YOUR FAMILY

My mother takes care of me.

WHO ELSE IN YOUR FAMILY TAKES CARE OF YOU

My father.

YOUR FATHER

You are like my father in some ways.

WHAT RESEMBLANCE DO YOU SEE

You are not very aggressive but I think you don't want me to notice that.

WHAT MAKES YOU THINK THAT I AM NOT VERY AGGRESSIVE

You don't argue with me.

WHY DO YOU THINK I DON'T ARGUE WITH YOU

You are afraid of me.

DOES IT PLEASE YOU TO BELIEVE I AM AFRAID OF YOU

My father is afraid of everybody.

WHAT ELSE COMES TO MIND WHEN YOU THINK OF YOUR FATHER

Bullies.

DOES THAT HAVE ANYTHING TO DO WITH THE FACT THAT YOUR BOYFRIEND MADE YOU COME HERE (p. 3-4)

Unexpectedly, however, professionals, in this case a number of psychiatrists, believed the program could grow into a form of automated therapy. They were enthusiastic and quite happy to begin using the computer program. Although the ELIZA project is now dated, and despite the warnings of Weizenbaum, there is still considerable interest in computerized therapy programs (Joyce, 1988).

Technology is used to enhance, duplicate, or replace human performance. Even the notion that machines may some day be thinking entities has been entertained. Technology represents a new genesis. It becomes the quest to create "thyself."

2.7 Computer as Meaning

For the most part, attempts to define what computers mean have centered around attitudes people have toward the technology. This interest has resulted in the development of computer attitude surveys - the Bath County Computer Attitude Scale (BCCAS) (Bear, Richards, & Lancaster, 1987), the Self-Statements About Computers (SSAC) (Glass & Knight, 1988), the Computer Anxiety Rating Scale

(CARS) (Heinssen, Glass, & Knight, 1987), the Computer Attitude Scale (CAS) (Loyd & Gessard, 1984), the Attitudes Toward Computers Scale (ATCS) (Rosen, Sears, & Weil, 1987).

2.7.1 Attitude Defined

McGuire (1985) reports that more than 500 definitions of attitude have been used by social psychologists. Problems with a definition are a result of a controversy that surrounds the nature of attitude and the relationship between attitude and behavior. When operationalized, attitude usually involves "asking the person to assign the object of thought to a position on some dimension of judgement" (p. 239). However, conceptually, theorists disagree as to whether or not attitude is primarily, affective, cognitive, behavioral, or all three (Dawes & Smith, 1985). There is a prevalent and implicit assumption that individuals tend to act in accordance with their attitudes (Cooper & Croyle, 1984), but prediction can only be made toward "the overall pattern of behavior" (Ajzen and Fishbein, 1980, p. 27). In other words, attitude is not a good predictor of a specific action unless the attitude assessment has been an assessment of the individual's attitude relative to the context of the behavior rather than the object of the behavior.

Consequently, attitude might be thought of in terms of probability. The more comprehensive the assessment of context the higher is the likelihood of predicting a particular action toward a particular object.

2.7.2 Attitude Measured

Although attitude can be measured in a number of ways ranging from a simple opinion poll to physiological recordings, a number of investigators prefer to measure attitude through the use of standardized interval or ordinal scales whereby the participant fills out a pencil and paper questionnaire (Dawes & Smith, 1985; Worchel, Cooper, & Goethals, 1988). The results of the questionnaire are tabulated (quantified) and an assessment is made as to the presence and strength of the attitude. LaPiere (1967) argues that quantitative measurement of such a symbolic situation does not adequately reflect its nature. To be more accurate, the researcher must qualitatively report the situation as it manifests itself in a particular environment. This would be more in keeping with the contextual perspectives concerning attitude; however, a standardized scaled questionnaire is inexpensive and easy to administer.

2.7.3 Attitudes Toward Computers

Opposing reactions to computer technology have created significant interest in assessing computer attitudes (Davidson & Walley, 1985). Computer attitudes have been measured across several diverse groups such as office secretaries (Ardnt, Feltes, & Hanak, 1983); elementary students (Bear, Richards, & Lancaster, 1987); college students (Cohen & Waugh, 1989; Fann, Lynch, & Murranka, 1988-89; Gilroy & Desai, 1986; Glass & Knight, 1988; Marcoulides, 1988; Morrow, Prell, & McElroy, 1986;); secondary students (Collis, 1985); managers (Gamble, 1988; Howard & Smith, 1986); educators (Norris & Lumsden, 1984; Schumacker & Hossain, 1990); accountants, lawyers, pharmacists, and physicians (Zoltan & Chapanis, 1982).

Although computer addiction may also affect the efficiency and effectiveness of office workers (Davidson & Walley, 1985), most studies concentrate on computer generated anxiety. High computer-anxious subjects appear to have lower expectations of performance, perform slower, and report less computer experience and mechanical interest as well as higher levels of math anxiety (Glass & Knight, 1988). Women may represent a larger proportion of the computer-

anxious audience and may experience more anxiousness than their male counterparts (Gilroy & Desai, 1986; Igbaria & Chakrab, 1990), but age and race appear to have little bearing as predictors of anxiety (Gilroy & Desai, 1986). Others maintain that gender has no bearing on computer anxiety (Cohen & Waugh, 1989; Glass & Knight, 1988)[12].

Morrow, Prell, & McElroy (1986), suggest that computer anxiety, unlike more deeply entrenched attitudes or personality traits (eg. locus of control, rigidity, and math anxiety), are modifiable. It would seem that the anxiety associated with the computer experience is reduced when the computer is used with application programs (eg. word processor) rather than computer programming (Gilroy & Desai, 1986). Although computer anxiety and computer experience are correlated (Igbaria & Chakrab, 1990), it would appear that performance, when using the computer, has more to do with anxiety than experience. User's expectations and beliefs concerning the effects of computers on job security, power shifts, and organizational change may circumvent attempts made to alleviate anxiety through computer literacy (Mahmood & Medewitz, 1989). As well, expectations by teachers, managers, and the like,

can strongly influence the performance of subordinates (Marcoulides, 1988).

It seems that computer anxiety is on the decline, arguably because the computer is more commonplace and "user friendly." Gardner, Young, and Ruth (1989) having reviewed studies over the past 20 years conclude that there are five factors underlying attitudes towards computers: (1) enjoyment, (2) quality of life, (3) fear, (4) anxiety, and (5) service. There has been a more positive shift in attitude towards computers. The computer is perceived as an aid rather than a threat and only looms as a thing to be feared by those classified as phobics. With computerphobia, unlike those classified as normal, experience with computers does not reduce anxiety. In addition, feminine-identity and ethnicity are variables in increased anxiety among computer phobic audiences (Rosen, Sears, & Weil, 1987).

2.7.4 Attitudes Toward CBI

Many students report that they enjoy the experience of having course material delivered via computers (Bangert-Drowns, Kulik, & Kulik, 1985; Kulik, 1983; Kulik & Kulik, 1987; Kulik, Kulik, & Cohen, 1980; Okey, 1985). Several studies appear to support the hypothesis

that CBI tends to produce more positive attitudes in a broad range of students than does conventional instruction, regardless of research methodology used to acquire the data (Jenkins & Dankert, 1981; Kinsner & Pear, 1988; Salisbury & Klien, 1988; Schumacker & Hossain, 1990).

Clark (1983, 1985), on the other hand, cautions that the majority of studies investigating CBI do not adequately control for instructional method, curriculum content, and novelty effect. The range of studies is large and attitude is treated with varying degrees of significance relative to the entire study. The context where the attitude is measured is almost always different in each study. The CBI materials also vary in extent and quality (Kid & Holmes, 1984). Furthermore, many researchers rely on their own construction of the computer attitude measurement tool they use (Bear, Richards, & Lancaster, 1987).

Cunningham (1986), questions the whole concept of generalizability in CBI studies and suggests much of this research is driven by the preoccupation of educational research to find the "best" method to produce the "most" effect. He suggests that all of our research is contextualized and value laden and that "our inquiry

will never produce laws that generalize across all possible circumstances" (p. 6).

As discussed earlier, what one may say on an attitude survey form may not accurately predict behavior. A study conducted by Offir (1983) indicated that when university professors were asked about the benefits of computers in an instructional role, all agreed that the idea was good and that the students would benefit from self-directed learning. However, all the professors declined when offered materials specially designed for their area. Alessi and Trollip (1985) suggest that when students report a dislike for CBI we should pay attention, but when they are positive, we should be more cautious since this is by no means a guarantee that these students will pursue CBI over traditional instruction.

It may be difficult to discern the meaning of the computer experience from behaviors directed toward the computer and responses on attitude surveys. It may require a more thorough analysis of the social and psychological context of the experience. Nevertheless, on the surface the computer appears to mean "better," But conflicting data make it difficult to determine just what "better" means. The area of computer attitudes remains fuzzy. Even

for those who experience significant computer anxiety the picture is not clear. Anxiety does not necessarily cause incapacity, or for that matter reduced capacity. It does, however, affect one's enjoyment of the computer activity. Consequently, for some, the computer means more stress and less fun, but does not necessarily mean poorer performance.

2.8 Computer as Phenomenon

Contextual studies are not prevalent in the computer literature. Good qualitative analysis is the exception rather than the rule. Sudnow's (1983) phenomenological narrative investigating the lived-experience of the people who play video-games, is one attempt to reveal the computer experience. He presents the disquieting theme of computer technology as the ultimate tool, the perfect tool,

> How could we not play these 'games'? How could we not stand in awe of the computer, the ultimate rational tool, that device that the most influential brands of reason for a hundred years could announce as their perfect piece of auxiliary equipment? How not to be enthralled by the lights, sounds,and colors knowing they result from the purest modes of human thought - adding, subtracting, subdividing, and the like? ... You can do

just everything with computers. (p. 64)

and contrasts the synthetic world of the computer with the vibrant still mystical world of nature itself.

> Paul is walking from the video-game room across a field toward the dormitory. It's muggy but cooling off. The dampness of the Sound is blowing in from the Connecticut shore. And he sees these little transistors flying around. Every so often, off there in the woods, a small light goes on for a second or two, moves about three feet, and goes dark. Now and then a real close one scares the pants off him. (p. 227)

Technology means faith in rational thought and control of everything. The computer is the crowning achievement of human rationality. Technology means humanity is measured by its development of "equipment." However there is something artificial about technology, something not quite "real." What one makes is, somehow, not all one is.

Qualitative studies often require extensive resources. The time and money needed to do thorough investigations can discourage many researchers from attempting longitudinal projects. Few studies have looked at computer technology from a contextual, more

cultural perspective. Turkle's (1984) ethnographic survey and analysis of the computer culture is one of the most celebrated exceptions. She began her study in 1976, and over a period of six years and the analysis of thousands of hours of interviews, she determined that the computer could be thought of as the first psychological machine. Her thesis contends that "people tend to perceive a 'machine that thinks' as a 'machine who thinks'" (p. 25). As a consequence the computer serves as an interesting metaphor or mirror that helps us come to grips with ourselves. The computer, in effect, can be seen as the "second self." It helps us pose questions about what is the essential nature of humanity, questions of intelligence, of life and nonlife, of consciousness and unconsciousness, of spirit, and of soul. We see in Turkle's work an attempt to go beyond the measurable impact of computer technology towards an exploration of the meanings and values which surround the computer as part of human culture.

But what lies beneath all this technology? What does it do to our being? Michael Heim's (1987) philosophical study of word processing is an attempt to reveal the presuppositional framework that makes possible the existence of electronic technology and word

processing. His evaluation of word processing is based on the premise that

> we are approaching a paperless society and that computers minimize the involvement of the unique movements of the personal hand are not trivial suggestions or sentimental criticisms. They touch the ontological foundations of our world, the way we turn to apprehend realities. The shift in economics is inseparable from a different apprehension of truth. Today, what is true presents itself within the drive toward greater productivity, better management and control, and increased organization through technology. (pp. 199-200)

Heim contends that the meaning we attach to literacy is changing and is becoming one of more rapid, efficient production than contemplative creativity. In essence, we are losing our respect for the written word - thinking has become output. He further contends

> Privacy becomes an increasingly fragile notion. Word processing manifests a world in which the public itself and its publicity have become omnivorous; to make public has therefore a different meaning than ever before. (p. 215)

This loss of privacy combined with an increasing ability of

individuals to publish their own documents will severely challenge the safeguards provided through traditional publishing. He suggests that the editorial practices of conventional publishing ensure some standard of quality control of the manuscripts printed. Although Heim appears somewhat pessimistic about electronic writing, his intent is one of guarding against complacency rather than the abolishment of word processors.

Those investigating the computer as phenomenon provide descriptions that give us a portrait of computer use in a particular context. Through Turkle's account we see people identifying with the computer and consequently asking themselves what it is that makes them different from the machines they use. Sudnow's description illuminates the "machineness" of the computer encounter and reveals a partial meaning of technology through contrasts with more "natural" experiences. However, his account is essentially an earlier examination of the theme illustrated by Turkle. Heim, on the other hand, is more analytic than either of the other two and discusses the fundamental transitions that may be occurring in people's understandings of literacy. Although each investigator has chosen a different method of examination, each has attempted to

provide a deeper and richer meaning of the computer experience.

2.9 The Question

The computer context is extensive and varied and peoples' experiences in the context are equally extensive and varied. The computer and associated technology has changed many aspects of modern life. Its impact on individuals and society has generated considerable discussion. Some of that discussion has raised the issue of technological transformation. The neutrality of technology has been questioned. Computer technology more broadly considered is more than instrumentation. It is:

* **Revolution** - The computer has changed the economy by giving information commodity status. Nations with "know how" have a product that accords them international political and economic strength. The development of human resources through education and training is viewed as essential for a healthy information economy.

* **Slave** - The computer saves time and money. Efficiency and expediancy of production are deemed essential to compete in a market that demands more, faster.

* **Master** - The computer threatens. Along with many new benefits, it has produced some "nasty" side effects. The computer has been blamed for physical ailments, psychological abnormalities, bureaucratic backlogs, and invasion of privacy.

* **Educator** - The computer has become administrator, teacher and student. Educational programs can be created, delivered, and monitored electronically. In more creative applications the computer serves as an "electronic environment" for student exploration. In some instances the machine becomes a student and human students experience learning through teaching, as in the case of computer programming.

* **Literacy** - The computer, more accurately learning to use the computer, is becoming a prerequisite for full cultural participation. It has acquired the status of a language. Many businesses encourage their employees to become computer literate. Computer literacy represents progress and progress represents profit. Students are asked to become computer literate as part of a campaign to make the population more technologically astute.

* **Mind** - The computer has become the metaphor for human knowledge acquisition. In some cases it has been reified. What the brain does has been equated with what a computer does (process information). Some question this understanding of human intelligence as excedingly narrow, citing intuition as a distinguishing factor in human intelligence.

* **Meaning** - The computer has become the object of attitude research. What the computer means to people is often extrapolated from surveys conducted to decern whether or not people like computers or what computers do. This information has revealed that some people are terrified of computers. However, most people appear to accept computers in their stride and often report "liking" them.

* **Phenomenon** - The computer is a phenomenon. In this sense working with computers is an existential and a social experience. Those investigating the computer from this perspective are often interested in the transformational nature of the technology. The computer is seen as something that mediates experience. It is seen as something that changes how we view the world and how we view ourselves.

In the past decade the computer experience has become much more common. We sense a quiet acceptance of computer technology, with heated debate residing primarily in the remote corners of philosophic discussion. The novelty has simply worn off. Computers have not conclusively been proven to be demons or angels, but have been applied, like most technological devices, in ways that were thought to contribute to a "better" life. Recently, we appear to be mostly interested in computer applications and less interested in critical examination of computer consequences, especially consequences of meaning.

For the most part the computer has been viewed as an object, an environmental variable. Although it may, in the words of Turkle (1984), "mirror ourselves," the depth to which computer technology has defined who we are, our very essence, has received much less attention than our efforts to measure, predict, and control the technology. Conventional psychology has often left the questions of meaning to other disciplines. We know the computer experience has an effect on our lives, but we have a superficial understanding of "what" that experience is really like for the individuals affected by this technology. We only get glimpses.

It is difficult to question something that has become part of the social and psychological fiber of life. Familiarity with technology obscures some of its meaning and implication. To answer questions such as, what is the "common" computer experience?, what do the meanings of that experience tell us about the technology?, and what implications do those meanings have for pedagogy?, requires a richer and deeper understanding of the computer encounter. We must go to the source itself, the persons who have sat down to the keyboard and can articulate the experience of being introduced to a computer. Another interpretation of the "text" may help us "see" technology as if for the first-time. This study asks the question **"What is the adult first-time computer experience like and what does this experience mean in the broader context of technology?"**

Chapter 3. METHOD

Investigating the meaning of the adult first-time computer experience requires a special method, a different perspective. The "computer experience" must somehow be revealed and interpreted. Existential-phenomenological investigations are uniquely suited to studies attempting to illuminate the meaning of an experience. The main premise, of course, is that experience is grounded in existence. Phenomenological research is concerned with the person as subject rather than as object.

