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Toy or Tool: Student Perceptions of a Notebook Computer University

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TOY OR TOOL: STUDENT PERCEPTIONS OF A
NOTEBOOK COMPUTER UNIVERSITY

by

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A Dissertation
submitted to the Graduate Faculty
of the
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for the degree of
Doctor of Philosophy

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2001
This dissertation, submitted by Rilla J. Anderson in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

[Signatures]

(Chair)

[Signatures]

Dean of the Graduate School

This dissertation meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

Dean of the Graduate School
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Title       Toy or Tool: Student Perceptions of a Notebook Computer University
Department  Teaching and Learning
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For My Dad

James E. Boresky

“The Man Who Has Friends Is The Richest Man in Town”
ABSTRACT

Notebook computers, on many university campuses, have moved beyond being an educational accessory to being mandatory equipment for a college education. The purpose of this qualitative study was to describe and gain an understanding of the sense students make of learning at a notebook university campus. In this phenomenological research study, two classrooms, both “wired” for technology, were observed for student and faculty use of notebook computer technologies. In addition, I visited several other courses across divisions on this notebook computer university campus.

Through the use of classroom observations, and student, faculty, and administrative interviews, I examined the impact of notebook computing on students in two classrooms. In one classroom the course content was how to use technology, and in the other classroom notebook computing knowledge was applied as students learned the content of their course. Students from these two classes were also observed as they attended the other courses on their semester schedules.

The results of this study indicated that (1) Students wholeheartedly endorsed the use of notebook computers for convenience, ease of communication, and completion of research, but in the classroom they were consistently off-task. (2) Because students were consistently off-task, they stated they did not develop strong connections with their professors which they themselves identified as essential to learning. (3) Students
sometimes advocated removing notebook computers from their classrooms, restricting computer use to outside their classrooms.

Conditions of learning, as suggested by Reimer (1977), include good human relationships, and without that students may not care about content. In this study I examined the impact of technology on students' perceptions of their intellectual curiosity and their life-long love of learning, traditional goals of liberal arts education.
CHAPTER I
INTRODUCTION

The purpose of this chapter is to introduce my research project. In order for the reader to gain an understanding of the background, nature, and purpose of my study, I have included sections pertaining to the initial adoption of the notebook computer initiative, the history of the transition to a notebook computer university, and the university's mission statement. I have also included sections on the research questions I developed, the assumptions, delimitations, and scope of this study, and the methods, procedures, expectations, and definitions of terms that will help the reader understand the concepts in this project.

Background

Notebook computers are quickly becoming the tools of choice on our university campuses (Educational Testing Service, 1999; Howley & Howley, 1995), and technology has sometimes been adopted "for what it is, rather than for what it can provide to the teaching and learning process" (Cooke, 1995, p. 20). Although educators sometimes experience a conflict of interest in implementing technological innovations (Snider, 1996), Parks (1999) observed that innovative educational techniques are guaranteed some success: "Success flows from the commitment, enthusiasm, and energy of implementers of the new technique rather than the technique itself" (p. 200).
There has been little research on the student experience of classroom notebook computing. Because notebook computer universities have only now begun graduating their first classes of students educated entirely on technologically enhanced campuses, there has not been enough time to complete longitudinal studies on the impact of technology on education. Moreover, most of the essays and studies I reviewed focused on K-12 education rather than university-level studies, and the research that has been done appeared inconclusive, the response of educators was mixed. For example, the Educational Testing Service (1999) noted that in terms of actual outcomes, proponents of technology have argued:

- Computers have been assisting students in classes since the 1960's.
- Technology to support higher order thinking skills may show promise.
- Technology seemed to increase student motivation and teacher morale (p. 1).

At the same time, opponents of technology have observed:

- Teachers were not generally making use of computers.
- Schools tended to have few educators/administrators who advocated technology.
- Teachers used only as much technology as administrators demanded (p. 2).

This research project attempted to gain an understanding of the student experience using notebook computers in their university classrooms, and should be useful to educators who want to match technology to pedagogy or integrate technology into classes to enhance student understanding. Educators' use of technology has
continued to evolve (Foa, Johnson, & Schwab, 1999), but educators should be aware of both the benefits and limitations associated with classroom notebook computing. There are some in education who believe there is a place for classroom computing. Others caution against a rush to technology because there is no research that demonstrates technology significantly improves teaching and learning (Oppenheimer, 1997; Postman, 1996). Postman (1996) suggested our society is unwisely making a "god" of technology, that we "rely on it, that it makes promises, that [we] are bereft when denied access to it, that [we] are delighted when [we] are in its presence, that for most people it works in mysterious ways, [we] condemn people who speak against it, that [we] stand in awe of it, and that, in the born-again mode, [we] will alter [our] lifestyles, [our] schedules, [our] habits, and [our] relationships to accommodate it. If this be not a form of religious belief, what is?" (p. 38).

Nature of the Problem

Notebook computers have become a major force on our university campuses. We have continued to implement the use of computer technology in higher education classrooms without adequate research which would indicate technology is used appropriately within our classrooms. There are benefits and limitations associated with classroom technology which will be more fully described in Chapter II. For example, computers can be powerful research tools, but they can also offer students a chance to electronically escape from their teachers and their classrooms.

A small rural university on the Great Plains with 593 registered full-time students, Notebook Computer University was one of the first in the nation to adopt a
notebook computer initiative which required students to lease notebook computers for	heir academic and personal use each semester. This study attempted to gain an
understanding of the student experience of that innovation on one campus, hereafter
referred to as Notebook Computer University (NCU).

Purpose of the Study

The goal of this research project was to gain an understanding of the student
experience on a “notebook” university campus. I selected the student experience on a
notebook computer university campus as a research topic because many colleges and
universities have advocated notebook computer technology on their campuses, and
educators have worked to match technology with pedagogy. This study served the
following purposes:

1. To understand the student experience of notebook computing.
2. To document how students used technology in the classroom.
3. To understand how students learned via technology.

Research Questions

My original goal was to understand the student experience at a notebook
computer university campus. I used an inductive process, and eventually my research
expanded into a broader context including the faculty and administrative perceptions at
a notebook computer university. I was interested in discovering whether notebook
computing enhanced the teaching and learning environment, earning a rightful place in
the classroom among educational tools such as chalkboards, film projectors, and other
audio-visual technology. I wanted to explore one institution's student experience as I considered these research questions:

1. What was it like to learn in a "smart" (i.e. computerized) classroom?
2. What did students do with technology in their classrooms?
3. What effect did computer technology have on the teaching and learning environment?

Significance of the Study

This study will contribute to the body of knowledge on the practice of teaching and learning at a notebook university campus. It should be of significance to administrators and faculty as they strive to make technology a suitable classroom tool. The data presented here is intended to assist educators as they plan for future technology-based pedagogy.

History of the Notebook Initiative

Notebook Computer University (NCU) is a small university in a rural state on the Great Plains. Many participants, in each of three participant groups (administration, faculty, and student), valued the "personal" atmosphere of this university. When students were asked why they chose to attend NCU, they often identified the smaller nature of the campus as their primary reason for selecting NCU: "I like the small campus"; "[I get] a lot of one-on-one with teachers [and] closer contact"; "As I got into [a bigger program on a larger campus in this state] it just really wasn't what I wanted to do"; "I thought it would be a good way to start out and then go from there, working my
way up to a bigger college”; “Both my grandparents live here and my sister goes here, and my parents went here. And, it was a small college.”

Some students specified computer access as the reason they decided to attend NCU: “I think that the computer is an overall good thing for the college...it really helped my decision to come here in the first place”; “Just having [the name NCU] down on a résumé or having employers know the fact that you’re from [NCU] would be a good thing even though you’re not in Computer Information Systems (CIS)” ; “Any job you go into now requires you must have some kind of computer background, and that was one of the major [reasons why I chose to attend NCU]”; “One of the reasons I came up here is so that I could have my own computer....[traditional computer labs] lock up at 11 o’clock at night. Well, what happens if you’re working on a big paper, and it’s just not feasible that you’re going to be done by 11? [Not having a notebook computer] just makes [getting assignments completed] inconvenient....so this way it’s just more accessible”; “My field of education, that’s what made me come here, too. The computers was [sic] just an extra bonus for the technology.”

Several students specified that computer technology was not a factor in selecting and attending NCU: “[In high school] the computer wasn’t a really big part of my life, so I guess it really didn’t have an influence on me”; “I didn’t take [computer use] into consideration....I wanted to get out of the house, but I didn’t want to go far away”; “Computers didn’t really affect [my decision to attend here] because we had them since ninth grade in high school, so it wasn’t that big a deal.” One student
believed she was not at all influenced by the use of notebook computers when she made her decision to attend NCU:

I guess [notebook computing] didn’t really matter because in high school if I had to type up a research paper on the computer, that’s pretty much what I’d use it for, or just, [sic] the library to research something. But I mean, it wasn’t a really big part of my life, using the computer, so I guess [notebook computing] didn’t have an influence on [my selection of schools]. But [personal notebook computers] would be nice and convenient.

Notebook Computer University lists the values of attending the university on their website. Among them: “The university is learner-centered”; “Learners are the first priority. The university exists to meet students’ needs. Students are involved in many university decisions and in their own learning”; “The university believes in teamwork”; “Mutual trust and respect are essential. Caring, enthusiastic faculty and staff work together to meet the needs of students.” The NCU website also lists “ten great reasons students should attend NCU: 1) True personal attention, 2) notebook computers, 3) graduate success, 4) higher education. not higher tuition, 5) we’re wired, 6) involvement (extracurriculars), 7) academic programs, 8) teacher education, business, and computer information systems are popular, 9) all [computer] access, all the time, and 10) athletics.”

Notebook Computer University’s transition from a traditional university campus to a “wired” campus was funded in part by money appropriated by the state legislature, in part by a $427 per semester student technology fee approved by the State Board of
Higher Education (SBHE), and in part by Title III federal grants. An NCU administrator confirmed that “We got the Title III grant to start putting multimedia applications in the classrooms...we’ve probably spent over two million dollars, I’m sure. The cost to the institution per se, we haven’t gotten any new state money. Most of it is paid through the notebook fee. Students pay for it.”

NCU Mission Statement

Notebook Computer University’s website noted that they had “remained true to its teaching roots while becoming one of the most technology-driven campuses in the country.” The NCU mission statement, as posted on the university website and as approved by the SBHE in 1998, reflects the infusion of technology:

The mission of Notebook Computer University is to educate and guide students, as individuals, so that they may realize their full career potential and enhance their lives. We do this in an environment that reflects our tradition of personal service, commitment to innovative technology-enriched education, and dynamic learning relationships with community, employers, and society.

According to an NCU Enrollment Services letter intended to recruit high school students, the transition process from traditional university to notebook computer university was for the potential enhancement of programs of study via “constant” classroom use of technology on the NCU campus.

Notebook Initiative Adoption Process at NCU

Notebook Computer University was never a bona fide liberal arts institution. Originally, NCU was a normal school, transitioned to a state teachers’ college, then a
state college, and finally a state university. The subsequent adoption process that occurred during the transformation from a state university to notebook computer campus did not appear to be well documented nor did many faculty participants have vivid recollections about the process. During the first faculty interview I asked about the adoption of technology. That faculty member indicated he did not remember voting on whether or not the university would approve a notebook initiative. In fact, that faculty member’s perception proved accurate. While there were several committee and faculty meetings on campus about technology, there did not appear to be faculty senate documents supporting the notion that faculty were involved in voting either for or against the notebook initiative. It appeared to faculty participants that NCU administrators used “power strategies” (Harper, 1998, p. 215) to adopt the notebook initiative. Administrative interview data supported that notion. Unfortunately, implementing power strategies almost always alienates the target population, creates strains in the relationship between the change agent and the target group, and does nothing to ensure commitment to the change (p. 215). Rogers (1983) noted that when choices to adopt an innovation are made by an organization’s few “who possess power, status, or technical expertise” (p. 347) for those who “have little or no influence in the innovation decision” (p. 30), the decisions may be more rapidly made, but the decisions are “often circumvented during their implementation” (p. 30).

A review of the minutes from various NCU committee meetings also showed that the notebook initiative appeared to be an administrative decision. Some committee meeting minutes were available in the NCU library and included minutes such as
Faculty Senate, State Board of Higher Education, Curriculum Committee, and the Executive Team. These minutes indicated, for example, that in March of 1995 an NCU administrator, Dr. A., had recently visited another area notebook computer university. He had "discussed this concept with the Board of Higher Education and they were supportive of any need to increase fees to students in order to implement a similar strategy on our campus." In April of the same year, NCU Technology Planning Committee minutes recorded that an NCU staff member met with US West to "discuss technical issues related to campus-wide networking for computers, and possible video."

But, in May of 1995, Curriculum Committee minutes reflected that the six division chairs wanted information from administration concerning "the direction technology is taking...including the total picture of the institutional plan of technology at NCU."

According to published minutes, in June of 1995, however, the Technology Planning Committee did not address concerns; instead, it made three recommendations: 1) Complete the campus infrastructure...and laptops by September, 1995; 2) Make final decision to become a laptop campus or not by October 10, 1995; and 3) Provide LAN (Local Area Network) access to all faculty and have one model classroom for faculty training and development of presentations by January, 1996. During the same month, Technology Planning Committee minutes documented that that "stressed the need for faculty participation and preparation to provide the students with the maximum benefit to available technology." These minutes were unclear as to who would make the "final decision to become a laptop campus or not."
Faculty Association minutes indicated that on August 18, 1995, “there was a brief discussion of laptop computers, but time for a satisfactory discussion was unavailable. A forum for discussion of laptops will be called.” On August 28, 1995, the Curriculum Committee met and noted in the minutes that, “we need to do some serious planning and decision making.” Minutes from a Faculty Association meeting on the same day indicated that a Computer Information Systems (CIS) faculty member had stated, “Faculty members are not deciding whether or not to go laptop, but whether we support an administrative decision to do so. If NCU goes laptop, we will need to decide on software packages and establish a standard for the campus.”

By September 1, 1995, Faculty Senate minutes indicated there was concern from several divisions about “going laptop”: The Education and Humanities/Social Science divisions thought the campus should implement the initiative in 1997, but had concerns the hardware would not be in place; the Science division was concerned about the higher cost shifted to students—“making us even more vulnerable to criticism of our cost per pupil”; the Health and Physical Education division was “unsure: will discuss this afternoon”; the Business division was in favor, but “concerned about overly rapid implementation”; and the Communications division indicated “a 1997 or 1998 implementation, not sooner; concern that going laptop is attractive without being truly appropriate for our students and programs.” Various interview data supported the sentiments of faculty in these divisions.

The September 12, 1995, [Executive Team] minutes indicated a “decision about whether to proceed or not to proceed will be made on Friday, September 15 [1995]. If
we decide to proceed, the next step will be to ask the SBHE for permission to move forward. This would be done at the November SBHE meeting which will be held on NCU’s campus.” The September 15, 1995, Faculty Association minutes stated that the:

[Faculty] Senate discussed laptop computers—whether or not NCU should go to universal laptops and, if so, when. A concern was mentioned: that Faculty Association at large should have discussed this issue and taken formal action. There was a report of concern that the laptop issue did not go through the [NCU] Education Subcommittee on Curriculum Development for their discussion or approval.

By October 3, 1995, I could find no recorded faculty discussion or approval of “going laptop,” although an administrator reported in the [Executive Team] minutes that “[the chancellor] will be supportive of the NCU technology fee (because of [administrative] decision to move forward with laptops) even if the other institutions reject the fee.” Finally, on November 20, 1995, the president of NCU, in Faculty Association minutes, reported that “The State Board of Higher Education (SBHE) visit to the NCU campus last week was a success: the technology fee and notebook computer fee were approved, the latter to start not later than Fall, 1997....”

Reasons for Adopting the Notebook Initiative

All interviewees indicated that concerns about decreasing enrollment played a key role in adopting the notebook computer initiative. One faculty member noted that:

Everything we’ve done here is to increase enrollment, and it hasn’t worked.

Students aren’t coming. I think we’ve got an FTE (full time equivalent) of 550.
Administrators keep saying if we don’t increase enrollment we’re going to shut the doors. But the technology thing didn’t work.

The administrative panic over enrollment was almost palpable in the contents of a memo Dr. B sent to some members of the faculty:

Agree with [faculty] or not, I have not tried to override any of your ideas, even when they mean forgoing enrollment in our time of greatest need for this enrollment, and in knowing that I would be held responsible for your actions....Although we need to find new groups of students, I have defended our traditional programs in light of the state’s directive to eliminate duplicative, low enrollment programs. I am trying to buy us as much time as I can so we can save them....