3.1 Existential-Phenomenology

Phenomenology has been described as the science of consciousness (Osborne, 1990). "We are - so far as we know - the only creatures to be aware of being aware" (Valle & Halling, 1989, p. xi). This awareness makes human experience different from other phenomena. Existential-phenomenology eliminates a premise of dualism, and presupposes a co-constituted reality whereby the "world" and "Being" each exist because of the other (Osborne, 1990). A change in one necessitates a change in the other. Man is what he experiences. He is "of the world rather than in it" (p. 80). A person is not a static entity, but rather "a process, always intending,

always evolving, and continually observing and reinterpreting what is going on (Valle & Halling, 1989, p. x).

Phenomenological investigations are attempts to reveal the phenomenon as it exists in the lifeworld. It is a method, as Colaizzi (1978, p. 53) suggests, "that remains with human experience as it is experienced, one which tries to sustain contact with the experience as it is given." The phenomenologist attempts to reveal the deeper structures or themes of the experience. The thematic structure of an experience is the collective characteristics common to that phenomenon and is shared by any who have the experience. The themes are transcontextual. They go beyond circumstance and should, with rigorous examination, be evident in the subject's pre-reflective accounts of the phenomenon.

Pre-reflection is cardinal to phenomenological investigation. It is the conscious experience one has before one reflects on the experience. In this sense, it is not analytic. Therefore pre-reflective accounts are descriptions of the experience not an analysis of the experience. For example a pre-reflective account of skiing would be a detailed account of actually skiing, the sights, the sounds, the smells, the emotions, etc. It would not be an attempt to

report or examine motives for skiing or a technical account of skiing technique.

Phenomenological methods are hermeneutic (van Manen, 1990; Palmer, 1969). Hermeneutics, in its broadest sense, refers to interpretation, usually of text (Palmer, 1969). However, in order to interpret one must presuppose some understanding of the text being interpreted, which according to Wertz (1984), places the researcher in "an apparently paradoxical position of having to understand her [his] phenomenon prior to carrying out her [his] research" (p. 34). An understanding of the text must be understood within a context of understanding, but through interpretation the understanding becomes reinterpreted; such is the hermeneutic circle (Palmer, 1969). Each attempt produces clearer, deeper and richer renditions, each within its context.

3.2 Bracketing

Preceding the selection of participants and data collection, I recalled my own initial computer experience. I also reflected on my career. I conducted this exercise for three reasons. Firstly, bracketing helped me become aware of my own interpretive framework. Although this position influenced my interpretation of

the data, it is hoped some recognition of that fact prevented an over zealous interpretation. Also, I wanted to reduce the likelihood of excessively leading the participants toward particular answers or accounts of the experience, particularly those I had identified as my computer experience. Secondly, I wanted to be better able to identify the experience as revealed in others' reflections. Without overly structuring my interviews, I wanted to keep the participants "on track." Finally, because interpretation is contextual, I felt an obligation to readers to provide a little more background to assist in their assessment of the study. It is important, from my perspective, that readers be assured that the researcher has some familiarity with the experience. My personal protocol is part of Chapter 1. INTRODUCTION. The following is a list of the presuppositions I acknowledge carrying into the research. The reader may discern others from my brief autobiographical sketch.

1. The existential-phenomenological method is the most appropriate orientation to my question, consequently I subscribe to the philosophical pressupositions of phenomenological methodology.

    a) experience is existential

b) meaning can be revealed through descriptions of experience

c) a person's world is a coconstituted existence, whereby the objective and subjective world exist because of one another

d) meaning has primacy for humankind

e) free choice exists for human life

f) there is an uniqueness in the individual human experience yet at the same time humans are able to share experiences

g) concrete lived-experience can be revealed through language

h) phenomenological research is both descriptive (points to something) and interpretive (points out something).

i) learning is personal

2. Issues of ontology, epistemology, and axiology are the central issues of philosophy and influence our lives at a fundamental level.

3. Computers are more than tools; they mediate our lives.

4. Experience is a qualitative notion.

3.3 Selection of Participants

According to Wertz (1984) "the most basic, minimal criterion for the choice [participants] is whether a potential subject has or can develop some illuminating relation to the phenomenon under study" (p. 36). The participants of this investigation are adults who were selected based on the following criteria:

* Able to vividly recall their first computer experiences.
* Received little if any exposure to computers throughout their public school years.
* Know the researcher well enough so as not to be intimidated by his educational and computer background.
* Readily available to reaffirm their statements.
* Interest in the research.

Eight individuals were selected (see APPENDIX A for a brief background of each). Four were used as the bases for a detailed thematic analysis. Data from the remaining four participants were used for validation. Where their pre-reflections were articulated more clearly or more interestingly than the core group, statements made by the auxiliary group were included as part of the final description.

Each participant was informed of the intent and purpose of the study. Each was treated as a co-researcher and required no coaxing to participate. Each person was asked to sign a consent form. This was done to meet the requirements of the University Ethics Committee. The participants were given the option of anonymity and the choice to discontinue their participation at any time during the research (see APPENDIX B).

Tables 3.1 and 3.2 give an indication of the heterogeneity and homogeneity of the participants.

Table 3.1

Characteristics of the Core Group

Participants	Gender	Age	Occupation	Computer Experience (years)
P1.	male	39	Grad. Stu.	1
P2.	Female	38	Teacher	2
P3.	Female	45	Univ. Prof.	4
P4.	Male	50	Principal	10

Table 3.2

Characteristics of the Auxilary Participants

Participants	Gender	Age	Occupation	Computer Experience (years)
P1a	male	21	Student	1
P2a	male	33	Student	1
P2a	female	38	Teacher	5
P4a	female	42	Physical Therapist	5

3.4 Method of Data Collection

Each participant was given a description of the purpose and method of the research. Emphasis was placed on the need for pre-reflective thought and all were encouraged to "tell the story" of the computer experience. The unstructured interviews concluded when the researcher was satisfied that the phenomenon had been adequately illuminated. Each session was transcribed and returned to the participant for verification of content. The following is typical of the opening remarks used to begin each interview:

> This is a phenomenological study. By this I mean that all that is required of you as a participant is to describe your first

computer experiences as best you can. Describe them as a story. Put me there beside you. Describe all that is happening. Use all your senses - sight, sound, touch, and smell. Recall how you felt about the experience. I want your rendition of the experience, not what you think I might want to hear.

Following this description you will be asked to review the description to verify whether or not this is what you meant.

The interview was not interrupted by questions or interjections from the researcher unless it was felt that:

* the participant was straying from the topic
* the researcher needed further elaboration of the participant's statements
* the researcher wanted to check on a particular theme that had emerged in the protocols of other participants
* there was an excessive lull in the conversation and it appeared that the participant needed prompting

(Note: Often participants would become quiet, but generally this was an indication that they were reflecting rather than an indication of being at a loss for words.)

3.5 Method of Data Analysis

For the most part, Colaizzi's (1978) method of analyzing phenomenological research was followed. Each protocol was read several times to get a feel for the content. Significant statements were extracted and listed as meaning units. Meaning units were then labeled and subsequently sorted according to label. Each labeled group was paraphrased and assigned as a first order theme. First order themes from all participants were examined and clusters of second order themes were developed. A final ordering of themes was determined and a table constructed. See APPENDIX C for a flow chart of the procedures used. The following is a presentation of procedures and samples to assist in explicating the method of data analysis.

3.5.1 HyperQual

HyperQual (1991) is a computerized qualitative data analysis tool. It was used to assist in identification of meaning units and their subsequent categorization into themes. HyperQual is not an "intelligent" computerized tool. It does not assist in analysis. HyperQual serves as a database and is useful for sorting and formatting qualitative data. APPENDIX D is a sample of screens.

3.5.2 Identification of Meaning Units

When a meaning unit was identified, the context where it appeared would be tagged (NoTag). Following the initial tagging, the same unit would be tagged with additional labels, often several because each context usually contained several meanings. See APPENDIX E for a sample of this procedure.

3.5.3 First Order Thematic Analysis

The first order thematic analysis involved sorting the labeled meaning units according to label and then paraphrasing the content. APPENDIX F provides an illustration of the sorting procedure. Note that the context number remains with each element sharing a particular label. This facilitates a quick check on any theme identified within the context of its origin. Chart 3.1 is an example of first order themes (paraphrased).

Chart 3.1

First Order Themes Paraphrased: Sample David

Theme	Paraphrase
1. anger	* anger at myself - my inability to use the computer - my technical incompetence * anger at others - for not helping - for their impatience - feeling possessive of the computer - feeling protective of the computer * anger at the computer - for the computer's lack of understanding - for the computer's lack of emotion - for the computer's lack of immediate response
2. anthropomorphism	* the computer has mind - it obeys - it understands - it dialogues * the computer has an ambience - a presence - friendly - a personality - folksy - diabolical - impersonal ("staring glassy eye") - unapproachable * the computer is a partner - helpful - cooperates - I trust the computer to return what is given

Theme	Paraphrase
	* the computer is patient - it waits endlessly for input - responses are always consistent - not judgmental * I must initiate with the computer - begin an activity - begin communication * I take care of the computer - protect it from the elements
3. anticipation	* expectations of my abilities - to master the computer - to understand the workings of the computer - to learn how to use the computer - to be efficient * expectations of the computer - to be efficient - to do "something" by itself - to be useful * expectations of personal gain and growth * anticipation of mistakes * anticipation of frustration
4. anxiety	* fear of mistakes - having to make corrections - losing material * fear of operation - of doing the wrong thing - of harming the computer * fear of not knowing * fear of progress (being trapped by the technology)

Theme	Paraphrase
5. awe	* amazed by the computer's - efficiency - power to facilitate changes - processing power - versatility - speed of operation
6. benefits	* computers can - make editing easy - produce a legible product - do more, faster
7. blame	* computers do not make mistakes * the blame is on the user
8. care	* the computer is something you approach gingerly * the computer is delicate * the computer is something you protect - from the environment - from others
9. cognition	* it is difficult to remember the sequence of operation * it is difficult to connect the conceptual understanding with practical application * I have to understand the computer as an "exact" machine * visual explanations are easier to understand * the manuals are difficult to understand * a good feeling comes from "knowing" * understanding of the whole is important * I often do on the computer without understanding, consequently I remember very little

Theme	Paraphrase
	* hard to believe other people may know less about computers than I know about computers * when I think about computers, my thinking is structured * the human is a slow processor of information * anger prevents understanding * luck eventually becomes understanding * I have some knowledge about computers when I am able to tell that others do not know * it is difficult to understand a process that I can not sense (touch, smell, see, hear, taste) * little breakthroughs of knowledge are often a surprise, but pleasant * the computer is difficult to understand because the computer experience is different from so many other experiences * I learn the computer by computing * understanding the computer is incremental, often sequential
10. communication	* communication with the computer is finding the right command * communicating with the computer is colder than communication with a person * communication with others about the computer generally involves discussing problems with the computer * I expand my community when I can discuss the computer * communicating with the computer makes me more aware of my humaness * computers do not negotiate

Theme	Paraphrase
	* having words on the screen is having some connection to the machine * I initiate and control the conversation when communicating with the computer
11. concentration	* I have to concentrate when using the computer * working with the computer is isolated, focussed work, even when other people are in close proximity
12. disillusion	* it is disillusioning to working so long for so little * it is disappointing to find out that computers require more than turning on the switch to operate * initially computers did less for me than I expected * I became disenchanted with my own abilities * it is disappointing to conceptually understand and then not be able to do
13. efficacy	* I am not readily able to - understand how to use the computer - develop an awareness of the "whole" picture - progress quickly - know when I know something - find a context for learning - move past start - realize that others were in the same boat * I often feel out of control * sometimes I feel that I was destined not to understand computers

Theme	Paraphrase
	* with more experience I find that I - have more control - have more understanding - know where to go for help - begin to look into my own awareness - begin to internalize procedures - am more able to initiate an activity * my confidence increased with each little success
14. familiarity	* it is easier to work with a familiar machine * it is easier to work with familiar software * I gain understanding with familiarity * owning my own machine helps * the computer that I was initially introduced to made a lasting impression
15. frustration	* I became frustrated with - the way I was taught to use the computer - the time it takes to learn - a lack of progress - not knowing what to do - not being able to remember the procedures - not having enough information - not being able to communicate with the machine - other people's lack of ability and knowledge
16. hesitation	* using the computer is a "jerky" process * I proceed cautiously/gingerly

Theme	Paraphrase
17. identification	* I identified with a particular - machine - brand - presentation - method/procedure - group of users * I identified myself as a computer user
18. instruction	* the conceptual instruction is easier to understand than the practical instruction * visual instruction is best * the discovery method does not work * the manual is considered the instructional guide * it makes more sense to be doing something for myself than doing it for the instructor * there is a dilemma in knowing who to ask (bother) * the best instructors are other students, especially students who are just a little more advanced than yourself * instruction is often toc fast and lacks adequate structure * cannot teach yourself until you have some control * instruction is often presented in an arrogant and condescending manner * responsible for some of the instruction (initiate)
19. literacy	* being computer literate is: - being able to read the manuals - knowing technical terms - talking to others about computers - not being "hood winked" by others - knowing some computer functions - being part of a technological society

Theme	Paraphrase
	- belonging to a certain social group
20. loss	* loss of material makes me angry * I worry about losing things * loss makes me feel stupid * loss makes me feel ill
21. mistakes	* to prevent mistakes one does things in a certain order * computers do not make mistakes * I am not always sure that I am making a mistake
22. need	* there is social pressure to learn the computer * needing a computer is legitimized by its efficiency * need a computer because I can do more
23. other	* the computer is experienced as other when: - I am not compatible with it - it helps - it is viewed as a partner - it doesn't do what's expected - I attempt to direct it (give it commands) - I feel pressure to input something - I have control - when it has control - I respect it - I despise it - I protect it * I experience other people as other when: - I need help - they know less than I do

Theme	Paraphrase
	- when they know more than I do (admiration) - I want to share my feelings - I want to talk about computers - I do not want to talk about computers (hide my ignorance) * I experience myself as other when I become aware of my own thinking
24. patience	* the machine shows infinite patience - in consistent responses - waits for input * little patience with others who are less accomplished * have little patience when things don't work
25. physical	* I experience the computer as a physical entity when: - feeling awkward and clumsy during operating the computer - operations are not visible - making eye contact with the screen and/or touch the keyboard * tracking my progress as being spatial * little awareness of the body when working on a computer * physical use of the computer is difficult * I may feel sick when something goes wrong
26. pressure	* I experience pressure when - I need to input something - I need to learn how to use it - I place pressure on myself

Theme	Paraphrase
27. procedure	* working with a computer is a procedural activity (steps) * to know how to use the computer is to know the next step * there is only one way to do it * I retrace my steps to solve problems * not following procedures results in damage * thinking about the computer is thinking about steps * I must internalize the correct procedures * procedures are logical
28. purpose	* I always have a goal in mind (usually an application) * I am learning how to use the computer in order to apply the computer to some activity (usually a work activity)
29. satisfaction	* I feel satisfied with: - the ability to do certain things quickly - when I recognize something they can do - when I is finish something or can see how to finish something
30. self-awareness	* became aware of the machine's characteristics relative to human characteristics * reflect on personal background (skills etc.) * look at my own understanding * became aware of anger and frustration * became aware of relating to other people * became aware of how I learn * became aware of my growth * became aware of my lifestyle

Theme	Paraphrase
31. self-esteem	* I feel stupid - relative to other people - relative to other abilities - relative to learning how to use computers * I feel knowledgeable - relative to other people
32. space	* the computer changes a room, makes a statement * the computer has its space at home * I experience progress as spacial * I feel locked in time-space * when using the computer space is collapsed
33. status	* experience more or less social status in terms of: - computer knowledge - social relationships - power over others
34. success	* I feel success with: - getting something accomplished - progress
35. time	* when working on the computer time elapses - fast when things were going well - slow when frustrated * may feel not enough time is given to learn
36. transformation	* I experience transformation - in personal growth - in being a student (work) - when the computer changes from obstacle to useful tool

Theme	Paraphrase
	- when control by the computer is replaced by control over the computer
37. trust	* I trust the computer output * I often do not trust myself * I trust the computer to be reliable and consistent * I must trust my "data" to a machine

3.5.4 Second Order Thematic Analysis

After a first order thematic analysis of all the core participant protocols, a second order thematic analysis was conducted. This involved clustering first order themes into more general themes shared by most of the participants. This process of reduction allowed for a more manageable situation since the first order analysis produced upwards of thirty themes for each participant. A brief description was attached to each of the second order themes. First order themes were included for reference (label only, marked with a prefix of 1 to identify first order).

Chart 3.2

Second Order Themes: Sample David

2.1 Computer as Challenge
The computer is seen as an invitation to compete. It is not viewed as a problem, but rather something one looks forward to mastering. There is a sense of anticipation. A feeling that this machine is going to serve.
* anticipation (1.3) * awe (1.5)

2.2 Computer as Obstacle
The computer is viewed as something that stands in the way. It must be negotiated before one is able to progress. Anticipation often gives way to disillusionment and frustration as one realizes there is more to a computer than turning it on.
* anxiety (1.4) * disillusion (1.12) * frustration (1.15)
* other (1.25) * pressure (1.26)

2.3 Purpose
The computer has a purpose. One uses the computer in order to do something. In the initial stages being able to use the computer is often thought of as the avenue toward progress, to keep up with the times.
* benefits (1.6) * need (1.22) * purpose (1.28)

2.4 Physical Experience
The physical experience of using a computer is often only noticed when the physical becomes uncomfortable due to long periods of inactivity and periods of anxiety. However, getting to know the computer has physical aspects.
* loss (1.20) * physical (1.25)

2.5 Computer Operation
The computer must be operated. Learning these operations comprises most of the new user's activities. Everything is procedural and requires knowing the steps.
* anxiety (1.4) * hesitation (1.16) * literacy (1.14)
* procedure (1.27)

2.6 Understanding

It is important to understand how the computer works. The whole picture helps make sense of the procedures and their sequences. Knowing the computer is knowing what to do.

* cognition (1.9) * frustration (1.15)

2.7 Making Mistakes

Mistakes are a big part of learning. Mistakes for the first-time user are often experienced as disaster or sources of extreme anxiety. There is a sense of loss and damage associated with computer errors.

* anticipation (1.3) * anxiety (1.4) * loss (1.20)
* mistakes (1.21)

2.8 Self-esteem

Knowing how to use the computer is in some way a measure of self-worth. It is in some way a measure of ability.

* loss (1.20) * satisfaction (1.29) * self-esteem (1.31)
* success (1.34) * instruction (1.18) * other (1.23)

2.9 Concentration

One must concentrate in order to use the computer. Time often becomes compressed and passes by quickly. One focuses on the computer and the outside world subsides and has little influence on the computing activity.

* concentration (1.11) * space (1.32) * time (1.35)

2.10 Efficacy

Using the computer efficiently means knowing one knows. Knowing is having confidence in one's abilities to control the computer. It is having a repertoire of know how.

* anger (1.1) * disillusion (1.12) * efficacy (1.13)
* other (1.23) * satisfaction (1.29)

2.11 Terminology

Using the computer has its own terminology. One learns the "syntax" of communicating with a computer and with other computer users.

* literacy (1.19)

2.12 Other People

The computer is an isolated activity even in a crowd. Computing is not something you often do with others. There is a social stratification surrounding users and non-users, experienced and inexperienced users.

* anger (1.1) * frustration (1.15) * literacy (1.19)
* need (1.22) * status (1.33)

2.13 Identification

One identifies with a particular computer, usually the one first experienced.

* familiarity (1.14) * identification (1.17)

2.14 Communication

Communicating with the computer is necessary, but different from human communication. Communication with the computer must be exact.

* communication (1.10) * blame (1.7) * frustration (1.15)
* other (1.23)

2.15 Self-awareness

Using the computer makes one ask questions about one's self, especially about what it means to be human.

* self-awareness (1.30) * transformation (1.36)

2.16 Anthropomorphism

The computer is often referred to as if animate. In its emulation of human communication and its ability to serve so accurately and quickly, the computer appears almost super human. When it makes life difficult, it is often viewed as an adversary.

* anger (1.1) * anthropomorphism (1.2) * other (1.23)
* patience (1.24)

2.17 Care

The computer is fragile and must be cared for. It is an important machine.

* anxiety (1.4) * care (1.8) * hesitation (1.16)
* other (1.23)

2.18 Trust
One must trust the computer with the material entered. One cannot see what is going on inside.
* other (1.23) * trust (1.37)

3.5.5 Final Order Thematic Analysis

At this stage of thematic analysis, second order themes were clustered into themes that might be considered the essential themes. One would look for these themes to be present in every adult first-time computer experience. "These are potentially invariant despite changes in the factual details of the data (Wertz, 1986, p. 197). The meaning of the experience rests in these themes. It is at this point that one is able to say "that" is an adult first-time computer experience and "that" is not. In the same way one is able to say that is a "table" and that is a "chair." One is able to distinguish from the innumerable variations within and between objects, which is which.

Four major themes were interpreted: (1) The Encounter, (2) Learning the Computer, (3) Becoming Computer Literate and, (4) Alterity: The Computer as Other. Within these major themes were minor themes that were often shared, but not universally. An X is used in Table 3.3 to indicate that a particular theme was identified

in a participant's protocol. An S indicates that a query, during or after the initial interview, was necessary in order to elucidate a particular theme. A blank suggests that the theme was extremely weak or non existent in the participant's recollection of their first-time computer experience.

Table 3.3

Final Order Themes

THE COMPUTER ENCOUNTER	**P1**	**P2**	**P3**	**P4**
* Computer as Challenge	X	X	X	X
* Computer as Obstacle	X	X	X	
THE LEARNING EXPERIENCE	**P1**	**P2**	**P3**	**P4**
* Purpose	X	X	X	X
* Physical Experience	S	X	S	S
* Computer Operation	X	X	X	X
* Understanding	X	X	X	X
* Making Mistakes	X	X	X	X
* Self-esteem	X	X	S	S
* Concentration	X	X	S	X
* Efficacy	X	X	X	X
BECOMING COMPUTER LITERATE	**P1**	**P2**	**P3**	**P4**
* Terminology	X	X	X	X
* Other People	S	S	X	S
* Identification	S	S	S	X

Table 3.3 cont...

Final Order Themes

ALTERITY: THE COMPUTER AS OTHER	**P1**	**P2**	**P3**	**P4**
* Communication	S		S	
* Self-awareness	X	X	S	S
* Anthropomorphism	X		S	
* Care	S	X	X	S
* Trust	X	X	X	S

3.5.6 Developing a Description

In phenomenological studies the final order themes are often presented as a description of the experience. In describing the experience the researcher (author) attempts to capture the essence of the experience. He or she attempts to develop an interesting but generic account of the experience. It is at this point that the interpretation must stand on its own and be accepted or rejected. The following chapter is a narrative description of the adult first-time computer experience, an experience that shares a common ground for all who have experienced the computer for the first time.

Some attempt is made to follow the ordering outlined in Table 3.3, but themes often overlap in the actual computer experience. For instance, one often experiences the computer as other during the initial stages of learning how to use the computer.

The Description was examined by all participants. See APPENDIX G for a sample of participant comments.

Chapter 4. THE ADULT FIRST-TIME COMPUTER EXPERIENCE

This description is presented in narrative form. Headings are used to accentuate themes or groupings of themes. To assist the reader in identifying where particular themes have contributed to the construction of the narration, final order theme (FOT) number(s) and second order theme (SOT) number(s) are included beneath each heading. Use Chart 3.2 and Table 3.3, located in Chapter 3, for identification of theme organization.

I don't really like it. On the other hand it's fun. (FOT1: SOT 2.1, 2.2)

For adults the first computer experience may be varied. Barbara is a 42 year old computer user:

> I first used a computer four years ago. Since that time, I would describe my relationship with computers as turbulent. The only computer I have ever used is the Macintosh Plus. Even though it is the easiest to learn and the most user-friendly, according to those who are supposed to know about these things, I still don't really like it or feel comfortable using it.

Several adults would express similar sentiments; however, it would

be a mistake to characterize all initial adult computer experiences as negative. Listen to Troy.

> I love it. I guess euphoria would be too much. It's just an accomplishment. It is exciting. Which I never thought it would be. I never thought that the computer would get you excited. It's not even work. It's almost fun.

What can be said about an experience where one person finds it "turbulent" and the other views it as "fun?" Where do we find common ground? It appears that the initial computer experience is difficult to dismiss. It is not an experience that produces apathy; rather, it is more what Bollnow (1972) describes as an "encounter." One only has an encounter with the unknown, and as a consequence, the encounter is said to "precede education" (p. 470). An encounter is not characterized by accommodation, but rather, by confrontation. The encounter "shakes" us, increasing our awareness, making us more sensitive to ourselves, preparing us for the "new".

I can't understand how my kids catch on so fast? (FOT2:)

We watch, often in amazement, as kids deftly maneuver starships on the computer screen. The impact of this technology

appears to be taken in stride and accommodated rather easily. Kids appear lost in the activity and unaware of the simple ease with which they operate the machine. The computer has a toy or game-like quality to it (Turkle, 1984). Ann says,

> You know I watch my kids play on the machine and they're not the least bit confused. I can't believe how they open a piece of software and dump it in the machine, never looking at the instruction, and get it to work. It seems like click, click, and presto! For me, now, well, that's a different story. I've been fumbling around for next to a week now, and only occasionally do I get "it" to do the right thing. I can't understand how my kids catch on so fast. Maybe I'm just getting old?

The child approaches the computer with the same openness and playfulness as he or she approaches any new toy or any stimulating learning situation. However, the adult sees the computer as a representative of a technology that is imposing, complex, and challenging. For the adult there is more at stake in this encounter, especially when the computer becomes a measure of ability. Like the cartoon character having just realized that it has walked out past the edge of the cliff, the adult is outside the activity and more

sensitive to failure. The adult has been asked to be a learner, to become a student, to be a child again.

This is going to be great!

(FOT1: SOT 2.1; FOT 2: SOT 2.3)

Anticipating using the computer for the first time is exciting. According to Al it is a good excitement. "I felt excitement in a good sense. Where you're doing something really novel, it's new."

Dave recalls:

> I took it out of the box and sort of used my farm-boy mechanical skills, well this plug looks like it fits here. I didn't bother hooking up the printer, cause well you won't need that right away. I mean it was pretty straightforward, so I had this kind of sense of elation cause I'd gotten this power cord all hooked in, found the on switch, and the screen lit up. It was like I had this sense of excitement that I was going to be able to do all that stuff.

Ylonda remembers it as being a privilege.

> It was really neat using these brand new machines. They had just been unwrapped. I suppose I felt kind of privileged being able to take it home. It was an expensive piece of equipment.

We were thrilled with the newness of the hardware. The first-time experience is new and fresh. There is an expectation that technology will make life easier or more productive.

I wouldn't want to hurt it!

(FOT 2: SOT 2.4, 2.7; FOT 4: SOT 2.17)

Not wanting to damage the machine is a concern of first-time users. There is a an uncertainty. As Ylonda explains:

> The first time, I was scared of hurting the machine or doing some damage. I didn't know what would happen if I pressed the wrong key. I remember being quite leery of touching the wrong button, or turning the wrong switch, and having something go up in smoke.

All the senses are engaged in discovery as one becomes aware of the machine. Ann recounts that:

> First I ran my fingers over the keyboard. I was surprised to find them so cool. I touched the edges of the machine. They were round and smooth. Most of the computer was plastic, but the big box where the disk drives sit, you know where all the electrical stuff sits, that was metal. I wondered if that part needed more protection. After awhile the top of the computer

became quite warm. I checked with the lab monitor to see if this was normal. Somehow when things get hot that's a warning, and I was so scared that the machine might be harmed.

Barbara was simply afraid to touch it.

I was somehow afraid that if I did the wrong thing I would break the machine. I had visions of an explosion or smoke pouring out the back, or something equally dreadful happening.

You get to know the computer bodily in the same way that you sit inside a new car at a show room, running your hands over the upholstery and dashboard, getting a "feel" for the quality of the merchandise. You cannot get an appreciation through brute force, it takes a lighter, more sensuous appraisal. But, this gentle appreciation is less an admiration of aesthetics than it is a respect for status and the unfamiliar. The computer, unlike more obviously mechanical machines, works quietly, without gears or exhaust. How the computer does what it does cannot be observed, and this invisibility adds to its mystique. The first-time user is often unsure and unable to handle the new technology with confidence and therefore assigns an importance to the computer and treats it

gently, not unlike the actions of a child appraising a precious vase after being told "don't touch!" In moments of weakness it becomes very apparent, as David suggests, that the computer will not respond to the "hammer."

> I remember getting the disk stuck in the computer. It would not eject. It was like, "this has gone on long enough!" My first job was working in a gas station. The guy there would always talk about using the "big f'n hammer" on things when they didn't work. Well, I got my needle-nosed pliers. I yanked the disk out. That was my low point in physical interaction.

The computer must be handled the "correct" way. There is a need for precision. To be imprecise is "wrong" or harmful. Technology broken is no longer useful. When technology is no longer useful, it loses its value.

How do I turn this thing on?

(FOT 2: SOT 2.5, 2.6)

The computer is a machine to be operated and must be made ready for operation. Directions must be learned, but these directions, like those received in a strange city, are often difficult to follow without the aid of some initial orientation. Ann felt that:

> If I could understand how it worked, I would be OK. If I knew how the information got from the keyboard to the inside of the computer and then on the screen, I would understand the process. I needed to know this so that I wouldn't do the wrong thing. When you do the wrong thing you wreck the sequence, and it is difficult to get back to the beginning - you get lost.

It can be as innocent as turning the machine on.

> I sat there in front of the thing. I bet I sat there five minutes just trying to figure out how to turn the damn thing on. I found the little button on the monitor and a green light went on, but I never did find the switch on the back. A guy beside me finally pointed it out.

Even after the machine is turned on, there is this sense of not knowing what to do next. Troy describes it as never being sure.

> You're never really sure. I'm never really sure if I should put the disk in first or turn on the machine first, and at the end do I have to do something before I can take the disk out, or shut the computer off.

Darrel says it is just a bunch of questions.

> I'm thinking is this right? Have I got the right order? Do I

close the door first? Or turn it on first? What will happen if I do one of these things wrong? What will happen if I don't close the door? What if the light is still on?

Instruction manuals, filled with cryptic explanations, often offer little relief. Barbara says it can be just as difficult when others try to explain.

He proceeded to run through the steps in using the Mac. After the first half hour of icons, menus, files, drawers, folders, double-clicks, drags, and scrolls, I was an emotional basketcase. I was totally confused. I couldn't remember any of the sequences and didn't understand what I was supposed to do. I became frustrated and burst into tears.

Mary Ann describes this state of confusion as not having the "head map" or "route."

The computer is not, by the first-time user, analyzed into its component parts or what Pirsig (1979, p.73) describes as "underlying form." Like the motorcycle, the computer is "almost impossible to understand unless you already know how one works" (p.78). David describes this as being out of sync.

.. sometimes the TA's would say, like just rattle off a bunch of

stuff, and they could do it that quickly. But that was like, well somehow that was just incomprehensible, it was being played at the wrong speed for me.

The computer demands some kind of synchronization, a sense of being in tune, being in tune with technology. A rhythm needs to be established. Similar to experiencing dance lessons, new users are compelled to look at their feet. They think about each step, rather than feeling and moving with the music. The mind and body must establish a knowledge of the machine. Until this happens, what may be simple instructions, are perceived as meaningless, disassociated, and fragmented bits of information. To know technology is to know how it works.

I pressed the right key! Why won't it do it?

(FOT 2: SOT2.7)

Mistakes are costly. A sort of paranoia results as doubts of what may have been saved compete with doubts of what can actually be retrieved. Suddenly the term "backup" takes on new meaning. It is difficult to be comfortable with the idea that a considerable amount of work, as Barbara suggests, "sits in some blue plastic buried in the machine. I always feel a little uneasy until I have the

hard copy in my hand."

Even worse, is knowing that your work is there, in the machine and being unable to retrieve it. Mary Ann recounts such an experience.

> I had just written a long seven page project and the computer said "that there was no room on the disk to transfer, Sorry." I just about died! It was all in there. I couldn't get it out! I phoned four different Mac experts and they all said no hope. I finally believed them, but turning off the machine knowing I was destroying several hours of work was awful.

Darrel remembers having the machine not responding to any command.

> What was really frustrating was not getting out of there. That really irked me. I would push the exit and I would push the escape. Nothing would happen. I simply couldn't get the document off the screen. It would just keep showing the same thing. I got so frustrated that I just turned the whole machine right off! That was not a happy day.