The faculty members I interviewed indicated, however, that when Curriculum Committee members had attempted to meet with representatives from another campus to explore the possibility of offering NCU courses on the other campus, the committee’s action was met with great disapproval from administration. The memo from Dr. B noted that he:

[Had] been thoroughly embarrassed the past few hours. I feel my affectiveness [sic] as [an administrator] has been reduced by being excluded from even knowing about an academic meeting that involves every academic division and an outside constituency with which part of our future may depend…
Faculty reported that Dr. B called a meeting of the division chairs, distributed and read a two-page memo verbatim, then walked out of the office. In this memo Dr. B forbade members of the curriculum committee from meeting as a separate group:

We are exploring a process that will give creative faculty the initiative and freedom to develop new academic programming options faster than the process we have tried so far.... If we adopt such a plan, your traditional duties...would continue as usual, but the strategic planning for enrollment initiatives would be done by faculty who are enthusiastic about the challenge and willing to do it.

Many faculty believed that enrollment was a frustrating, stressful problem. One faculty member thought that, “administration is concerned only about bolstering enrollment.” Another indicated “all projects are focused on enrollment, not much else.” A third faculty member insisted that NCU “probably needs to have a niche to survive, especially with the declining enrollments coming in and things like that. And so I think that the notebook initiative or any kind of technology initiative is really designed to give us a niche because we can’t compete head-to-head with other places.” A fourth faculty member noted that in the “head-to-head” competition for students, NCU was not winning: “The enrollment update showed [our] school at dead even with last year’s decreased enrollment. If marketing doesn’t make a difference, why is [another state university] spending all that money on advertising?”

Dr. B confirmed the faculty notion that administration was focused on enrollments: “We have to do something to get enrollments up, ‘cause that helps keep all areas alive. Alive and well.” But this former-faculty, now-administrator noted that
although he does remember attending meetings and listening when the pros and cons of adopting a notebook initiative were discussed] “a lot of people would expect, though, that I was really [involved] in that, but I really wasn’t. I was up to my eyeballs in Title III activities and there was so much to do there—all equipment and multimedia things and software and all investigation—in getting that stuff started. I was totally consumed [by Title III] at the time.” Dr. B continued by saying that Dr. A and a former vice president were fully immersed in the transformation process and:

What [administrators at the time of the adoption of the notebook initiative] told me the feeling was we’re [sic] going headlong into the information age and the computer is the tool of choice, and it looks like, even at that time three years, three, four years ago that everybody’s going to have to be computer literate. And the best way to do that was, of course, was to have your own computer all the time.

Now that Dr. B was responsible for marketing the institution and bolstering enrollment, he noted in written communication to faculty that their “greatest need” was increased enrollment and that he was currently fighting for creative ways to increase it:

Tomorrow I will be in [our state capital arguing] the same thing before an audience that can not [sic] understand why I keep trying to support programs that clearly don’t support themselves financially. I will also face a hostile audience as I ask for graduate credit.

Dr. A suggested that enrollment could be increased if administrators could only verbalize what they were doing on their campus:
Our biggest challenge is marketing [the university] in at least two respects. One is being able to express what it means [to be educated on a technology-enriched campus] in ways that people have never experienced it. And then also I said that one of the benefits [of being a notebook computer university] is strategic positioning. It's only a benefit if people know what you're doing, so having the resources to adequately get the word out, it's a huge challenge.

NCU's website was being used to "get the word out" and according to Dr. A, "There is no greater opportunity to market [the university than the website]. The cost per hit is minute compared to any kind of publications, mailing, traveling...."

Students were not exempt from feeling the strain of low enrollment. A female student indicated:

[Administrators] set up block classes and then throw in other classes that meet the same time as the block. I think they want to keep us here for more [tuition]. Administration's not real accommodating. When I asked about the time conflict [administration] just said, 'Well, you'll have to go to summer school.' I wonder if it's to keep up enrollment.

Three other students were aware of the looming enrollment issue. One student's perception was that "I think part of the deal [with adopting technology] was supposed to be enrollment, to help out with enrollment, and I don't know if it's done that. I don't think it has." A second student's perception was that NCU was trying to increase enrollment to the overall detriment of the school. "[Administration and faculty] are so busy keeping NCU open that they don't have time for students." A third student noted
that a newly proposed technology minor, intended to enhance enrollment, would not be a good administrative strategy:

Personally, I'd like to know more about technology, but [administrators are pushing a technology] minor at the expense of core curriculum? That's obscene! It's theft! You're robbing someone's education. [Administration] can develop a technology program, but not at the expense of everyone else. [Administrators] shouldn't force [technology] on people. I think it will cost [NCU] enrollment, and it'll change the nature of the school. That's a bad plan.

NCU was struggling to maintain enrollment levels by niche marketing computer technology, which administration hoped would permit survival in a state with, arguably, too many institutions of higher learning for too little population.

Description of the NCU Computer Program

In 1997, Notebook Computer University became one of several notebook computer universities in the nation. According to the NCU website, each student at NCU received a notebook computer to use for his/her own personal and academic use, twenty-four hours per day, seven days per week (24/7) in exchange for a SBHE approved $427 per semester technology fee. When notebook computing began in the fall of 1997, the university leased IBM Thinkpad Notebook Computers. Computers were traded every two years, and students were not given an option to buy at the end of the term. The student fee of $427 per semester bought the opportunity to have the same software as every other student and employee on campus, as well as universal tech support for both software and hardware. After three full years of incorporating
notebook computers on campus, a state university system brochure indicated that “smart classrooms and network connections in every dorm room make the world a 24-hour-a-day classroom.” As a result, NCU advertised on their website that they were ranked as one of Yahoo’s “Most Wired” by a Yahoo Internet Life magazine national survey.

Need for the Study

Notebook computer technology is rapidly expanding on university campuses and “infiltrating almost every aspect of campus life” (Keown, 1999, p. 116). We have evolved from an agrarian to an industrial society, and we are now evolving into an information-based society (Dede, 1989; Mehlinger, 1996). Is the rush to technology appropriate? Because notebook computing on university campuses is a relatively new innovation, I had difficulty locating studies, both quantitative and qualitative, evaluating full-time notebook computer use on university campuses. In the essays I reviewed on computer use, typical perceptions of technology’s impact on education ranged from positive, to neutral, to negative: Parks (1999) wrote positively and suggested that technology allows weekly classroom assessments, decreases faculty office hours due to availability of electronic mail (e-mail), and provides a vehicle for web page development that is more personal than hard copy term papers. But Snider (1992) took a neutral position and observed that computer-assisted instruction is dependent on the material that goes into it. Frisch (1991) saw the limitations of technology and stated that, “technology is the knack of so arranging the world that we do not experience it” (p. 57). No matter the position held, Mehlinger (1996) observed
that technology has always played a major role in our schools, “but until recently the technology employed was rather simple and changed slowly” (p. 401). He wrote that Information Technology (IT) has become similar to a volcano, “changing the landscape of American culture in ways we either take for granted or scarcely notice” (p. 402).

The need to study our changing educational landscape is indicated by educators and administrators believing technology opens educational doors of opportunity to students (Press & Washburn, 2001), but also because many believe technology may enhance the already entrenched social hierarchy in our country: “Far from democratizing education, many critics argue, on-line learning could facilitate the rise of a two-tiered educational system—prestigious campus-based diplomas for the children of elites, mass-marketed online degrees for those less fortunate” (p. 37). Furthermore, Press and Washburn indicated that universities could split into two groups: “brick” and “click” schools. Brick schools would provide traditional college degrees, while click universities would offer “glorified vocational training for everyone else” (p. 37).

Another indication of the changing educational landscape is that college students may have perceived that employers or employment recruiters focus on students with certain skill sets rather than on students with a broad-based education, possibly leading students to believe they should also focus on skill building. Marina (1994) wrote that “schools exist for society’s benefit; society is not served by having business interests control the schools” (p. 10). If business were to gain too much control over curriculum would it mandate which knowledge students ought to know? Moreover, if
industry were to redesign curriculum, what and whose interests would be expressed or served?

It is certain that humane values, protection of the environment, caring and mutual support, skeptical consumerism, health and safety, and positive images of labor unions would not be in the curriculum. Teacher and student freedom to study diverse views of American society, economics, politics, and history could be severely curtailed. Would examination of the robber barons, the savings and loan fiasco...industrial pollution, unjustifiably high salaries for corporate executives...be part of the curriculum in these corporate-sponsored schools? (Nelson, Carlson, & Palonsky, 1996, p. 287).