There may be an inclination to blame the machine for mistakes, but, as well, there is a sense of personal blundering. As

Ann says:

> I was trying to get out of one program into another and the screen went blank. I went sick to my stomach as I tried desperately to get something on the screen. "Now what have I done! I pressed the right key! Why won't it do it?" Finally, I went into the lab monitor's office and told him what happened. He went to my computer, wiggled something on the back, and the screen reappeared. I'm telling you, was I relieved!

In David's case, "It seemed so predictable. It was almost like sitting on a powder keg waiting until the next time I was going to bugger up. I usually didn't have to wait long."

How often have you heard the expression, "Machines don't make mistakes, people do"? The new user experiences a sense of self-blame when things go wrong. The computer is not treated with disrespect. You can't just kick the "crap" out of the computer like you might a car tire. You can't blame a computer for mistakes. To make a mistake means to be accountable for error. The computer does not apologize. Technology works, or it doesn't work.

I thought it would be faster than typing.

(FOT 2: SOT 2.3)

The computer promises so much. This is often the reason new users are drawn to the computer in the first place; however, they soon find that learning to use the computer takes far more time and energy than initially expected. According to Barbara, sometimes computers do not do what they are expected to do.

> I had been invited to be one of the keynote speakers at a conference. My husband suggested that I prepare my paper on the computer and have it printed on a laser printer at his office. I was very excited at the prospect; I thought it would be faster than typing and I would have the extra bonus of a really professional, polished-looking copy of my presentation. Somehow through the hours of misunderstandings and wrong key presses, I finished the speech. However, the first time it was printed, whole chunks were either missing or in the wrong place. I remember thinking that, as far as I was concerned, using a computer was more trouble than it was worth. I re-did the paper, somehow inserted the missing bits, rearranged everything, and breathed a sigh of relief. I think it took nearly

two weeks to complete the paper. This was after I had already written out what I intended to say. When the time came to prepare my slides, I used a typewriter. You couldn't have dragged me near a computer if my life depended on it.

For David, there was almost immediate disillusionment.

Then one day the College van pulls up and the guy comes in and he's toting all these computers, and so I stayed after work. I was so excited, set one of them up and couldn't get it to do a f ---- thing! It wasn't a good experience.

What was thought to be a faster more efficient method turns out to be slower and less efficient. Hours and hours are taken to produce so little. Time lost becomes equated with increased frustration, and the validity of the task is questioned. The first-time user is disillusioned, let down by the promise of technology. In some ways there is also a sense of letting themselves down.

Feeling really stupid!

(FOT 2: SOT 2.8, 2.10)

Computers are fast and efficient. There is something attractive, slightly magical, about the ease with which others are able to create documents, enhance presentations, collect and sort

data. With that aura comes a pressure to know your way around a computer - to stay with the pack. Barbara again recounts her experience.

> A friend and I were trying to use PCTIE to gain access to the MTS system for some statistics assignments we had to do. We had a list of the proper procedures and had the right passwords, but were not successful. We wasted an entire Saturday afternoon and came away feeling really stupid.

In this instance, Barbara doesn't talk about being frustrated, she says she felt "stupid." Being able to use the computer is, in some way, a statement of intellectual prowess. The computer is sort of a technological IQ test.

For Ann, sitting in front of the computer and not understanding was very much a bodily experience. Feeling stupid was a tightness in the chest, a shrinking of the shoulders, a hesitancy to make eye contact, and a furrowing of the brow. One feels smaller - less worthy of taking up space. Feeling stupid was not just not knowing, but also a fear of not being able to know, not having the correct perspective.

David found the computer a constant reminder of his inabilities.

> Well, I would get angry at myself for my own incompetence. It was like I was dealing with some perfect being, and I was the idiot, and it was...it always seemed like I was aware of being inept. It was like the computer could do no wrong, like it was my mistake.

Troy says,

> I don't find myself a genius, but I know that I am not dumb. But when you go in there and you have this little blinking screen and you think you have so much knowledge, and you can't even find the right button to make this machine go - you think, that doesn't even make sense. We built these things, you know someone like me built this thing, but why can't I understand it? It just makes you feel so useless.

We use technology to measure things, yet in the computer experience, the technology measures us. Measurement is a technological notion in that we use some tool as an arbitrary calibration to compare, judge and give value to something or someone. It forces objectivity and eliminates ambiguity.

Who's been sitting in my chair?

(FOT 2: SOT 2.4)

The computer environment is ordered, sequenced if you like. Ann's descriptions gives us a sense of this routine and its importance.

> I always tried to work at the same machine. I know that's silly, but I felt more comfortable. I could almost tell (feel) when someone else had been on it. One day the keys were still warm when I came in. I didn't like that. It was harder for me to get settled. Anyway I would always roll my chair a little and get so I could see the monitor square on. The person had also left the keyboard a little off center and too close to the machine, so I adjusted that. Then I turned the machine on, and then the monitor. I adjusted my books, and looked at the assignment.

Ylonda suggests that sitting in front of the computer is like piloting an aircraft.

> It was just like being in the pilot's seat. Everything had to be set up exactly - my body positioned in such a way that I could respond quickly. Paper and guides had to be in a certain

position for easy access. I felt quite important!

A routine settles in; however, this ritual is not preordained, and in some ways, is still being defined. This makes the actions of the user more deliberate, more accentuated, less conditioned by habit. The first-time user sits up straighter, closer to the edge of her seat, and moves her head closer to the screen so as to not miss anything. She is constantly checking to see if key presses are registering some change on the screen. Watching first-time computer users is like watching nervous animals at a watering hole bobbing up and down as they frequently check for danger.

In a peculiar sense, the first-time user is the tail that wags the dog. Although the computer is controlled by the user, the computer defines the position taken. The computer is not moulded to the user's position, like pen and paper are positioned by the writer. You don't find the new user subconsciously doodling with keys in anticipation of inspiration. As David says, "I felt good when I could see myself saying, well OK, I'm going to open a file - I know how to do that!" The user takes a position in front of it. As Ann remarks, "You can't take a computer to bed with you." Technology has a place, and one arranges oneself in relation to this place. Technology

defines the technological experience.

Then I looked at the clock!

(FOT 2: SOT 2.9)

The first-time computer user experiences a collapse of time and space. Al describes the computer as a "time-eater."

> I'll look at my watch after having started after supper maybe about seven o'clock, and I'll sometimes look at my watch and it'll be midnight or beyond. I'm not aware that that much time has gone by. So it's a time-eater.

Working on the computer requires a great deal of concentration and there is an experience of being drawn in. Brenda says,

> Its more than concentration. You are actually drawn into the machine. You seem to be functioning at another level of intelligence and involvement. The other day my daughter wanted to discuss an invitation that she had received from her friend Amy, but she insisted that our conversation take place before I got on the computer - because in her words " I'll never get you to listen if you are on the computer."

Ylonda says,

> I felt like I was in a different world, oblivious of what was

happening around me in the house, totally absorbed and reluctant to be interrupted or disturbed. It was almost exhilarating and quite exciting.

Darrel feels a little guilty.

Right now I feel slightly guilty about spending so much time on the computer when I should be spending the time with my family instead. When I'm working on the computer, it's just the computer.

Using the computer is a planned activity and requires a certain mental preparation. The computer demands a certain commitment of time, energy and space. There is a narrowing of focus. Time may pass very quickly and when disrupted or finished with a particular intensive computer activity, there is a feeling of vague uneasiness in that instant where the user disengages from one square foot of video display terminal and again recognizes a much larger physical and social world. You might say one is "reduced" by the technology, made to fit.

I did it wrong six times. Just to make sure I was wrong. (FOT 2: SOT 2.10)

One knows they know how to use the computer when they know

that they know. Until that time things are rather tenuous. It takes a while until past experiences of failure are erased. Confidence comes with success. As Darrel says,

> I still have a tendency not to trust the computer. I still check to see if something is saved. It's nice to see it saved, but I like to go back after I've punched in a whole program, save it, go back into the directory to see if that "sucker" is really there.

There is a sense of uncertainty until one has a sense of control. David describes this transition.

> Often I'd go through the same little wrong routine about six times just to make sure it was wrong. I guess it got better after awhile. [Now] I feel like I'm the operator, like I'm in control. I use to feel that somehow the computer was more in control. That's changed now. To me it can be like a quiet time and there is no more screaming and pulling out my hair unless I do something different.

Having a sense of control is important. Technology needs to be controlled. Learning to use technology is learning to control it. Making it conform to particular goals.

Excuse me. Do you speak Macintosh?

(FOT 3: SOT 2.11, 2.12, 2.13)

A common term for computer competence is "computer literacy." In a sense, it is a categorical term, associated with a perceived hierarchy of computer people, ranging from those who know a lot (computer literates) to those who know little or nothing at all (computer illiterates). In some sense you become literate in almost anything new that you try, but it is not often expressed as becoming literate. For instance, the auto association does not advertise car driving literacy, nor does the summer camp brochure promote water skiing literacy. There is a stronger sense of learning a language, a way to communicate, when one first learns to use a computer. This is how Troy sees it.

> I think the most amazing people in the world are those that can speak more than one language. When I went around the world, I only knew one language. That was the worst thing of all - I was illiterate. And that's what I feel when I sit down to a computer. Even though it's the same language in a way, it's like going to a foreign country.

"What kind of computer do you use?" is the "Excuse moi. Parlez

vous Anglais?" which serves to separate the men from the boys. Often it is a simple declaration of ignorance.

> You know, I haven't used anything but the Macintosh. I sure hope you don't want to talk about the IBM type. If I have this much trouble on the Mac, I will be hopeless on those computers. I find the Mac so much easier to use. I have not even attempted to learn how to use the IBM-type computer. I find the Mac sort of folksy.

It is important that the "right" computer is being discussed. It is not a joking kind of kibitzing that often occurs when someone finds out what kind of car you drive or beer you drink. It really is a concern. It becomes very obvious early in a conversation who is literate and who is not. The fear and embarrassment of being "found out", being ignorant, or being trapped by a barrage of computer terminology, is a very real threat. Ann remembers this account:

> I was sitting there at a table and a group of us were talking about the computer class. I didn't say a thing the whole time I sat there. I didn't know my disk drive from my keyboard. I remember thinking that I didn't belong here, or I wasn't ready for this, or something along those lines. But I got through it.

Knowing a language allows social participation; being illiterate is a handicap. You might say that Ann's experience was like sitting at a table listening politely, at times smiling in faint understanding, while the rest converse in a foreign language - like the Gentile listening to Hebrew at a Jewish marriage ceremony, invited, but totally out of place.

But having accomplished something on the computer and learning the language so to speak, David alludes to the developmental quality of the experience.

> I know a guy who sells computers. I was visiting him and knew about his fascination [with computers] and he has shown me all the amazing things his machine can do, and for the first time I was able to participate in that conversation in a meaningful way. For me there was a nice kind of bond there. I felt I had expanded my community, but I still stay away from people who want to talk about the hot new program they got - I guess I'm not at that stage yet.

There is a sense of participation "expanded community" accompanied by becoming more computer literate. I suppose this sense of expanded circle could be accomplished by joining the Shrine

Club, but becoming computer literate is to be better able to participate in the main culture, the technological culture, and has larger implications for privilege than those attached to Wednesday night meetings. For Mary Ann " being part of the club" means being "with it, keeping up with the times."

There's something about this silence that bothers me. (FOT 4: SOT 2.14, 2.15, 2.16)

Barbara sees the computer as demanding. It demands time away from other people.

> Nobody talks when using a computer. Everyone is isolated. There's something about this silence that bothers me, almost frightens me. I could spend all day in an office, at a computer, and never talk to anyone, even though I was surrounded by people. When I look into the lab in our department, I see six people bent over the keys, ticky-tacking away while the printer is spewing out sheets of paper. The room is silent. I feel uncomfortable; it seems these people don't need each other, don't want to be bothered with anyone else. When I sit down and begin to work, I become a part of this. I give a part of myself to this machine.

Working with the computer requires a peculiar sort of conversation with an object. David remembers,

> I remember coming out of a library workshop where we were doing some online searches. I remember coming away thinking, Jeez, I just had a conversation with a computer. I gave it directions, it gave me answers, It gave me directions, I gave it answers, and so on. But I realized I had this real empty feeling. It was an interaction, all right, but it was a cold one.

There is a sense of what it means to be human as the user acknowledges the "machineness" of the computer. Wenger (1987, p. 22) suggests that "... systems that seem to manifest some intelligence tend to draw unrealistic expectations from naive users." The user has assumed an attentive audience, but has been, instead, in conversation with an object. Realization of this leaves the user with feelings of dissatisfaction. As David says, "I never got anything back except the big glassy eye that never blinked."

Human conversation is filled with ambiguity. People "feed" off of each other's ideas as well as their own. A conversation is as much listening as it is speaking. On the other hand, a conversation with a computer lacks this spontaneity and ambiguity and

consequently leaves the user less than satisfied. In the human sense, the computer does not "need" to communicate. It does not rephrase, clarify, or check for understanding. The computer, as we say, is hard wired. It is programmed. One cannot "convince" a computer.

Feed me!

(FOT 4: SOT 2.14, 2.16; FOT 2: SOT 2.3)

There is a sense of impatience experienced by first-time users. David remembers feeling pressured.

> I think it was the flashing cursor or something waiting for me to make some kind of response. The flash reminded me of someone tapping their fingers on the table impatiently waiting for an answer. I knew that if I could just come up with the right command it would be able to do whatever it was that I wanted it to do. I always felt a kind of pressure to give it an answer.

Ylonda remembers wondering just how long the cursor would stay flashing. "You never really knew if it was going to stay on there forever, how long the cursor flashed before you responded."

The machine's design to imitate an intellectual response

gives the user a more immediate sense of communion with the machine, but in reality the machine displays a pseudo-intelligence and responds only to narrow, restrictive, specific commands. The nature of the machine is to await inputs. It does not initiate, nor does it work in approximations. The first-time user feels a sense of urgency to do the "right thing", like Seymour in The Little Shop of Horrors, as he so desperately wants to save the man-eating plant, but has yet to figure out what it eats.

Having ascertained the computer's diet, the impatience continues. For an adult, the initial computer encounter, is motivated by a perceived necessity to put the computer to some practical use. Ann gives us a sense of the need for immediate application.

> It didn't dawn on me at the time, but I remember doing the dumbest things. I remember learning the basic commands to use a database and then putting all my friends addresses and phone numbers in the database. It wasn't the idea of practicing by using the addresses, it was the foolishness of thinking that this was going to be a useful tool, and would be much more practical than an address book.
>
> You might say that the first-time user has the power of

getting behind the wheel of a Ferrari, but drives it up and down the driveway; however, one does not train and become ready, only to have the object of preparation stand as a decorative ornament. The aesthetics of technology are in its practicality. The ease to which it can be put to use.

Oh, what a feeling!

(FOT 2: SOT 2.3; FOT 4: SOT 2.18; FOT 1: SOT 2.1, 2.2)

A recognition of success with the computer is manifest in the transition from process to product, when a sense of confrontation diminishes and is replaced with a sense of confidence that the time and efforts spent have resulted in a practical end. When the "expected" is indeed the result. For Ylonda it was,

> almost exhilarating. You got this feeling that "Hey, I can really run this program!" I can actually be in control of this thing. Having something work was a real reinforcer. You know you saw those words or pictures or whatever you were doing with it, and it was exciting. It was like a continual reinforcer to see what else you could do with it.

David was impressed when the machine did some work for him.

> Being able to get a copy out, and it's not the headache that

typing was. So those are all really practical things, but they make me feel like this machine is very helpful, and in that way, it's my buddy."

Darrel says it

was a really good feeling. It felt like "OK, things are cooperating with me." It felt good when you printed it. It was sort of like tangible evidence that what I put in actually worked.

That first "real" product is a thrill. The printer starts up, and "God, isn't this amazing." The electronic processes of the computer produce an illusion of intelligence through speed and an incredible capacity for accurate recall. These abilities appear to both mesmerize yet frustrate the first-time user.

A partnership has developed and the first-time user has successfully communicated with the machine. The distance between the two narrows and the user feels a sense of accomplishment and appreciation. The next time the user faces the machine there is a renewed sense of confidence and anticipation, more importantly, a sense of control. The results may not be as favorable, and the relationship established very fragile, but the first-time user has

moved toward the machine, and in many ways, the encounter is over.

In Summary

For adults, becoming familiar with the operations of a computer may be a challenge filled with anticipation or it may be an obstacle surrounded by frustration and disillusionment. In any case, meeting the computer for the first time is memorable. We might characterize these initial experiences with the computer as an encounter where adults find themselves experiencing the "new." They are not refreshing old ideas, but are experiencing new perspectives. Adult first-time computer users are engaged in learning.

Getting to know the computer is driven by a desire to stay current. Adults respect the computer for its power and are in awe of computer speed. They expect the computer to be efficient. They expect the computer to serve a purpose. Adult first-time computer users see the computer as a machine to be operated, controlled, to be made useful. For adults, to be a student, means ordering, sequencing, and regulating. We see adults inspired by the efficiency and speed of the computer and disillusioned when expectations are unfulfilled. There is an urgency to "produce."

New users are constantly measuring and being measured through arbitrary standards of computer literacy, in many ways, a measurement for "fit" into the technological culture. As a result, difficulty or success with the computer deeply influences users' sense of self-worth. There is such a faith in the "correctness" of the computer, that we find new users often in a dilemma of who or what to blame. Making mistakes is interpreted as an intellectual weakness. Adult users are quick to blame themselves for errors, often comparing their inadequacies with the "exactness" of the computer.

First-time users enter a world of inputs and outputs, where they experience reduction or a sense of narrow focus and concentration. Adults find themselves trying to "understand" the computer. They find themselves trying to find out what "it" wants. At a more subtle level the adult first-time user experiences the computer as other. They have given the computer something and expect something in return. Adults feel a sense of vulnerability until they experience some control of the machine, until they trust the machine.

As in all encounters, a transformation occurs. Adult first-

time users become more confident with experience and are able to use the machine for certain ends. However, using the machine requires a certain conformity to standards and procedures.

Chapter 5. DISCUSSION

It was difficult to draw this study to a close. I have been left with more to think about than I have to offer in conclusion. However, after discussing the limitations, validity, and reliability of this research, I have chosen to recap the themes in the computer literature and relate them to the intuitive comments of the participants. I have elaborated on the final order themes pertinent to the adult first-time computer experience and have attempted to amplify the meaning of technology. Finally, I have taken a position on the pedagogical implications of this study, and expressed some opinions.

5.1 Limitations of this Study

The purpose of phenomenological research is to explore meanings. Phenomenological studies are driven by an interest in understanding lived experience. Their task is to examine the natural, pre-theoretical world, the concrete world as it were, and to explicate the fundamental meanings of experience. It is at this more primordial level of consciousness that we construct a meaningful foundation from which we interpret and understand our existence. Phenomenological studies are investigations concerned with "what"

constitutes a particular experience (Polkinghorne, 1989), in this case the experience of adult first-time computer users. However, such experiences can only be examined retrospectively (van Manen, 1990). This perspective limits the scope and purpose of phenomenological research to questions of "what" and "how" rather than "why."

This study is limited to a descriptive account of the adult first-time computer experience. These experiences may or may not differ from the experiences of younger users. This study is not conducted to determine the effect or consequences of computer technology upon individuals. Its purpose is to better understand the phenomenon as experienced.

Analysis of these descriptions is limited by my own presuppositional foundations as well as by my interpretive abilities. I carry certain predispositions into the research and am restricted by my own understandings of both the data and the method of data analysis. One is never able to completely bracket his subjectivity nor completely verbalize the "essential" experience. As van Manen (1990, p. 18) suggests, "phenomenological reduction teaches us that complete reduction is impossible, that full or final descriptions are

unattainable."

Interpretation is temporal and therefore limited by a particular historical, sociological, and psychological context. Although the data must speak for themselves, these data will continue to speak, and a decision to "close the book" is more a function of practical considerations than an acknowledgement that this is the final word about these particular computer experiences. It is likely that future interpretations of these data, or similar data, will vary and reveal yet another side of the adult first-time computer experience.

5.2 Validity and Reliability

Validity and reliability in phenomenological research are "based upon the observation that human perception is perspectival and contextual" (Osborne, 1990, p. 86). One cannot escape one's point of view nor live outside one's own time.

Questions of generalizability and replicability must address the validity and reliability of the essence of an experience. As a result reliability is inextricably tied to validity (Wertz, 1986). In other words, if one accepts a description of an experience as valid, one would expect the essential elements (themes) of that experience

to transcend particulars, and to be present in all valid accounts of that experience. In this sense, all valid descriptions of an experience are reliable. Reliability in itself has no significance without validity. It is not a question of whether an experience can be recounted several times verbatim, but rather a question of whether or not the essential themes (essence) of the experience are present in each account. The divergences of the experiences can actually confirm the essence of the experience. Several accounts of an experience, differing both in context and fact, can be the same in meaning. For example, there is "something" essentially similar in the grief and sorrow of a parent mourning the loss of a child whether it be situated on the dirty floor of a gutted building in war torn Bagdad or next to a mangled bicycle on a manicured boulevard in Western suburbia. The different perspectival positions support the existence of a common (reliable) lived-experience, a common meaning (Wertz, 1986). The phenomenologist attempts to illuminate consistency of essence, not facts.

The validity of this research depends on the validity of the descriptions by the participants and the interpretation of these descriptions by the researcher. The phenomenological researcher

must rely on rhetoric (Osborne, 1990) for persuasion and "cannot draw on a reader's commitment to th conclusive power of statistically expressed arguments" (Polkinghorne, 1989, p. 57). In order to render a valid analysis of this study, three procedures were outlined in Chapter 3: (1) bracketing, (2) within-person validity checks, and (3) between-persons validity checks. The remaining validity rests with the reader. As Osborne (1990) suggests,

> The best the researcher can do is to argue a particular interpretation as persuasively as possible, supported by references to the data, and leave the final judgment to the reader... (p. 87)

However, because hermeneutic interpretation is contextually bound, it does not imply "rampant relativism" (Gergen, 1985, p. 273), but rather, it suggests that the study must be evaluated on its own merits and, as a consequence, able to withstand the "phenomenological nod." Each individual, in some sense, has a unique view of reality. "And yet effective communication depends on shared assumptions, definitions, and understanding" (Entwistle, 1984, p. 1). It is only our rendition of experience that we share with each other. We experience our world intraspectively but share it

retrospectively (van Manen, 1990). Our mutual understanding of human experience depends upon empathic generalizability.

5.3 A Discussion of Themes

The themes revealed through the phenomenological description represent the essential nature of the phenomenon. The themes contained in the description of the adult first-time computer experience are what make it possible for us to recognize and understand this as a particular experience. The themes disclose the foundation of the experience (Colaizzi, 1973). They make the experience distinctive (Valle, King, & Halling, 1989). In reflecting on these themes we are able to more fully understand the meaning of the experience.

5.3.1 Themes in the Literature and the Adult First-Time Computer Experience

We do not create meaning in a vacuum. Meaning always has a context. Experience generates meaning, but our understanding is always influenced by a foreunderstanding. As one might expect then, the themes, as reflected in the computer technology literature, are also, in some part, reflected in the individual experiences of those who use computer technology. The following is a juxtaposition of

the the thematic analysis of the literature reviewed in Chapter 2 with the experiences of the first-time computer user. For instance the theme ***Technology as Revolution (The computer is part of the technological revolution. Knowing how to use the computer gives you a competitive "edge.")***, introduced in Chapter 2, REVIEW OF THE LITERATURE, is also evident in interviews given by first-time computer users about their first computer experiences. The following are a few passages taken from the protocols of participants in this study.

* *It's realizing that you are not only part of the club, but realizing that technology is advancing and advancing, and that you are part of it, which is ,I think, pretty powerful.*
* *The kids were starting to ask me questions about computers. I felt I should know how to answer. I was starting to feel inadequate in areas I felt education was moving.*
* *I felt those that learned to use the computer were going to be far ahead of those who did not.*
* *I feel power when I can produce organized data that most others do not know how to do.*

Users have a sense of the "hype." They are aware of the

ubiquitousness of computer technology. They understand the need to stay current. The computer represents progress. To use the computer fulfils an obligation to be a part of the technological culture.

The remaining themes identified in the literature review are highlighted in bold, the descriptive accounts of participants are italicized.

Technology as Slave (The computer is a tool. Technology assists in more efficient and expedient production.)

* *I appreciate their potential and how they can facilitate many tasks.*

* *You can be creative. You don't have to care if you make mistakes - they are easy to fix, get rid of, change, etc.*

* *I spend most of my free time now trying to find ways to make more effective use of our computer system.*

* *I feel exhilaration at being able, through the use of the computer, to do such powerful processes...[to do a process in hours] that would have taken three counselors several weeks.*

Technology is defined by its use. Technology that does not work has no value. Users measure the value of the computer in

relation to its usefulness. It has power, but that power must be harnessed. It must be controlled.

Technology as Master (The computer controls. It forces changes in the way we do and think. It creates a sense of helplessness in the user. Technology can have a "life" of its own.)

** It takes courage to tackle a new program, because you stand a very good chance of being defeated. Your opponent is bigger than you.*

** Things were happening beyond my control. The lights were on, the cursor flashed, and things went on the screen, and they were happening very quickly to me - not with me - to me.*

** I felt so stupid.*

Technology can threaten the user. It takes on a new character and is no longer defined by its usefulness. It is viewed as an obstacle. Technology as the "enemy" reduces the user, by making the user feel less adequate. When not controlled, technology represents oppression.

Technology as Educator (The computer can be programmed to teach. One can learn from technology.)

** Maybe i believe that the computer is really patient in working with people, doing drills, giving corrective feedback...*

** I feel it has changed being a student ... somehow notes seemed like kind of throw away items ... I feel, hey this stuff is worth saving, because the essential ideas are there.*

** It was more the fact that, What are these machines going to do in our school? or How are they going to influence what we have to teach?*

** I suppose it threatened my teaching ego to say the least, and I was probably feeling very insecure at that moment in the classroom.*

The computer has many uses in education. Although creative applications of computer technology are becoming more prevalent, the computer is used primarily to assist in administration and the delivery of instruction. The computer is precise, accurate, and fast. Most of all, it is consistent and patient. However, beneath all that is a sense that the computer changes education. It opens new avenues of experience and perception. For some, computer

technology will even alter what it means to be a teacher.

Technology as Literacy (Knowing how to use the computer certifies technological literacy. Technological literacy is a prerequisite in a technological cultural)

* *As soon as I started to talk to him I got all tongue -tied, because I knew I was probably using the wrong words.*
* *There was a whole language built around the machine.*
* *There were definitely two camps - those who knew more than I did, and those who knew less than I did. I had an admiration for those who knew more, and I think a little impatience for those who knew less.*

In a narrow sense, to be literate is to be able to communicate effectively within one's culture. More broadly, literacy means having an appreciation for cultural values and being able to critically appraise those values. Generally, computer literacy refers to being able to use a computer. However, computer literacy is more than acquiring technical jargon. It is being included in "the group." To the user, knowing how to use a computer represents participation in the technological culture and thus part of the technological revolution.

Technology as Mind (The computer is different from other machines. It is smarter. In some ways, smarter than people. Technology can be "intelligent.")

** Somehow I had already elevated the computer to something more intelligent than a car motor.*

** Well, I suppose you feel that you should be more intelligent than a machine.*

** There's no brain in it ... that took awhile, I think, to get over that impression.*

** It took awhile for me to realize a computer is a machine.*

** I've always looked on computers as an extension of my brain...*

The computer is different from other machines. It appears to have intelligence. Although there is recognition that this is not quite an accurate representation of what the mind does, the computer's manipulation of information at incredibly high speeds produces a certain respect for the computer's capabilities. For many it has become the metaphor for thinking itself. To think "like a computer" is to be clear, precise, and rational.

Technology as Meaning (Developing a positive attitude toward technology is a measure of achievement.)

** I first used a computer four years ago. ... I still don't really like it or feel comfortable using it. ... I had this feeling that she was measuring my intellectual capabilities against the yardstick of facility in computer usage.*

** I really feel that my attitude is slowly evolving from a very apprehensive, negative one to a more positive one. I can accept my limitations more easily as I learn more and understand more about computers and have more success in my attempts to use one.*

** My feelings toward the machine can best be described as going from awe to respect.*

The meaning of "meaning" is difficult to define, but usually definitions reflect the purposes and techniques of those doing the defining (Osgood, Suci, & Tannenbaum, 1978). The psychologist may be interested in the metaphorical relationship of the computer to cognitive process. The computer scientist may describe the computer as an electronic tool that can be programmed to store, retrieve, and process data. To the first-time adult computer user

the computer means getting the job done. To "like" the computer is often a statement of success or a sense of having more computer skill than others. To "hate" the computer often represents failure, fear or a lack of confidence. The meaning of the computer is measured by its usefulness. Attempts to quantify the meaning of the computer usually take the form of "attitude" surveys.

Technology as Phenomenon (The computer is an object of consciousness. Technology as an object of intentionality mediates experience and transforms our world-view. Experiencing technology is a way of being-in-the-world)

* *So it was setting up a whole new structure. I had to think differently than I had "thunk" before.*

* *It was very different. I had to cozy up to this thing, before I could even think about what I was going to do on it. And cozying up for me took a little while to accomplish.*

* *In a way the computer output became or has become an extension of me. As the person in charge, an error the computer makes, is almost the same thing as me making the error.*

* *I feel a sense of humanity in the sense I'm not a microchip. ...*

That makes me feel more human having had some interaction even at a very basic level with computers.

** I just remember thinking that I kind of felt that I wished for the world of brick and the gargoyle-type things on the corner of the building. But it was like there was smoked glass, and I guess that's like a moment of being locked in modern time and having this nostalgia for another time...*

** We just accepted it as the latest step in technology, and went along with it, never doubted it.*

** I was aware of everything, the movement of my hands, every key I touched and that kind of thing.*

It is difficult to imagine a world not mediated by technology. Humankind, naked against the elements, ceased when people discovered their first tools. The computer transforms the user's experience of the world. It opens new avenues of perception and closes others. One enters the data into the computer and awaits a response. Process is trivialized (the computer does "it"). Product is emphasized (the user receives "it"). For example, calibrating a computer to mix paint after a color scan is not the same as painstakingly adjusting the mixture as the eye makes the judgement

call. Training and experience are replaced with a computer printout. "Anyone" can mix paint. These conveniences change us. The question remains how, and in what way? The computer user recognizes a transition. These changes may be articulated through expressions of uncertainty, of anticipation, of increased sensitivity.

Experiences confirm previous understanding. However becoming reacquainted with the adult first-time computer experience not only reaffirms what is already known, but refreshes an appreciation and awareness of lived-experience. One again reflects on what that experience meant through identifying with the experiences of others. In this way one confirms, negates, or transcends a certain understanding of what it means, as an adult, to use the computer for the first time.

5.3.2 The Meaning of Computer Technology

To provide a fuller meaning of the experience, the phenomenologist may have to provide a "strong reading of the text." This is to say that not all that is meant is always literally there in the description. One may have to read between the lines as it were. This is an attempt to extrapolate, from the experiences of adult first-time computer users, a deeper meaning of computer

technology and to further explicate the significance of "advanced technology" in general.

Themes of the adult first-time computer experience cannot be analyzed in isolation from one another. They constitute an entire experience and therefore can only be more fully understood within the context of one another. For this reason I have chosen to begin my explication of the adult first-time computer experience with alterity, since this theme appears to be the foundation for the computer encounter, the learning experience, and the acquisition of computer literacy.

Alterity: The Computer as Other

Considering the computer as "other" may seem somewhat pretentious. People are not machines. Humans may be machine-like in some instances and machines may be human-like in other instances, but, unlike the other, technology is unable to share in our experiences. It is unable to "understand" us. However, we give computers anthropomorphic qualities and, as a result, they become more than mere objective objects. We give technology a quasi-otherness or a quasi-life of its own (Ihde, 1990; 1976). We experience "otherness."

According to a discussion of Emmanuel Levinas by Peperzak (1989), Bernasconi (1989), and Cohen (1989), there is no phenomenon without language. There is no phenomenon without the "other." Language and the other are pre-phenomenal. Essentially, this suggests that our very consciousness of consciousness, our very being, is made possible through communication. We say "something" to "someone." Our relation to the other is not an object of intentionality[1] (a phenomenon). When we objectify the other, we are prevented from "having an encounter with this person" (Peperzak, 1989, p. 12).

> The other to whom I speak is not there before me as a phenomenon that I can observe, study, analyze, reflect upon, but as someone to whom I offer something that I have observed, felt, heard, studied, reflected upon, written, or said. (p. 12)

It is through language and the other that we thematize objects and give them meaning. For objects to be meaningful, there must be a reception of meaning (Cohen, 1989). "All meanings are already subject to the other person, are already for-the-other..." (p. 42). Objects do not question "me." They do not have a claim on me. I am

not obligated to objects as I am to the other (Cohen, 1989). I am the object of the other's intentionality. In this sense the other gives meaning to my being. From this perspective machine alterity seems absurd. I will call this "otherness in the first sense."