Society is already structuring the school day to prepare children for the world of work. "Timed classes, academic tracking, and continuous monitoring all have as much to do with internalizing the practices of paid labor as they do with learning. Even the physical surroundings—the single desks, stark walls, and lighting—are work oriented...students and their parents have almost unquestioned faith in the connection between schooling and work" (Shannon, 1999, p. 98).

Miller and Seller (1985) wrote on curriculum, an "explicitly and implicitly intentional set of interactions designed to facilitate learning and development and to impose meaning on experience" (p. 3). In their textbook, Miller and Seller wrote on three modes of teaching and learning: transmission, transaction, and transformation. The transmission position assumes that learning is a "passive process in which students adapt or respond to a situation" (p. 40). With transmission, emphasis is placed on
direct instructional techniques including lecture or memorization, proceeding from the most simple to the most complex concepts. The transaction position “views education as a dynamic process that can help the student participate in the democratic process” (p. 63), and that traditional subjects are problem-centered. Transaction differs from transmission in that knowledge is related to the students’ experiences and is not passively received; both the teacher and the students share control of learning.

Transformation position involves an ethereal component to education. It is a “gradual awakening to the interconnectedness of things…” (p. 123). It refers to relating oneself “to significant others, to human beings in general, to other species, to nature, and to the cosmos” (p. 127). Transformation process involves not limiting “ourselves to one way of looking at the world” (p. 133). It is unclear how technology, our focus on job training and job skills, and our preparation for the world of work, have impacted these methods of teaching and learning.

Dewey (1938) noted it is essential for students to become acquainted with the past in order for them to appreciate the living present. “In short, liberal education has always been about encouraging not only the means for economic and personal success, but also furnishing the capacity and willingness to make the world a better place (i.e., produce good social/global citizen)” (Jasko, 1997, p. 18). We may do well to incorporate both liberal arts and vocational training to prepare our citizens for the future. Keizer (1988) wrote that, “A truly effective school is always both realistic and utopian. It prepares students to survive the real world, and it prepares them to make a more humane world” (p. 69):
What would John Adams say to the rightful heir of his vision who claims that he must study poetry so he can pass English and 'get a good job with computers'?

[Keizer would say] perhaps this student has apprehended a new kind of poetry of which Mr. Adams was ignorant. I say let us give this person all he needs to get the job he wants, and let us do our job so well that it will seem to him as though we read the printout of his future and planned our lessons accordingly. But let us read the *whole* printout. Let us perceive that in addition to data processing he must have some grasp of life's complexity, and of his own mortality. Let us give him some means to fill that void which cannot be filled simply by cluttering a screen with graphics, or by blacking in an oval with a number-two lead pencil (p. 76).

Assumptions

This research project was born the day an NCU faculty member stated to me, “If you’re looking for dissertation research, you would be a fool not to study the educational impact of notebook computing. It’s all right here for you and it’s cutting edge.” Notebook computers have offered a cutting-edge educational experience to students and faculty, but how students experienced technology in classrooms has not been adequately described. This research study was designed with the following assumptions:

1. Students prefer notebook computing.
2. Faculty integrate technology and pedagogy in their classrooms.
3. Administrative leadership supports classroom technology.
4. There are different levels of technology used across divisions.

5. Participants are willing to openly discuss their perceptions and beliefs about notebook computing.

6. The researcher is not a "Luddite" (i.e., technophobe); I value and use technology in my life every day when appropriate.

Delimitations and Scope

This study was limited to gaining an understanding of the student experience on a notebook computer university campus, hereafter referred to as Notebook Computer University (NCU). The NCU initiative was adopted in the Fall of 1997. I selected this university because it was one of the first universities to adopt a notebook computer initiative, providing students access to personal notebook computers "24/7." Notebook Computer University offered the opportunity to reveal how students on one notebook university campus used their computers both in and out of the classroom.

There are some limitations associated with this work that may affect the validity of the study:

1. Participants, including students, faculty, and administrators may not have been representative of the population on this campus. Students and faculty across divisions were selected to provide the widest view possible of how individuals were using technology.

2. Participants were not self-selected; I alone invited students, faculty, and administrators to participate in this study.
3. Thirteen word prompt cards were used which included neutral or negative terms such as “important to me,” “spreadsheets,” “classroom use,” “e-mail,” “games,” “writing papers,” “CD-Rom,” “web,” “library services,” “sad,” “torn-between,” “frustrated,” and “angry.” Only one positive term, “success,” was included in this research; however, most students did not choose to respond to any type of emotional construct shown on prompt cards.

4. Student perceptions of teaching and learning on a notebook university campus were the focus of the research, although the faculty and administrative experience may have impacted the success and use of technology in classrooms.

5. Although committee meeting minutes were to be deposited and made available in the NCU library, repeated searches and inquiries revealed many minutes were missing. For example, when I searched on January 24, 2001, and again on March 2, 2001, there were no minutes available in the “Long Range Technology Planning Committee” section of the NCU committee meeting minutes binder.

6. Because notebook computer universities are a relatively new phenomenon, there was little literature available concerning computer use in higher education classrooms. Consequently, much of the literature I reviewed for this study was the result of research done in K-12 classrooms.

7. I had been a lecturer in Sociology on a notebook computer university campus; consequently, I entered into this research project with an a posteriori assumption that students were not always utilizing notebook computers for educational purposes.
Methods and Procedures

This study examined the student experience on a notebook university campus. A review of the literature was conducted to explore the research on technological innovations in the classroom. An historical perspective is offered as is an examination of how computers might benefit and/or limit students. Current research on issues related to technological tools was also included and considered as I built a foundation for the assessment of the findings.

Qualitative research methods were employed in this research, including extended periods of observation and interviews with students, faculty, and administrative staff. Observations were conducted both in classes where students were being taught to use computers in an upper level division course, and where students were expected to apply their knowledge in a general education course. In addition, observations were conducted in a variety of classrooms across divisions in an attempt to understand how students used their computers during the course of their educational day.

Interviews were conducted using open-ended questioning techniques to gain an understanding of students’, faculty, and administrators’ thoughts and beliefs about teaching and learning on a smart campus. In addition, a review of available university documents was also completed in an attempt to understand the historical significance of the adoption of the notebook initiative.

Expectations

This research study will accomplish the following:
1. Gain an understanding of the student computing experience in one locale.

2. Provide information on how students in that locale use technology in the classroom.

3. Understand how a learning environment is impacted by notebook computing.

Definitions

The following terms are defined here to assist the reader with an understanding of this study:

1. “Smart” campus: A computerized university campus that offers students a notebook computer and offers students networked classrooms and 24-hour computing.

2. Notebook computer: In this study, participants sometimes referred to personal notebook computers as “laptop” computers. These terms are interchangeable.

3. 24/7: Computing available to students 24 hours per day, seven days per week in classrooms and in dorms.

4. Classroom technology: Refers to classrooms employing computing, but may include other types of technological education such as on-line learning.

5. Off-task: Students who were not engaged in coursework in the classroom but using their computers were considered off-task. Off-task behaviors included, but were not limited to, e-mailing, web surfing, and game playing.

6. Internet: Accessing the World Wide Web for a variety of purposes.
7. Virtual: A virtual experience is when students perceive an experience through some mode of technology rather than through a humanistic experience with a human being present.

8. Ethernet/Wired in: The cord that wires personal notebook computers to the networked connections in classrooms, dorms, and other areas on campus.

9. Information Technology (IT): Computer technology for classroom work or research.

10. CIS: The Computer Information Systems, an academic division at NCU (or students within that division).

11. Courseware: Course materials on specialized software for remedial or "real world" practice.

12. Traditional student: Any student 23 years old or younger.

13. Nontraditional student: Any student 24 years old or older.

14. Luddite: Reference to Robert Ludlum, organizer of an anti-technology movement in nineteenth-century England. Workers in cottage industries argued against the introduction of mass-production equipment, and today the term Luddite is used synonymously with technophobe.

15. Technophobe: One who is afraid of or loathes technology.

16. Technophile: One who is devoted to the use of technology.

17. Faculty: Full-time tenured and non-tenured professors at NCU with a current teaching contract (and includes the division chairs).
18. **Administration:** Full-time, upper-level employees at NCU, including the president, vice president, and other administrative-level employees. Division chairs were not considered administrators in this study.