Ihde (1990; 1976), however, discusses something he calls "instrumental intentionality." As instruments mediate our experiences they also transform our experiences. Sophisticated instruments often radically transform experience. For example, the spectroscope gives us a band of color that must be interpreted. The band of color represents an object, but the band itself bears no likeness to the object it represents. In this sense it becomes "text like" (Ihde, 1976, p. 35). More recently, computer generated fractal geometry, often used for motion picture special effects, is being utilized by physicists, chemists, seismologists, metallurgists, probability theorists, and physiologists (Gleick, 1988). From a "text" of swirling ever-changing patterns scientists are learning about the paradox of random, chaotic, order. The hermeneutic capacity of instruments has revealed a new "world." Instrument intentionality suggests that instruments "point at something," making the invisible visible. In this respect instruments mediate

the mundane and are "radical variants upon human intentionalities, [taking] us into uncharted areas" (Ihde, 1976, p. 35). Instruments serve as agents of revelation and partially fulfil a more complete mandate of the other. I will call this "otherness in the second sense."

There are moments in the computer encounter where users experience otherness from the machine - where the user experiences the "face" of the computer (otherness in the first sense) and where the user experiences the "revealing nature" of the computer (otherness in the second sense). The computer program "asks" something from the user. It asks for input. It requires a response from the user. Until the user is familiar with the operation of the computer and understands the mechanics, such requests appear to originate "inside" the machine. In moments of difficulty the user will sense the machine is "doing it" to him. During retrospective analysis the user is quite aware that the machine does not have the otherness of a human being. However during the experience it often feels the same. During these moments it is not a question of what the computer program or the computer programmer want, it is a question of satisfying the machine. The

machine has a hold on the user. It claims the user, but only momentarily. The computer may never "be" other, but for the adult first-time computer user it "is" other. The computer is a transitory other, a surrogate other, an intended other.

To experience computer otherness in the second sense, is to have the computer change the way one experiences the experience. The computer as other mediates the experience by amplifying and reducing certain features of the "natural" experience (Ihde, 1979). For instance, the computer enhances one's ability to produce text, but reduces the experience by removing the pen and paper. In this sense the computer is not neutral. It transforms the experience. The more one experiences the world through the computer, the more the computer defines that world. Technology as other, to some extent selects what is experienced (Ihde, 1979). What one does with the computer is restricted by what the computer is capable of doing. Consequently, the computer reveals a limited world. One must not confuse enhancement of experience with breadth of experience. The encounter with "real others" both liberates and restricts one's world view, an encounter with the computer both discloses and hides.

When one uses today's computers, otherness in the first sense

is brief. So brief, it goes almost unnoticed. However, as we relinquish more decision making to computers, for example in the use of expert systems, the "face" of the computer may become more significant. In the second sense, otherness is evolutionary. It evolves with the increasing capabilities of computers to explore the unfamiliar. One begins to do things differently, and more importantly, to see the world differently.

The Computer Encounter

In the presence of technology one is confronted. By giving technology a certain "subjective" character one has an encounter with technology. An encounter forces a new awareness (Bollnow, 1972). It demands a different world-view. To effectively use technology one must become technologically aware.

The process of becoming technologically aware is to participate in a series of confrontations. Initially, technology challenges one to use it "appropriately." To use a working computer as a doorstop would be inappropriate. In most circumstances it would not make "sense." Technology is defined by its use. Further, technology confronts one with "correctness." If one uses the technology correctly, it returns the expected result. The unexpected

result implies that the technology is faulty or the incorrect procedure was followed. In the case of the computer, using the incorrect procedure returns the uncompromising, "error message," which translated means "You did it wrong." Understanding technology is to understand technology according to correct procedure and application. As well, technology confronts one with "wastefulness and timeliness". It is used to save - to save precious resources such as time and money. To use technology inefficiently or inexpediently is to undermine the purpose of its creation. Also, technology confronts one with "goodness." It makes life easier. It contributes to one's physical and material well being. It assists in one's labors, increases one's ammenities, and enhances one's survival. Technological progress assures the "good life," and the good life is equated with the easy life.

In encountering technology one encounters the "technological atmosphere." One learns to think and to act technologically.

The Learning Experience

Some would argue that "genuine learning" is more than acquiring information. It is a change in world-view (Colaizzi, 1978, Osborne, 1987). In this sense, learning is closely associated with

Bollnow's (1972) conception of an encounter. Learning is making information existentially relevant (Osborne, 1987). One experiences new meaning. One is changed by a learning experience.

Learning an unfamiliar technology begins with learning the what, when, and how of mechanical operation. The "text" of technology is the ever-present instruction manual, or in more recent times, the on-line help menu. To know the computer is to know how to get it to work. At first, the adult computer user finds using the computer uncomfortable and awkward. The user has not as yet made computer operations "natural." Making sense of technology is inextricably tied to making it work. When the technology does not work there is some resistance. The user is not sure that the efforts will translate into benefits. There is still some scepticism that the "new" is "better."

However, one has not learned the technology until one can apply it appropriately and efficiently. Having used technology successfully changes one's perspective. During this transformation from procedure to application, technology becomes less extrinsic and more part of the way one does something. One is no longer confronted or challenged. Technology's usefulness is no longer

questioned. The learner accepts this as a "better" way to do things. Doing it the "old way" no longer makes sense. The "old" experience is devalued. The learner has been changed, and in some sense, accepts the "technological truth."

Becoming Computer Literate - Accepting the "Technological Truth"

The measure of technology is performance. Technology introduces new standards of efficiency and expediency. There is a sense that almost everything can be done a little faster, a little more accurately. Essentially, almost everything can be done a little better. Technology promotes the practical and the workable as virtue. If something "works," it is "good." This is the "technological truth."

To be technologically literate is to understand this virtue. To use technology correctly and appropriately is to demonstrate technological literacy. Technological literacy is not only a command of jargon or familiarity with brand names, but is also the ability to apply and critically assess the usefulness of technology. Beyond its use technology has little meaning for the user. When it does not work it is "junk."

However, literacy in a broader sense is a way of thought. One's language is a conceptual framework. In communicating about and through technology one develops a technological "mind set," a psychology of technology. One extrapolates from the technological context and technology becomes a "useful" metaphor. One's intentionality of thought is dominated by "use." Even people are subject to measure and usefulness. They become, as some suggest, human resources.

5.4 Implications for Pedagogy of the Adult First-time Computer Experience

For teachers, particularly those who teach adults computer technology, the technological experience needs to be approached with a great deal of pedagogical responsibility, especially in the light of the previous analysis of the computer encounter and its implications as a "genuine learning" experience. It is particularly important that educators involved in using computers for instruction or as a subject of instruction be cognizant of the computer as more than "just a tool." It is a cultural artifact with meaning, a meaning deeper and richer than the computer's mere physical presence.

As suggested, technological learning is learning to use

technology. Students expect to learn how to make something work. They often find diversions from procedural tasks irrelevant. Teachers often view diversions irrelevant. The implication is that technological learning can become a model for all learning. Learning becomes something that has to be efficient and expedient. As a result learning becomes a quantitative notion. It becomes a number of pages, a number of weeks, a number of courses, a number of credits, a number of certificates, or a number of years.

As well, learning becomes a question of cost effectiveness. One does not want to spend "too much" time learning before doing. Learning becomes the quest to be current. In this sense, it becomes a race to consume information. Learning becomes a never-ending game of Trivial Pursuit. The answers are sold. Learning becomes an industry, where knowledge is advertised in glossy brochures and tendered on the open market. Its value is subject to the rules of supply and demand. When one sells knowledge as a product, one sells knowledge as technology. Consequently, it had better work!

The computer and technology have become a cultural and intellectual standard of measure. People apologize for their lack of computer or technological skill. They feel embarrassed when they

are unable to get something to work. They feel ignorant. In order to meet the criteria of technological literacy, they upgrade. They become better. They perform better. They "work!" In their quest for technological proficiency, students become technological. One's value is measured in one's ability to do "the job right." To perform, one must "make" oneself better.

As educators we are charged with dispelling ignorance. To be inept technologically makes us feel ignorant. Could the real ignorance be in the unexamined acceptance of that which makes us feel ignorant? As educators of technology we must be careful not to become technologized educators. We must be careful not to "atomize or fragment the learning process" (Murphy, 1985, p. 169). The adult first-time computer experience is an opportunity for teachers and students alike to examine that rare moment when one "struggles," when one encounters the "new." An opportunity to return to the world as lived.

5.5 Some Final Thoughts

There is no presumption in this thesis that it is a treatise of original thought. The previous discussion is steeped in the ideas of many. However, as practioners there is a tendency to treat

philosophic thought as somewhat esoteric, as being removed from "real" life. It is hoped then, that this thesis has helped illustrate the technological life-world as a "real" life. By describing the technological experience as lived, it is hoped that the reader is better able to see the transformational nature of technology.

I talk of experiences with technology as developing a new perspective. This begs the question - What was the old experience? I'm not sure anyone, after having experienced the technological life, can adequately suggest an answer. We cannot experience the pre-technological. I do, however, offer the following. The technological life is not the contemplative life. Questions, in and of themselves, have no value. The technological life demands answers. Therefore, to "escape" technology one must encourage questions without answers. We must "waste time" experiencing questions. As Heidegger (1977b) suggests, "questioning is the piety of thought" (p. 35). Through questioning we "open ourselves expressly to the essence of technology, we find ourselves unexpectedly taken into a freeing claim" (p. 26). In revealing the essence of technology we are freed from a technological world-view.

More specifically, we must be increasingly more sensitive to

the experiences we have in the "presence" of machines. We must go beyond conventional practices and theories of computer human interaction (HCI), which encourage and facilitate effective interfaces with technology, and explore the transformations inherent in technological accommodation. We utilize technology to transcend the human condition, but in escaping we are caught by the technological condition. We must be doubly cautious of our use of so called "smart" machines, machines designed to assist or replace human decision making. We have not examined in any detail the experiences of people who relinquish their responsibilities to machines, either by design or by accident. It is not a question of passing the "Turing test." It is a question of human experience. We are the choices we make, and as a result of this liberty, responsible for everything we do (Sartre, 1973).

Critics of technology, warn of the dangers of "technological thinking." They are often cautious, even pessimistic, about a technological future. Many are inclined to write philosophically and for the most part, I suppose, have created amongst themselves their own group of admirers. I, as well, am predisposed toward a position of caution concerning technology. On the other hand I am very much

involved with technology. I "make a living" encouraging students to use computer technology. In closing I offer this contradiction as an illustration of complexity rather than hypocrisy. In the mundane technological experience of turning on a computer for the first time we find more than a useful tool. We discover something about our uniqueness as human beings in contrast to the "machine" and at the same time recognize a precariousness in our increasing adoption of technology.

POSTSCRIPT

One offers a doctoral thesis for scrutiny. In this sense one's work becomes an object for examination. The process is somewhat secondary to the product. I would like to take this opportunity to reflect on the process, and in some way detechnologize my study, to explore my understanding of my experience as "the researcher" and to take the liberty of expressing the resulting impact on my thinking as an educator.

Keeping the Question Open

Gadamer (1975) suggests that a good question always remains open. A good question is never satisfied by answers, only strengthened by the inadequacy of answers. If emerging from this research experience asking more questions than when I started is an example of a good question, then I have asked a good question. Yet, I continue to experience a tension in assuming a richer and deeper understanding of the phenomenon, while sensing that I have only scratched the surface. It is that old paradoxical cliche of knowing less by knowing more.

In order to keep the question open, phenomenologists rely on bracketing. Bracketing is quite straightforward in theory, however,

a little more awkward in practice. Keeping the checks and balances on one's own thoughts is difficult. I found myself often taken hostage by my own presuppositions. What I did not anticipate was the paralyzing effect of my awareness of my awareness. At times I was so cognizant of the importance of bracketing that I found myself unable to trust my intuition. My previous experience with computers, my familiarity with the literature, and my extensive experience in the classroom allowed me to recognize a "legitimate" reflection of a computer experience, but it made it more difficult for me to let the data "breath." Consequently, bracketing was a never-ending process. I soon became aware, as Merleau-Ponty (1962) suggests, that understanding phenomenology is, doing phenomenology.

Phenomenology is the tactful stimulation of someone else's reflections. It was difficult to bracket the urge to explore certain preconceived notions of the experience that I brought into the interview. For instance initially I understood the lived experience of time in the computer experience as being a state where the individual simply forgot about the clock, totally absorbed in the experience. That is how I experienced it. I often asked questions

such as, "Did time pass quickly?" I would get answers such as , "Oh yes, very quickly." However, as I changed this query to "Tell me about time," I may get "You know, I resented the time the computer took away from me. The time it took from the kids." Even now when I review the analysis, I am still questioning the impact my preconceptions had on the final abstraction of themes.

Phenomenology is the patience to allow people to tell their stories. It is finding silence endurable, for it was often after a period of quiet when a participant would divulge the most salient aspects of the experience. Initially it was difficult not to be directive. I was just as apt to get quality data through a nod or an "uhum" as I was through a direct question. In fact a direct question, often interrupted the flow causing the dialogue to become more analytic than reflective. It has become clear to me that one does not escape himself through phenomenology, but becomes more aware of himself.

Living with the Data

Qualitative studies have often been criticized for lack of demonstrative rigour. This usually means that data, the method of data collection and the analysis of data have not been sufficiently

outlined and/or defended. The danger with this thinking is that questions of procedure may overshadow questions of description. Van Manen (1990) says phenomenology is either good or bad. Because the issue of essences requires frequent revisits and challenges, researchers should be encouraged to entertain unorthodox perspectives on method. Let the descriptions, as well, speak for themselves. What may appear to be straightforward data collection and analysis in my research, was in fact evolution through revision. Insights were not always wrestled from long hours of sorting, categorizing, and deliberation. They were often as not intuitive "flashes" inspired by remarks made during coffee breaks. Essentially, one lives with phenomenological data as opposed to works with it.

Although I share with others an appreciation that the "phenomenological process" is useful in revealing essential elements of a phenomenon, certain characteristics of some phenomena may change. Even the short time between the beginning and ending of my research, I began to sense that future adult first-time computer experiences may be different than the current experience which I examined. Continual changes to the human computer interface

provide more rapid transition from learning to application, thus reducing or eventually removing the "encounter," an essential characteristic for the recognition of the experience as I have described it. Will other such contextual changes alter other phenomena? Is it possible that our understanding of phenomena will not keep abreast of our ability to influence and change them? Does this reduce the appropriateness and application of phenomenology? I would like to think not. It will, however, require more contextual justification of our descriptions, as well as an open atmosphere toward reexamination of similar questions. In the case of technology, the question should be under continual and [illegible] study. One must never take for granted the mediating character of technology, a character so often camouflaged by convenience and cultural acceptance.

Questions of Appropriation

Not that long ago I would have said an introduction to computers in education meant unveiling avenues of new discovery and understanding for teachers and subsequently for their students. For the most part it meant offering teachers an opportunity to catch up with the times. Today, I find myself gravitating toward the

foundational issues of technology in education such as the merits of technological teaching and the quest for expedient and efficient training, not because I see no further value in computers as educational tools, but because I have grown to appreciate the very questioning of technology tends to undermine the entire structure of security we presently enjoy in the Western world. In some respects technology is addictive. We simply are technological because we need technology. We will become even more technological as our dependency increases.

It has been argued that we are "technological animals." Tools and making are so much a part of our natures that to question technology is to question ourselves, a futile adventure in light of our inability to be nontechnological. It has been suggested that technology has made possible the life of contemplation. In effect, technological advances have made it possible for us to examine technology. We have time to think, because machines do the work. However, a conservation of time and energy is not necessarily a conservation of mind. Understanding and meaning are not always a product of a life of leisure. In fact it is questionable whether they are a product at all. Wasting time is not always wasting mind.

Reflection does not have to imply inaction, but may very well make certain actions more thoughtful. This leads me to believe that we must question the values associated with technology.

As an educator I am appalled at the preoccupation with science and technology. As an educator with the responsibility of presenting technology to other educators, I find myself uneasily redefining what computers in education implies. Technological literacy and computer literacy in particular have been primarily curriculas of skill. A literacy of any sort must be more. It must emphasize the importance of the cultural context in meaning. I see a more appropriate curricula including an examination of the mediating nature of technology. If educators cannot understand these implications, it is unlikely their students will.

The Results

Empathic understanding is the basis of communication. Our experiences are grounded in the experiences of others, therefore a certain amount of sharing and agreement is expected. To do research, solely for the purpose of personal fulfilment would not only be selfish, it would be suspect for its apparent lack of applicability. However, our understanding of any phenomenon

becomes our understanding of the understanding (ie. the researcher's understanding of the phenomenon, the researcher's understanding of the participant's understanding of the phenomenon, the reader's understanding of the researcher's understanding, and so on). Like a stone hitting the water, the epicenter soon gets lost in a series of widening circles. It is my hope that readers of this research take whatever part of the research stimulates some thought and examine that thought in relation to their own practice. I would like to think that readers of this research, become engaged rather than satisfied. I would like to think that pedagogues reading this study reflect on their own teaching and understanding, as well as mine.

NOTES Chapter 1. INTRODUCTION

1. The following quote from Genesis illustrates a little of the "flavor" of these liberal interpretations. The emphasis in bold is mine.

> So God created man in his own image; in the image of God he created him; male and female he created them. God blessed them and said to them, 'Be fruitful and increase, fill the earth and **subdue** it, **rule** over the fish in the sea, the birds of heaven, and every living thing that moves upon the earth.' GENESIS 1:28,29 (The New English Bible - Oxford Study Edition)

2. Chapter. 5 "The Process of Secularization" Peter Berger (1969, pp. 105-125) and Chapter 1. "The Biblical Sources of Secularization" Harvey Cox (1965, 17-37) discuss the historical influences that the authors believe have led to the increased secularization of Western society.

3. Apes make tools, but man appears to be the only primate that systematically makes tools for both immediate and future use. He stock piles tools. Some would say this ability demonstrates a capacity for conceptual thought.

4. Max van Manen (1990, pp. 35-51) examines the concept of the lived-experience in some detail. As well, this section discusses the significance and importance of "orientation" toward the lived-

experience.

5. An 1990 Evan's Research Corporation survey shows that the home computer market is ballooning. 1.5 million Canadians own home computers. By 1995 this figure is expectec to double (MacLeod, 1990).

6. Object in this sense is not necessarily physical. It is in reference to object of thought. Object in phenomenological literature generally refers to that which we are conscious of. When we think, we think of something. When we believe, we believe something. Consequently, for every mental act there is an object of intention. This being conscious of "something" is referred to as intentionality. For Husserl it was the defining characteristic of consciousness (Schmitt, 1972).

7. This is often described as the "hermeneutic circle." One can only understand from an orientation of pre-understanding. One interprets from a position of pre-understanding. However, through the process of interpretation one develops further understanding, and so on. For a good discussion of hermeneutics, see Palmer (1969).

8. van Manen (1990, p. 182-184) surveys several definitions of the lifeworld (*Lebenswelt*): (1) "the world of immediate experience" -

Husserl, (2) "a certain kind of attentiveness and will to seize the meaning of the world" - Merleau-Ponty, (3) "modes-of-being, ways-of-being-in-the-world" - Heidegger, and (4) the semiotic direction of Wittgenstein "form of life" and "language games" and Derrida "the world as a text." For the most part the lifeworld refers to the pre-theoretical world as lived in everyday experience, the world as pre-reflectively experienced.

9. This is a Western perspective of computer technology and predominately North American. Ihde (1990) refers to this technological context as the technological texture of Western society.

10. Bracketing is an attempt to minimize presuppositional biases that may influence the research. As well, it provides information for others who may want to examine the data from another perspective.

NOTES Chapter 2. REVIEW OF THE LITERATURE

1. As a consequence of leadership, the U.S. may also be experiencing a trade disparity. Apparently America has more information to trade than its trading partners. As well, a changing economy coincides with a changing workforce. The entry of women, minorities, and immigrants (legal and illegal into an aging workforce means more people requesting fewer jobs (Hoyt, 1987).

2. CIM is a broad category that integrates computer-aided design (CAD), computer-aided manufacturing (CAM), factory automation (robotics), and computerized administrative systems (Long & Long, 1986; McKeown, 1986; Savage, Magidson, & Stein, 1984).

3. There may be an overestimation on the impact of technology on occupational change. At any rate, the estimations will probably vary greatly from nation to nation (Hoyt, 1987). Furthermore a premise of vocationalism may be an exaggeration of the prevalence of high tech jobs (Grubb, 1984; Hoyt 1987; Kidd, 1988; Savage, Magidson, & Stein, 1984).

4. There is often confusion as to what computer as "tutee" means. This is generally referred to as the student programming the computer, using one of several programming languages available.

The student is, in effect, teaching the computer to do something. By debugging (removing errors) the student learns to problem solve.

5. This study focuses on elementary schools. However, Cochran-Smith includes several studies from all levels of schooling (including college) to support her propositions. This is one of the better reviews of word processing to date.

6. However, this may be an overreaction to what is actually needed in the business community as well as a misperception of what is wanted by the business community. A survey by Levin and Rumberger (1986) of some 3,000 small businesses across the United States, revealed that reading, comprehension skills, and reasoning skills well outweigh formal computer training or computer experience, as prerequisites for employment. For the most part, predictions by the National Commission for Employment Policy, 1986, (cited in Levin & Rumberger, 1986) indicate that by 1995 only 1% of the workers will require extensive computer training and only 23% of the labor force will be expected to use them. It appears that perceptions of the importance of computer literacy by the public and educational institutions are not shared by business, at least small business. This may be merely a reflection of the general lag between

education and industry or a reflection that computers have not sufficiently infiltrated the every day operations of many small businesses.

7. Statistics Canada says that 9.6 million Canadians report being able to use a computer. That's just under half (47%) the adult population. The figure is much higher for teenagers (82%) (Lowe, 1991).

8. Not all people receive their computer training in public schools. In recent years there has been increasingly more emphasis on adult computer training, often through community education programs or in-service training (Carter & Honeywell, 1991a; Carter & Honeywell, 1991b). However it should be noted that these programs emphasize use and operation. Computer literacy in a broader sense is not usually addressed.

9. It certainly can be argued as to whether or not one communicates with a machine. Communication usually implies understanding. Computers, today, do not understand - have a mental state (consciousness, intentionality, subjectivity, etc.). John Searle (1984) advances this argument very well. On the other hand, Ihde (1990) discusses the intentionality of machines. However,

communication, as used in this case, refers primarily to knowing how to use computers, knowing the right inputs, recognizing the significance of the outputs.

10. Computer literacy in the broadest sense is argued by some as the only legitimate conception of computer literacy. From this perspective computer literacy, as only learning how to use a computer, is a result of ideology and hype and may be unimportant. Although dated both Noble's (1984) argument that computer literacy enthusiasm is merely an "ideological campaign, one that reinforces a hegemonic vision of a computerized future" (p. 602)., and Menosky's (1984) contention that the press "feeds" its readers with the promises of technology to sell a "new angle" taken from external sources that have the most to gain commercially.

11. It appears that doctor's want to protect their credibility as medical experts.

12. Gender does appear to influence one's expectations of technology in general when education, age, seniority, and relevant characteristics of an employee's current job are controlled. According to Hackett, Mirvis, and Sales (1991) women are more skeptical about the technological future. They anticipate fewer

employment and organizational benefits from technology than men.

NOTES Chapter 5. DISCUSSION

1. Intentionality according to Husserl is the "fundamental property of consciousness" (Husserl cited in McIntyre & Smith, 1989, p. 147). A great deal of mental life (thought) is "of" or "about" something. Intentionality is internal "representation of that "something." It is the "first-person" knowledge one has of something. How that "mental representation" happens or why it happens are inconsequential. Experiences in and of themselves have properties. It is the internal structure of intentional acts "that make them the mental states or experiences that they are" (p. 152). A phenomenon is distinguishable from other phenomena through its unique character. For example, when we think of the external object "car" or the imagined object "alien spaceship," we have a mental representation of those objects. The mental representation referred to as the "intentional object" is not of a particular car or alien spaceship, it is that which makes it possible to recognize the particular as a member of "carness" or "alien spaceshipness." The fundamental characteristics of these acts, the internal structures, constitute the essence of the phenomenon. However, according to Peperzak, Bernasconi, and Cohen, language makes even intentionality

possible, and as a result is pre-phenomenal.

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APPENDIX A: PARTICIPANTS' BACKGROUND

All ages and number of years computer experience are based upon the time of the interview.

Troy Bartman: Troy is twenty-one years old. He has one year of computer experience. He is presently enrolled in a BEd program at the University of Lethbridge and hopes to teach elementary school. Troy is an avid sportsman and accomplished golfer. He also enjoys music.

Mary Ann Bibby: Mary Ann is an Associate Professor of Educational Psychology at the University of Alberta. She is forty-four years old and has four years of computer experience. Her current research interests include qualitative methodology, teacher education, and gifted hearing impaired students. As well as enjoying her two sons, hiking, tennis, and reading, Mary Ann is a pianist.

Ylonda Jordheim: Ylonda is a school teacher and a pilot. She is thirty-eight years old and has five years computer experience. Ylonda enjoys classical music, biking and skiing.

Barbara Luckhurst: Barbara is a forty-two year old physical therapist. She is currently completing a MSc program at the University of Alberta. Her interests include music, art, literature, gardening, hiking, mountaineering, and travel to third world countries. Barbara would like to do research in physical therapy, especially in the area of chronic pain. Eventually she would like to complete a doctorate. Her computer experience has been intermittent for the past five years.

Darrel Maier: Darrel is an education student at Medicine Hat College. He is thirty-three years of age and works as a recreation aide at a nursing home as well as teaches music. He has one year of computer experience. Darrel is interested in his children, reading, music, yard work, and biking. He aspires to be a good husband and father and hopes to assist people throughout his entire life.

David Thompson: David has one year of computer experience. He is thirty-nine years old. He claims his interests are wine, women, song, and computer technology (in that order). On a more serious note, David is completing a MEd. in the Department of Educational Psychology at the University of Alberta. He is particularly interested in men's issues. He spent some time in Nigeria and has an interest in the social, political, and economic impact of third world countries on global development. David hopes to be a chartered psychologist and would like to work in the areas of self-esteem development and personal empowerment.

Al Pols: Al is 52 years old. He is a school principal with 10 years computer experience. He enjoys golfing, the educational profession, and has an interest in financial management. He is particularly interested in computer applications. Al is just finishing a sabbatical.

Ann (not her real name): Ann is thirty-eight. She is an elementary school teacher with two years of computer experience.

APPENDIX B: CONSENT FORM

I, _____, agree to participate in the study of first-time computer users being conducted by Dale Howard, for his Ph.D. thesis, under the supervision of Dr. John Osborne of the University of Alberta.

I understand that I have the option to discontinue, without prejudice, my participation in this study at any time.

_____
signature of participant

_____
Date

Confidentiality options:

(1) I would like my participation to remain anonymous. I understand that all audio-tapes of my response will be erased and that my name and names of places will be changed to ensure my anonymity.

_____
signature of participant

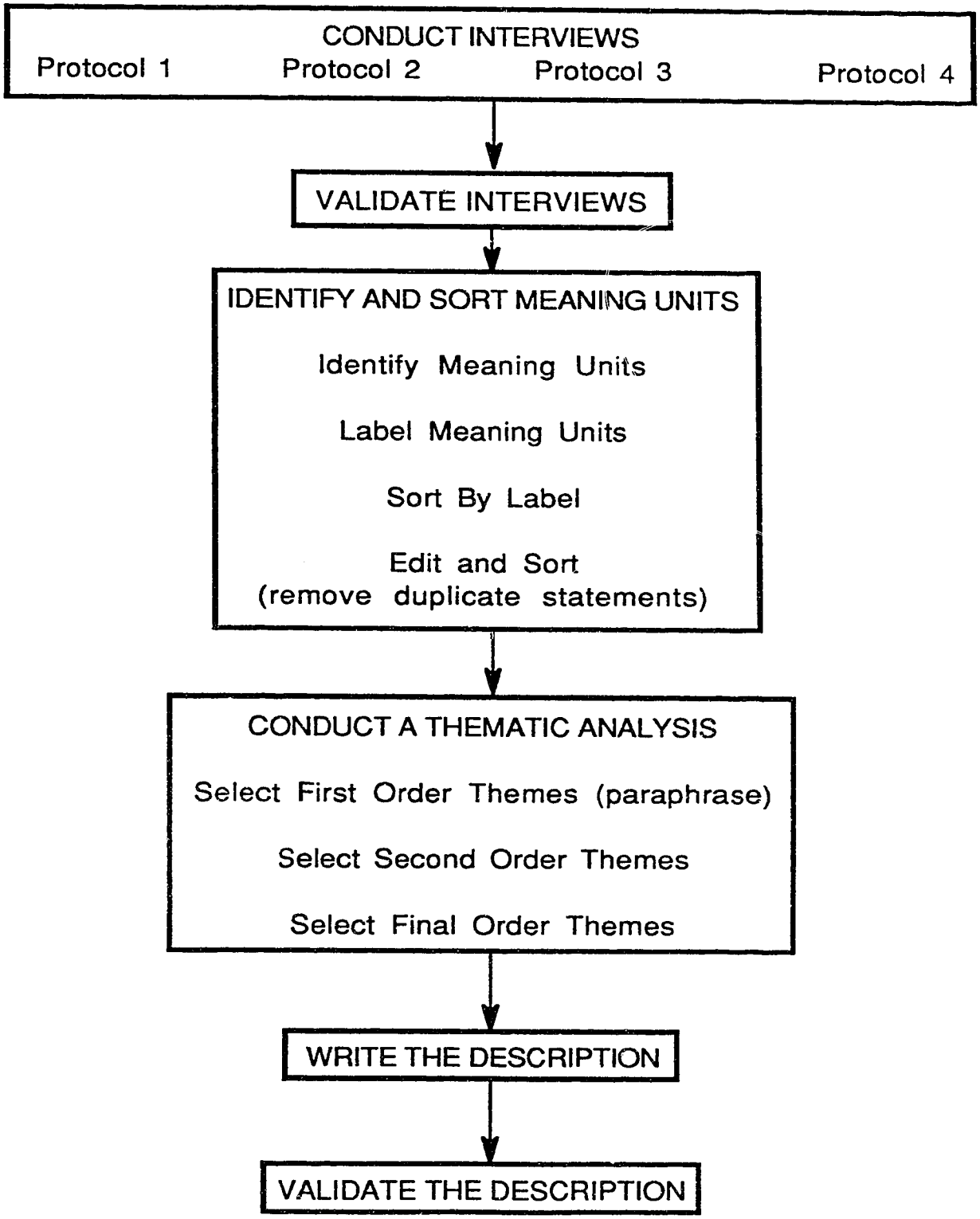
_____
Date

(2) I would like to be recognized as a coresearcher on this project and be given recognition for my participation. I have read all my transcripts and agree with the content. Excerpts from this content may be placed in the researcher's description without alteration and at the discretion of the researcher.