**Conclusion**

Oppenheimer (1997) observed, “There is no good evidence that most uses of computers significantly improve teaching and learning, yet school districts are cutting programs—music, art, physical education—that enrich [students’] lives to make room for this dubious nostrum...” (p. 45). Others wrote that the use of technology was powerful enough to restore the nation’s leadership (Neison et al., 1996). With students’ increasing demands for convenient and flexible education via notebook computing (Press & Washburn, 2001), an accurate assessment of the impact of technology on student learning became crucial. This project will attempt to gain an understanding of the student experience of notebook computing and how student use of technology impacted their learning.
CHAPTER II
REVIEW OF THE LITERATURE

The purpose of this chapter is to review the relevant literature on technology and education. Following a brief introduction, I have reviewed the apparent shift in our educational focus from liberal arts to vocational training, the history of technology in education, and the adoption of classroom technology as an educational innovation. I have also reviewed the benefits and limitations of educational technology.

Introduction

"In much educational literature today, technology is synonymous with computers" (Snider, 1992, p. 316). We have moved from an industrial age to an information age (Clinchy, 1999; Dede, 1989; Snider, 1996) where computers are a staple of education (Holt, 1998) and technology and technological literacy are necessary to our futures and our children's futures (Holt, 1998; Nelson et al., 1996; Snider, 1996; Tell, 2000; Van Dam, 1999). Just as the printing press transformed teaching and learning (Postman, 1996; Snider, 1992, 1996), the notebook computer has offered an educational transformation via a technological revolution (Mehlinger, 1996) and is a versatile classroom tool (Grabe & Grabe, 1986) within our schools. Keown (1999) wrote that almost every campus has some technology in its learning environment, and Mehlinger (1996) noted that, "technology has its foot in the door of classrooms all across America" (p. 406). With technology so ingrained in our schools,
Civello (1999) indicated we should not avoid technology, but consider the ethical uses of it. Educators as early as the 1980's believed technological advances in schools would become standard pedagogical practices (Goodlad, 1984). Considering the massive amount of money spent by our country's schools and universities on incorporating technology into standard pedagogical practices (Martin, 1999), there should seemingly be research evaluating the effect of educational technology. However, there appeared to be little research conducted in higher education classrooms, and much of the literature focused on K-12 classrooms. To complicate matters further, there did not appear to be a definition for classroom computing; consequently, there was no clear division between simple word processing and classroom computing. Moreover, little research existed concerning the efficacy of classroom computing (Cooke, 1995), and what did exist appeared split three ways: teaching and learning was enhanced by notebook computing, was negated by notebook computing, or was simply a neutral educational tool. Howley and Howley (1995) noted that technology itself cannot be held responsible for being a positive, negative, or neutral influence on students: "Only the uses of technology can be misguided. People simply need to determine what are the appropriate and just uses of technology and implement them" (p. 128). Agre (1999) suggested, "For example, does the Internet, all by itself, bring us a decentralized society? Certainly not. Does the world that brought us the Internet also bring us a decentralized society? That is a different question" (p. 39). Ehrmann (1999) predicted that the "third revolution" in education would impact relationships between
teachers and students and between students and their peers. Technological tools “will cause harm as well as good” (p. 43).

Educational Shift

Although Van Dam (1999) was not sure when the shift occurred, the “educational enterprise slowly but surely began to adopt the language of business. ABC’s and 3 R’s became sister acronyms with TQM (Total Quality Management) and ROI (Return on Investment)” (p. 1). In the twenty-first century, technology is “no longer a luxury; it is essential to the success of its students and business operations. When the phones, networks, or computers fail, so does the educational system” (Van Dam, 1999, p. 1).

How would ancient philosophers evaluate the apparent shift in our educational system from that of educating well-rounded citizens to a citizenry trained for specific tasks? Historically, students have been required to take a liberal course of education in an attempt to make each of them a well-rounded citizen, “a bit like a Renaissance person. However, the information explosion makes that goal out of reach even for the most learned students” (Coplin, 1999, p. 62). Have we shifted our focus from liberal arts education to vocational training, and if that shift has occurred, is it problematic?

Over time our educational purposes and goals do appear to have shifted. “In American schools, the medieval curriculum of seven liberal arts—rhetoric, grammar, logic, arithmetic, astronomy, geometry, and music—has been replaced by a list of subjects too long to include here (Nelson et al., 1996, p. 189). In the 19th century, schools were to develop citizens’ reading, writing, and calculation skills, their ability to
vote intelligently, judge officeholders’ conduct, to know and understand rights, and to have information sufficient to transact business. Schools were also to assist citizens’ understanding of their duties and help them fulfill social relationships (Honeywell, 1931, as cited in Tozer, Violas, & Senese, 1995). Male university students in Thomas Jefferson’s day may have been free to attend the schools of their choice, but their educational requirements included strict adherence to language proficiency and focused on developing the character of well-educated men:

But no diploma shall be given to anyone who has not passed an examination in the Latin language as shall have proved him able to read the highest classics in that language with ease, thorough understanding and just quality; and if he be also proficient in Greek, let that, too, be stated in his diploma. The intention being that the reputation of the University shall not be committed but to those who, to an eminence in some one or more of the sciences taught in it, and a proficiency in these languages which constitute the basis of a good education, and are indispensable to fill up the character of a well educated man (Tozer et al., 1995, p. 33).

In the 20th century, Veblen (1918) wrote that “business practices and values detract from the primary purpose of academic institutions: to liberate students” (as cited in Nelson et al., 1996, p. 293), but that seems precisely where our educational system has shifted in the 21st century. Nelson et al. (1996) indicated “American schools have been dominated by the values of business and industry since the beginning of the 20th century, and have lost their primary purpose of enlightenment for the improvement of
social justice” (p. 289). Nevertheless, the political component of our educational system has survived into this century: “Educators from Dewey to Freire have considered the fostering of political literacy in students—the habits, knowledge, and inclinations needed to participate fully in democratic action—an important intellectual and philosophical element of higher education” (Brookfield, 1990, p. 21). Despite the enduring desire for politically literate students, it may be that society has thrust us in another direction. “The system’s agenda is to direct schooling more clearly toward economic goals” (Howley & Howley, 1995, p. 128).

A series of proposals for reform over the past decade have brought school and the workplace closer together. This could mean better-prepared workers for our competitive enterprises, but it could also mean our schools have become economic sorting machines (Finkelstein, 1984; Spring, 1976). And in addition to practical, theoretical, and moral schooling questions, fundamental disputes concerning who controls the curriculum have developed (Nelson et al., 1996). For example, private industry could make suggestions for curriculum change (Perkin, 1989). Jasko (1997) argued that: “It seems that in connecting our nation’s economic performance in a global marketplace with academic institutions at all levels, we have commodified education, not as a process, but as a product” (p. 18).

It seemed reasonable that if our educational system has focused on preparing students for the world of work, students would believe in the importance of job training over liberal arts education:
Although a single history class might still be made compulsory at some point in high school, it would come with a consumer advisory: history would require a reduction in the technology component. Alternatively, students would be able to substitute business studies for their single history course if they found it more productive (Robertson, 1998, p. 57).

Perhaps a review of the history of technology in education will provide a foundation for understanding how society shifted focus from liberal education to skill building and job training.

History of Technology in Education

As early as the 1960’s, technology has been in use in our classrooms (Brumbaugh & Rawitsch, 1980). President Lyndon Johnson believed that our country could not solve the problems of a “nuclear age with horse and buggy learning”; as a result he greatly expanded the national education budget. During Johnson’s term in office, the U.S. Office of Education saw a budget increase from $477 million to $5.5 billion (Snider, 1992, p. 316). Snider noted that at one point education was evolving from the art of teaching to the science of learning, and technology was utilized to make lives richer, more comfortable, and convenient (Mehlinger, 1996). Nonetheless, there were those who disagreed that teaching and learning should be scientific. Hight (1950) wrote that he:

[believed] teaching is an art, not a science. It seems to me to be very dangerous to apply the aims and methods of science to human beings as individuals, although a statistical principle can often be used to explain their behavior in
large groups and a scientific diagnosis of their physical structure is always valuable. But a ‘scientific’ relationship between human beings is bound to be inadequate and perhaps distorted... Teaching involves emotions, which cannot be systematically appraised and employed, and human values, which are quite outside the grasp of science... ‘Scientific’ teaching, even of scientific subjects, will be inadequate as long as both teachers and pupils are human beings.