_____
signature of participant

_____
Date

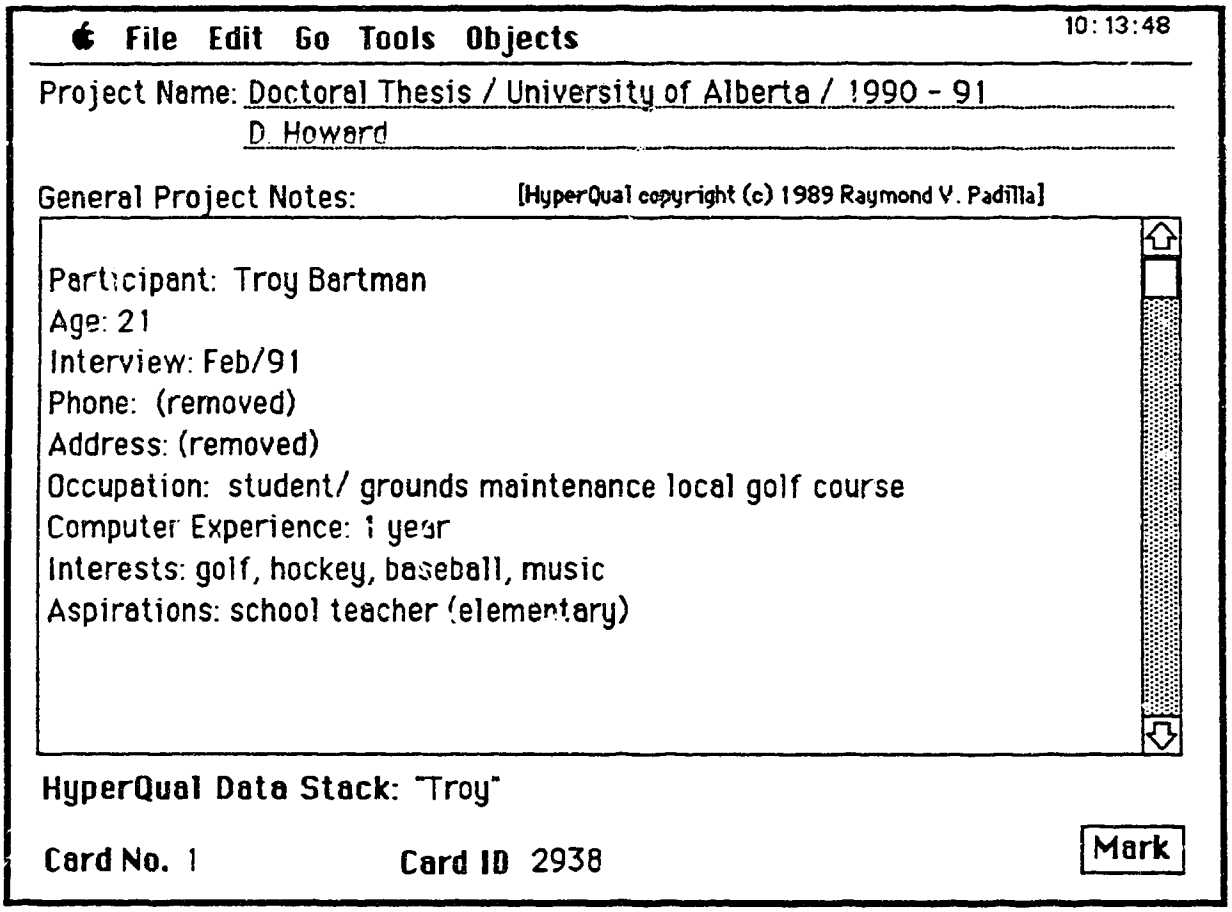
APPENDIX C: DATA ANALYSIS FLOW CHART



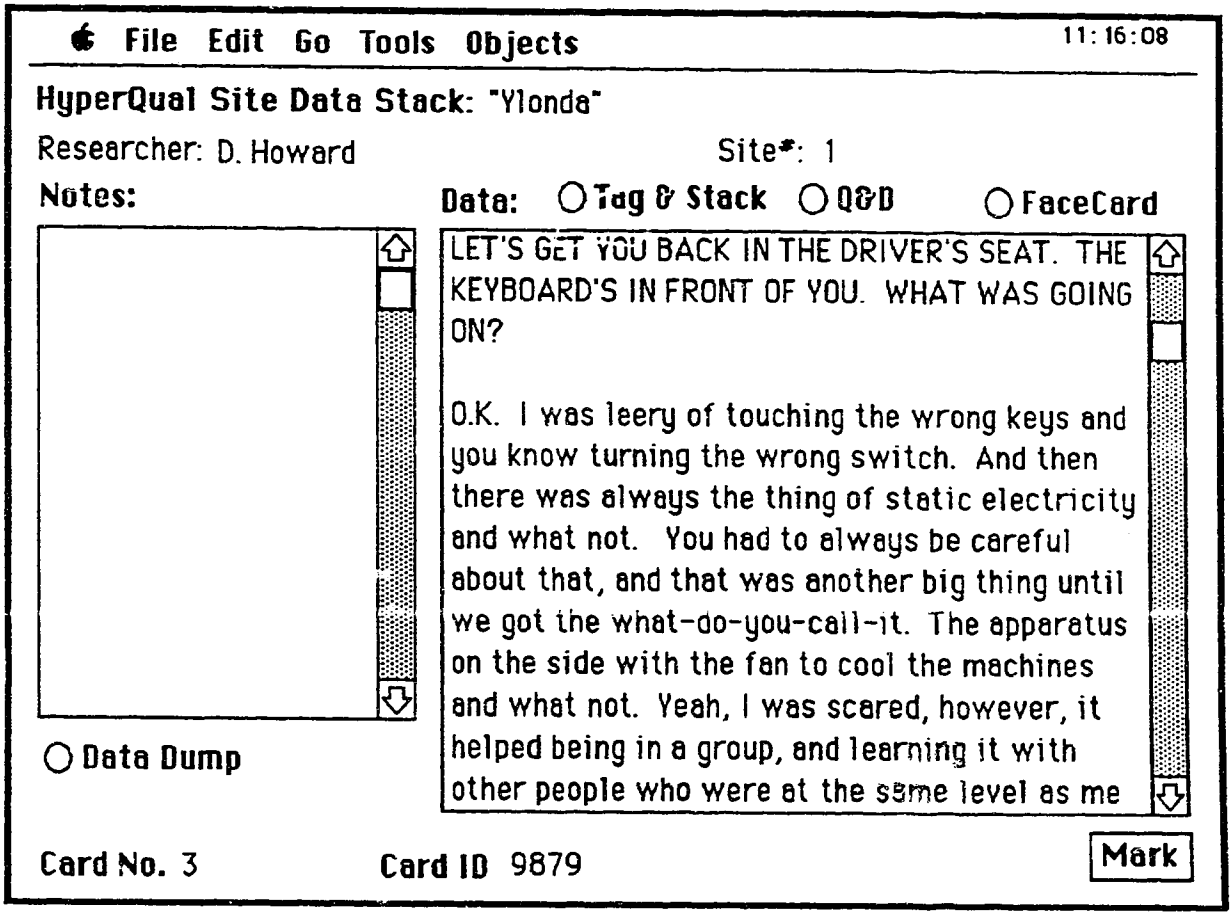
APPENDIX D: HYPERQUAL SAMPLES

For Information, contact the author:
Raymond V. Padilla
3327 N. Dakota
Chandler, AZ 85224
U.S.A

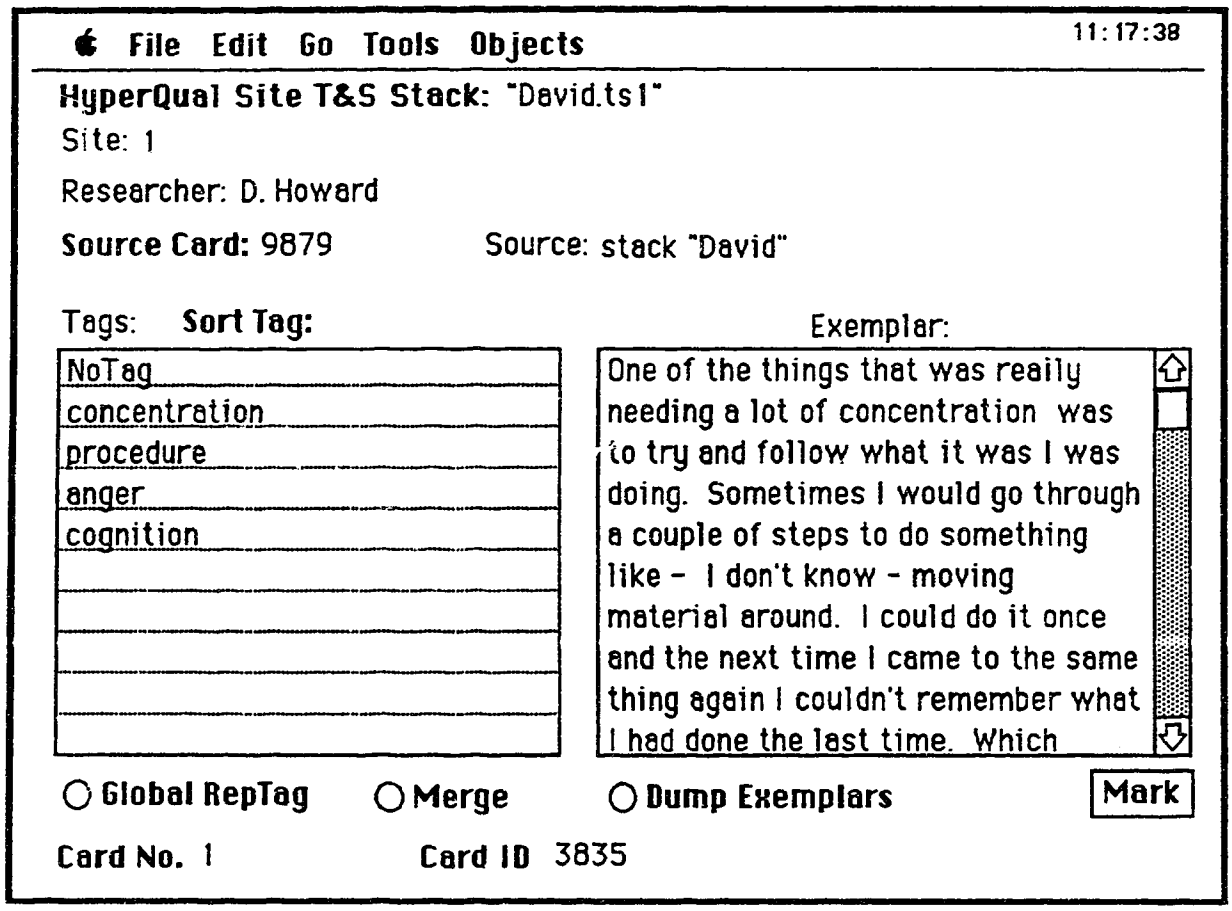
Sample Project Notes Card from Interview Stack



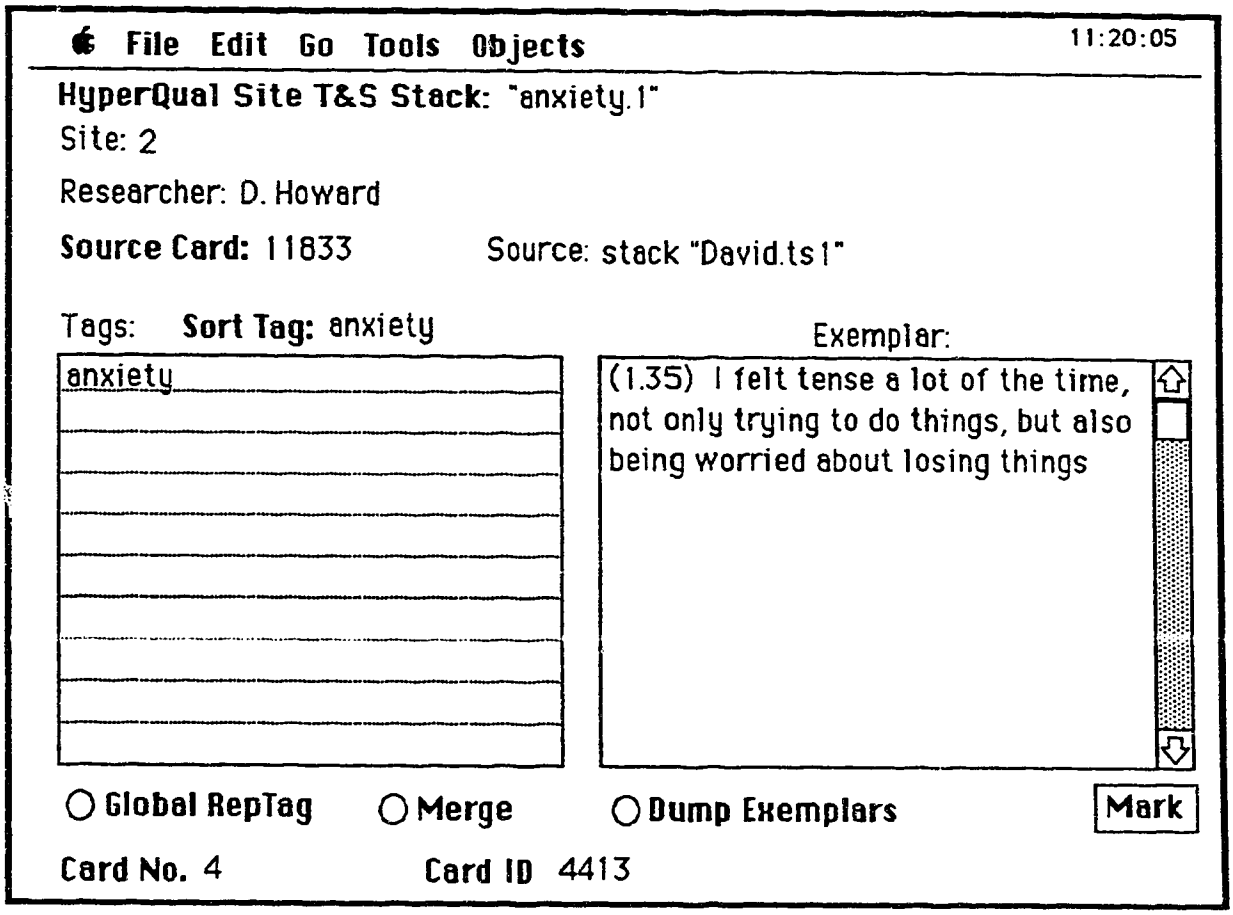
Sample Interview Card from Interview Stack



Sample Card from Tagged Stack



Sample Card from Sorted Stack



APPENDIX E: SAMPLE TAGGING

NoTag
concentration
procedure
anger
cognition
1.0 One of the things that was really needing a lot of concentration was to try and follow what it was I was doing. Sometimes I would go through a couple of steps to do something like - I don't know - moving material around. I could do it once and the next time I came to the same thing again I couldn't remember what I had done the last time. Which would make me feel really upset.

NoTag
attraction
1.1 On the positive side I guess I felt really drawn - to - just the whole business

NoTag
attraction
cognition
efficacy
instruction
anticipation
1.2 I was really intrigued during the lecture because I could understand conceptually all the stuff the guy was talking about - it was BASIC- so when I went in for a hands on experience, I was always feeling up - Jeez this is really intriguing - I can't wait to master this and go on with it. To me there seemed to be a real split between understanding stuff and even understanding programming, and yet when it came time to program - like conceptually I understood what feedback loops and so on were, but then the applied part of that for me was just a real struggle.

APPENDIX F: SAMPLE OF FIRST ORDER THEME ANALYSIS

David: First Order Themes Sorted According to Theme (Context Identification Attached)

1. Theme: anger

1. (1.0) I couldn't remember what I had done the last time. Which would make me feel really upset.

2. (1.3) I felt that I wasn't clear enough on what it was that I wanted the machine to do. That made me angry at myself just because all I had to do is think of the right thing to tell it

3. (1.18) Half the time I would get insanely angry and have to have smoke to calm down. Probably a quarter of the time I would lose information by doing something wrong, and then I would really be "pissed off."

4. (1.36) Well, I would get angry at myself for my own incompetence.

5. (1.37) I've lost it. Usually the first thing I was aware of was feeling angry, and then there was no negotiating with this thing. I used to get up, go away, The physical part of it was just feeling this anger come up inside. I would get pissed off about something, and that would be alright if it did some good, if it paid off, there was no understanding of that emotion on the part of the machine. There was nothing that pissed me off more...But to me it's almost like paying someone an honor if I care enough about making things work with them, but it's just not right, so hear what I say. The computer's not interested in that, and so, I was just left with my own feelings of frustration and anger, and I mean it doesn't take a genius to figure out if you want to work with this thing then you can be angry or not it doesn't matter, so for me I had to realize I had to settle down a bit and go back and try to be methodical

6. (1.44) I got whatever program it was doesn't matter, but what upset me was that I couldn't just turn on the machine and start to type. I had to open something to do this.

7. (1.53) I got my needle-nosed pliers. It wouldn't eject my disk, and all you need is one of these...anyway I yanked the disk out. That was my low point in physical interaction.

8. (1.56) I tend to be a little cranky about new users. I realize somehow the computer seems really delicate to me so if somebody's been eating better stay away. I remember getting really angry because ...had her own way in shutting down, but I got really pissed off and I don't know if it was a computer issue, or a personal issue.

9. (1.72) I remember not liking my T.A. much because he didn't explain much.

APPENDIX G: PARTICIPANT COMMENTS

I really liked it. It gave a good account of what I felt like at the computer for the first time.

The idea that Barbara talks about on p. 117 (p. 137), I feel the exact same way, even though I never realized it.

My own sense is that this dichotomy is not fun under some conditions and can be fun under others, or even both in the same few minutes.

My experience as well.

Great quote. My experience exactly.

Yes, so true. I feel this way also.

Or it may be the self-satisfaction of being able to do what everyone else seems to be doing so easly.

Not so true from my experience. I relate to this much stronger.

I can relate to the generic description, but did not expereince the fear and frustration of the others.

The 'time eater" aspect and the narrowing of the world were the strongest aspects.

Yes. I can relate to the ambivalence.

I still have this sense of excitement when I see a new function that my software can perform.

This still happens, but now sometimes I have glimmer of insight.

On the whole, I really like the description and feel I can relate to most of it.

Not me. Not me. Yes. Yes.