Teaching is not like inducing a chemical reaction: it is much more like painting a picture or making a piece of music, or on a lower level like planting a garden or writing a friendly letter. You must throw your heart into it, you must realize that it cannot all be done by formulas, or you will spoil your work, and your pupils, and yourself (p. vii).

Even with the advent of computer technology in schools, some agreed that teaching is still an art; anyone can offer information, “but it is the art and genius of a teacher to have [students] turn that into knowledge” (Walzak, 1998, p. 1). In the 1960’s, Henry Howe II, President Johnson’s commissioner of education, prophesized that great teachers will always be necessary because, “The essence of education is beyond the capacity of a machine and always will be” (1968, p. 316). Teachers need to help students make meaningful connections between pieces of information (Ericksen, 1984; Good & Brophy, 1997; Griffin, 1999; Rice & Wilson, 1999) in order for them to learn.

During the 1970’s the computer chip was invented, and the 1980’s saw the decade of the personal computer where there was to be a shift from the textbook/lecture format to student-centered, hands-on learning. By the late 1980’s, computers were a
significant force on college and university campuses (L'oyer, 1987). The U.S. Department of Education (1989) noted the infusion of technology in schools and warned that the computer revolution threatens higher education.

In the 1990's, Cooke (1995) wrote that computer use has increased and that personal computers are more powerful and less expensive than ever before. This seemingly fulfilled Finn's 1988 prophecy and fortified the notion that continued technology use in our schools is likely:

The computer will deepen its presence in schools and classrooms as software improves and teachers begin to see it as a power tool for getting the job done. The microcomputer offers more information than any teacher can, and it puts that information directly into students' hands, permitting them to interact with it—to manipulate graphs, enact simulations, edit texts. Eventually, a keyboard will be at the fingertips of every student in class (p. 24).

And keyboards at the fingertips of every student means students will become more tech-savvy (Sandford, 2000; Tomei, 1999). Students have demanded that schools meet their mounting technology requirements, resulting in the current trend for adopting technology for classroom use (Cooke, 1995).

Adoption of Classroom Technology as an Innovation

The majority of the literature reviewed for this research project was based on schools rather than on universities. The question here is whether higher education officials, when adopting computer technology initiatives, relied on the research conducted in K-12 schools or relied on any research at all. In terms of Notebook
Computer University’s decision to adopt a technological innovation, an administrator did not have an answer to my question concerning the literature NCU reviewed prior to adopting the technology initiative:

If you are looking for proof positive that anything by itself improves learning you may be disappointed. Removing all other variables rarely, if ever, works in education. In the end, the ‘proof’ in education seems to be student success, employee success, etc. If you could put people in laboratories and control all variables, things would be easier to measure. In [NCU’s] case, our students seem to be getting hired quicker [sic] and getting better jobs, but we don’t have the tools or staff to prove that either. We just know it happens. Employers are quick to tell us how much they appreciate [students’] IT knowledge. One of the biggest gains for our students is that society is rushing to technology, and our students have high levels of IT training in their skill sets.

Others could not answer my question concerning the literature reviewed prior to adopting such an expensive educational tool. In fact, I contacted four people in higher education and two in K-12 “tech” positions, and I was unable to get a meaningful response from any of them. There did not seem to be evidence to support the adoption of technology. Still, society has “convinced the American people that their children must prepare for the high tech economy of the future, and therefore they’ve got to be highly trained in math and science…” (Tell, 2000, p. 197), what is dominating our schools today is what Postman (1996) called the “narrative of economic utility” (p. 27). Nelson et al. (1996) observed that schools have chosen to bring students to our
economic utility system to avoid "[dooming] them to life on the margins of a high tech future" (p. 220). Mehlinger (1996) doubted this would occur because "schools will be unable to resist the new technology...it will be used in schools because it appeals to students and may enhance learning and because the schools can offer no reasonable defense for rejecting it" (p. 402). Indeed, Calcarra (1999) wrote that "the primary components of education are changing. The Internet and videoconferencing are emerging as primary tools of education" (p. 71). But Ellul (1964) believed the new law of our age does not compute: "When something becomes possible, it then becomes necessary" (p. 99). From cloning sheep to transforming education, "technology is shaping the culture that created it" (Mehlinger, 1996, p. 400).

Why has there been a rush to adopt technology and "spend billions before we...know whether such a colossal investment of public funds makes sense?" (Mehlinger, 1996, p. 404). Cooke (1995) noted, There is "little current research regarding student perceptions of using notebook computers...and educational institutions [have adopted] technology for what it is, rather than for what it can provide to the teaching and learning process" (p. 20). In many cases technology firms have provided grants, hardware, and software to schools because these firms recognized teachers would share their newfound knowledge with other teachers (Civello, 1999), and provide the potential to increase firms’ customer base (Oppenheimer, 1997).

Teachers sharing knowledge and teacher training are essential aspects of the successful adoption of a technological innovation (Mehlinger, 1996). Keown (1999) suggested an individual school’s technological capacity should be slightly beyond
faculty skill level so as to challenge teachers without frustrating them, thus losing faculty support. It is tenuous to adopt a notebook initiative without faculty support: educational innovations such as notebook computing, driven by administrators or others in power, will fail if not supported by faculty or those intended to carry out the innovation (Creamer & Creamer, 1986). Educators need to support the introduction of technology and be proactive in designing and implementing computing in the curriculum rather than simply react to administrative pressure to do so (Aiken & Braun, 1980).

On some campuses, the adoption of notebook computer initiatives did not involve faculty, the very people intended to carry out the innovation (Feenberg, 1999). Those oversights sometimes resulted in faculty members who did not believe they were truly empowered by both administration and faculty technophiles:

Too much of the [technology] debate has taken place with an ‘us’ versus ‘them’ mentality. I’m continually surprised by the fact that those who use technology as a major teaching and learning medium see themselves as a community somehow separate and distinct from the rest of higher education... and reinforces the notion that what ‘we’ do is more important or better than what ‘they’ do” (Merisotis, 1999, p. 51).

The university workforce is a community of professionals that possess a high level of knowledge and/or expertise in a wide variety of fields. Decision-making in this community is traditionally much more participative in nature than almost anywhere in industry. Thus, the application of technology in this
liberal community must be a cooperative decision ("Planning for Information Technology," 2000, p. 52) and must not become an 'unconscious destiny' (Kincheloe, 1991, p. 181).

Mehlinger (1996) observed there are those who believe teachers have resisted the technological revolution. In fact, "assisting faculty efforts 'to integrate technology into instruction' remains the single most important Information Technology (IT) challenge confronting American colleges and universities over the next two to three years" (Campus Computing Project, 1997, p. 1). Foa et al. (1999) suggested that technology should never be imposed on resistant teachers, but should allow those who are interested to learn about integrating technology so that eager teachers can teach their colleagues. Educational innovations will not succeed without the active support of teachers (Goodlad, 1984), and teachers must collaborate if there is to be a successful integration of technology in schools (Foa et al., 1999).

Over three decades ago Evans (1968) wrote that B. F. Skinner was concerned about teachers' perception that they must resist technology or lose power in their classrooms. "Educators, [Skinner] argued, are seldom willing to concede that they are engaged in the control of human behavior. The word 'control' itself is avoided in favor of less threatening synonyms such as 'influence' or 'guide'" (p. 64). Research results which indicated teachers resisted technology may have stemmed from a lack of support for teacher use rather than a Luddite belief that technology would usurp authority or that technology was a waste of their valuable time (Educational Testing Service, 1999). Many people who see false claims for technology have been identified as Luddites.
though they own cell phones, ATM cards, voice-mail systems, e-mail accounts, and various other sorts of technologies (Alvear, 1999/2000; Howley & Howley, 1995; Rothenberg, 1997). Technophiles have dismissed technological moderates as heretics and “equate opposition to technology with mindlessness” (Mander, 1991, p. 37). Most teachers do not want to give up technology completely, and as Alvear (1999/2000) observed, “Giving up [technology] isn’t an option. It’s [technology’s] unintended consequences that make me cringe” (p. 144)

We have continued to churn out teachers and/or professors who are unaware of the benefits and limitations of classroom technology (Bozeman, 1999) and who are ill prepared to infuse technology appropriately into curriculums and classrooms:

Imagine that we trained people to fly airplanes the way we teach faculty members to use technology to foster interaction. We’d say, ‘Here’s the plane, here’s the starter button, Paris is that way, feel free to carry thirty paying passengers, and there’s a help button on the dashboard if something serious should happen along the way.’ Faculty development must draw on research and evaluation to prepare professors for the real issues that will confront them as they transform courses in their disciplines (Ehrmann, 1999, p. 46).

Benefits of Technology in Education

In reviewing the literature, it sometimes appeared that researchers found as many benefits as limitations of classroom technology. The ongoing debate over the adoption of classroom technology has had two main arguments: 1) Students are more engaged in the learning process when computers are available to them than during
traditional classroom lessons (U.S. Congress, 1988). and 2) "[Passively looking at a screen] yields little more than a transitory entertainment; for it cultivates neither the memory nor the power of correct description. Impressions succeed each other so rapidly that few are fixed in the memory, and the spectator is not called on for any mental effort on his own" (Snider, 1992, p. 316).

The promoters of technology either "focus on the technical capability of technology" or they "celebrate its wide-ranging possibilities for transforming higher education" (Newson, 1999, p. 52). Palme (1998) believed computer technology offered students an unprecedented opportunity to learn:

...Consider the way students are now learning by means of digital technology—a remarkable way to hold great things at the center of our attention...I have long been spellbound by the solar system and its working, but neither the astronomy classes I took in college nor the books I later read satisfied my hunger to understand. But recently, sitting at my computer, using an astronomy 'lab' on CD-ROM, I have started to digest the fundamentals of that discipline in a deeply fulfilling way. One reason for my accelerated learning is the computer's power to create virtual reality. With it, I can make and manipulate models of the planets, their moons, their relationships, and the play of gravity that allow me to place this immensity at the center of my attention...Using similar technology, students in many classrooms are now able to relate more personally to great things in disciplines ranging from architecture to zoology (p. 118).
There are benefits to incorporating technology into classrooms at all levels. As noted previously, research indicated some students learned more when they were aided by technology, and educators have hailed the anytime, anywhere education that technology has provided (Burchett, 2001; Calcara, 1999). Computers offered a more level educational playing field by opening doors to learning to those in geographically remote areas (Snider, 1996). Those “virtual classrooms” could be more diverse with “individualized instruction” (Snider, 1996, p. 326). Mehlinger (1996) suggested that, “[Students] did not become bored by technology over time. Instead, the desire to use it for their own purposes increased with use” (p. 404). Teachers could combine strategies such as PowerPoint presentations, chalkboard notes, drawings, and Internet sites to engage students more in classrooms (Parks, 1999). And Bialo and Sivin (1990) wrote that when technology is used appropriately it can positively impact student achievement, motivation, and social interaction. Snider (1996) believed that, “Information Age advocates will maintain that social relations can take place over an interactive, multimedia network just as they can take place in a classroom” (p. 24).

Some would argue that e-mail alone has the potential to improve student/teacher communication and aid in developing cohesive educational communities. E-mail can be an efficient form of communication, and it has contributed to a better learning environment (Parks, 1999). During a course I took from University of North Dakota faculty member M. Zidon (personal communication, April 10, 2000), she wrote to me about her experience with her students and their use of e-mail: “My experience with e-mail communication has been good, actually. Students ask for clarification of an
assignment, ask for appointments (face-to-face), let me know upcoming schedules that make it impossible for them to get to class...Some, also, just have to tell me something personal NOW.” Computer technology may indeed offer a form of community:

We find honesty, responsibility, trust and mutually respective behavior—traits that are all too rare in our increasingly paranoid and hostile culture.

[Technology], then, is where we can turn the tide. Through computer communication, we quickly evolved from individuals embedded in their separateness into community...[and celebrated] the community spirit of wholeness and connection (Palloff & Pratt, 1999, p. 162).

In the absence of what many believe is a critical assessment of technology’s impact in schools, a UCLA research study on higher education indicated that 87% of teachers agreed, “Student use of computers enhances their learning” (Sax, 1999, p. 1). Weston (2000a) wrote that according to the Educational Testing Service, eighth graders had higher National Assessment of Educational Progress (NAEP) scores when they learned via computer simulations. Weston (2000a) also wrote that the Indiana Buddy System project indicated those who used home and school computers had better writing skills and better conceptual understanding of mathematics. In addition, one state’s educational technology survey of school administrators indicated a correlation between computer use and greater student achievement, more time spent on homework, and better communication skills (Weston, 2000a). “Regular use of technology has helped raise academic performance (“Making Time,” 1999, p. 1). And Kirkpatrick (1992) indicated that computer-assisted instruction helped students with basic skills and
writing. With technology, students were taking more responsibility for their own learning (Foa et al., 1999; Mehlinger, 1996). Computers are “one important tool among many; they will still permit a great deal of face-to-face contact between students and teachers” (Educational Testing Service, 1999, p. 1).

Since students stopped listening to college professors’ lectures at least a decade ago (Civello, 1999), the banking method of education (Freire, 1973/2000)—whereby information is withdrawn from teachers and deposited in students—was not the best way to educate. Palmer (1998) wrote:

We can begin with a simple pedagogical fact: if the aim of a course is to deliver a great deal of information, the worst way to do it is by nonstop lecturing (although lecturing can serve other purposes quite well...). The human brain is simply not good at retaining armies of facts as they march single-file through a lecture-laden with information. Facts are far better delivered via tests or electronic formats, where students can do with them what the brain requires: look at them once, look at them again, and check them once more, then massage them. correlate them. and apply them—in brief but frequent installments (p. 121).

Decentralizing the teacher via technology is not necessarily a concern, because “shouldn’t we be concerned with preserving the ideas within text, rather than its physical pages and covers?” (Civello, 1999, p. 91). Perhaps educators need a new tool to deliver information and to connect to students where they are. That place may be in computer labs where technological tools could help “transform student exhaustion
about school and learning to exhilaration” (Foa et al., 1999, p. 29). When technology was used in classrooms “teachers were working more as mentors and less as presenters of information”; however, “the degree of effectiveness is influenced by the student population, the instructional design, the teachers’ role, student groups, and the levels of student access to technology” (Mehlinger, 1996, p. 405). Mehlinger (1996), like Palmer (1998), believed that various types of technology attracted students and held their attention longer, saving wear and tear on teachers. But Sax (1999) wrote that higher education faculty were stressed by having to keep up with technology; however, faculty and administrators are “leading this revolution, and they are not leading it in order to save American business or to prove a new theory of learning. They are buying, installing, and using technology simply because they believe that students will be less bored and will learn more through the use of the technology than without it” (p. 1). In short, faculty and administrators are using technology to improve schools (Mehlinger, 1996).

The Flashlight Project (American Association for Higher Education, 1987) is a teaching, learning, and technology affiliate of the American Association for Higher Education. This group helps institutions study interaction and the role technology plays in that interaction. As reported by Ehrmann (1999), this group believed:

Students enter higher education with their own deeply held ideas about how to study. If students believe it is better to study alone, they are unlikely to use e-mail to collaborate. Evaluative tools such as the Flashlight Project could help students test their own theories of learning, and show them how to use
technology to best support their own learning. If students are to make sensible use of technology, and of interaction, they, too, need better feedback about how they and their peers use technology to promote (or escape) interaction, and the consequences of their interaction for what they ultimately learn (p. 46).

Kempel and Strand (2000) were interested in student achievement at a notebook computer university, and their research was particularly compelling because it was completed on a rural notebook university campus within the context of the Flashlight Project. Average respondents were likely to be upperclassmen with above average grade point averages, were enrolled full-time in either the business or education divisions, and were using e-mail more than any other type of technology. In several areas my qualitative study duplicated Kempel and Strand’s results, indicating the dual nature of the effects of educational technology. Kempel and Strand’s positive research outcomes included:

1) Student PowerPoint development was associated with “cognitive and creative outcome benefits…[but] it should not go unnoticed that students believe the most effective use of PowerPoint is to turn control over to them rather than have instructors use it to deliver content.”

2) E-mail messages allowed students to paraphrase materials that promoted active learning. Students used e-mail to ask questions and to engage in “absentia collaboration.”

3) Technology in general assisted students’ “cognitive and creative outcomes” and provided “practice at ‘real world’ applications.”
Weston (2000b) was a moderate in terms of integrating technology with proven pedagogical practices that might maximize the benefits of technology:

One thing we have learned from spending billions of dollars trying to get results from the computer-achievement connection is realizing the complexities of that work. We now know that a great deal more is involved than simply attaining low student-to-computer ratios. A quick review of the research about pedagogy, teaching and learning, reveals that much is known about improving learning without using computers. For instance, there are no silver bullets for strengthening teaching and enhancing learning. Best are cumulative approaches with clear learning goals, robust curricula, increased time-on-task, improved teacher competencies, incentives for teachers and students, frequent assessments, skilled leaders, proven models, strong student relationships with caring adults, and involved parents and communities. This means that the computer-achievement connection must become more rooted in proven pedagogy in order to produce learning gains. Silver bullet approaches—computer labs and courses—must be jettisoned in favor of cumulative approaches where computers are used in ways to increase behaviors that produce greater learning (p. 1).

And Papert (1980) noted the dual nature of technology: a positive aspect of technology can at the same time be a negative aspect of technology:

Computers encourage students to make mistakes and try again. It does not humiliate them, and encourages them to try again. If this is true, it is a good
reason to use computers. If this is true, it's an insult to teachers that it is only through the introduction of a machine that the classroom can become a place where trial and error is an acceptable mode of learning, where being wrong is not a punishable offense (p. 125).

It has been noted that educational technology may have positive, negative, or neutral impact on academic achievement. In terms of neutral impact, when teachers are trained and do resolve to integrate technology into their classes, they often patch it into traditional teaching and learning methods. For example, they may use a PowerPoint presentation in place of a chalkboard (Bass, 1999; Foa et al., 1999). It is the same traditional classroom, but in digital form. Fusing technology into traditional classrooms results in a hybrid learning experience in which technology supplements, not supplants course content (Bialo & Siven, 1990; Campus Computing Project, 1997; Green, 2000a). Similarly, Trinkle (1999) advocated integrated technology, small classes, and human contact: “The most effective use of instructional technology is being made in small-class settings, where technology is being adopted not just to promote efficiency or ameliorate crowded classrooms, but to be integrated into classes that also provide face-to-face interaction” (p. A60).

Limitations of Technology in Education

For every research study that indicated technology positively impacted teaching and learning, there was another study that suggested technology’s impact was neutral or even negative. Postman (1996) was cynical about the availability of technology in schools but has not argued “against using computers in school. I am arguing against
our sleepwalking attitudes toward it, against allowing it to distract us from important things, against making a god of it” (p. 333). Mehlinger (1996) indicated that in studies of computer efficacy, “the experimental group nearly always wins, but seldom does the investigator study the two groups a year or two later to find out if the gain has survived” (p. 404). The research on technology and learning styles remains incomplete and inconclusive:

The research to date does not consider how a student’s learning style—how he or she processes information, for example—can influence the success of particular technologies. Our understanding of how the learner, the learning task, and specific forms of technology interact is in fact limited...information about a students’ preferred learning style could influence how a course is designed, including what type of technology is used. And additional research could give us more details about why certain technologies might be better suited to specific learning tasks (Merisotis, 1999, p. 50).

Bass (1999), wrote that he believed “...one of the reasons we know next to nothing about the impact of technology on learning is that we know next to nothing about learning itself at the collegiate level” (p. 4). Mehlinger (1996) suggested there is great uncertainty concerning how much and what kind of technology is in use in schools, and how much is available to teachers. He wrote that the fact that technology exists does not mean it will be used effectively, but Ely (1991) suggested that classroom technology use has had relatively little impact upon teaching and learning. In fact, the efficacy of classroom notebook computing is difficult to measure: “It would be
wonderful if we could point to specific data that would demonstrate conclusively that the use of one technology or approach produced better results than the use of some other technology or approach. Alas, the problem is not so simple" (Mehlinger, 1996, p. 404). An already complex research problem may be confounded by software companies’ conflicts of interest when they commission studies to prove technology’s effectiveness in classrooms (Holt, 1998).

Many times computers are not used in classrooms but are utilized primarily for homework and research. Mendels (1998) wrote that according to one survey “the most popular use of the Internet is for research” (p. 1). Quality Education Data (QED), a market research firm, studied K-12 educational trends and noted:

Most teachers reported that the students in their classes spent an hour or less a week doing ‘hands-on’ Internet work. But almost a quarter—23 percent—reported that students in class spend up to two hours online. Research was the most widespread use, with 49 percent of teachers reporting that their students used the Internet at least once a week for this purpose. Twenty-one percent reported students doing online projects in class and 19 percent of the students used e-mail in the classroom (Mendels. 1998, p. 1).

Palmer (1998) wrote that technology did not always provide a positive influence no matter the location it was used:

We are obsessed with manipulating externals because we believe that they will give us some power over reality and win us some freedom from its constraints. Mesmerized by a technology that seems to have done just that, we dismiss the
inward world. We turn every question we face into an objective problem to be solved—and we believe that for every objective problem there is some sort of technical fix. That is why we train doctors to repair the body but not to honor the spirit; clergy to be CEO's but not spiritual guides; teachers to master techniques but not to engage their students' souls (p. 19).

Oppenheimer (1997) wrote that Apple Computer vice president, Terry Crane, believed "technology actually encouraged students to collaborate more in classrooms...Crane didn't mention that after a decade of effort and the donation of equipment worth more than $25 million to thirteen schools, there is scant evidence of greater student achievement" (p. 47). Oppenheimer also noted that, "To be fair, educators on both sides of the computer debate acknowledge that today's tests of student achievement are shockingly crude. They're especially weak in measuring intangibles such as enthusiasm and self-motivation, which do seem evident in Apple's classrooms and other computer-rich schools" (p. 49).

Other research findings indicated technology could not be cited as the cause of the improvement in student achievement scores (Levinson & Surratt, 2000). In some schools computers were "mere hunks of hardware" (Foa et al., 1999, p. 29) while other schools' computers added to and improved the learning process. How those results were measured was difficult to assess. It was difficult to know if "PowerPoint, e-mail, web page assignments/techniques have the desired effects" (Parks, 1999, p. 200). Cooke (1995) suggested that others have found little evidence that technology produced measurable change in achievement and that achievement cannot be improved without
education reform. Indeed, assessment is a complex problem. We cannot just ask teachers and learners to subjectively assess technology's impact:

Assessment of [learner centered teaching and technology] effectiveness is limited to the opinions of students and teachers. These off-hand, noncritical assessments are one component of effectiveness, of course, but will pass muster neither with education professionals nor school boards—nor should they. Conventional assessment, with its reliance upon the answering of questions in a rigidly controlled examination format is not necessarily the answer. But we need better evaluation than that of asking students and teachers if they liked the approach: the dangers and biases of these assessment methods are well known (Norman & Spohrer, 1996, p. 24).

Howley and Howley (1995) insisted that "technology is a form of process, and, for us, education is substance: ideas, intellectual content, and emotional meaning" (p. 127). As such, assessing technology's impact is difficult because apparent gains in academic achievement may be due to individual students rather than technological tools (Educational Testing Service, 1999).

A limitation of technology is that it lacks a social element, regarded as essential to learning by some theorists (Vygotsky, 1986), and "Industrial Age advocates argue technology-intensive education is anathema to the development of social skills" (Snider, 1996, p. 24). Vygotsky believed that collaboration is the natural social context and students may learn more when engaged with others (Rice & Wilson, 1999, p. 28). To learn, students are required to process information and then embed the information
via complex reinforcements though conversations with teachers and peers. The Educational Testing Service (ETS) (1999) noted that computers limited social interaction, thus limiting learning. Specifically because of social isolation, the ETS suggested that computers might not increase learning, but only decrease learning (Educational Testing Service, 1999). If computers substituted for human interaction, they could undermine the social components necessary for learning.

Former President Dwight Eisenhower recognized early that technology could have a mind of its own and said, “Because of its power, its complexity, and its potential danger, technology requires effective human control” (Snider, 1992, p. 316).

Technology has not become the definitive answer to all societal problems. Postman (1996) reflected on Kay’s suggestion that “problems schools cannot solve without computers cannot be solved with them” (p. 45). Moreover, Graham (1975) reminded us of technology’s limitations and wrote that we:

Thought modern technology would solve many of the great problems of the human race. In some ways it has, by eliminating the fear of diseases like polio and small pox. But it has also given us Frankenstein weapons of destruction. Poverty, hunger, greed, injustice, prejudice, terrorism, lust, war and death are still with us (p. 205).

Another of technology’s limitations is that it decentralizes the teacher and makes teaching impersonal, creating informational have and have-nots (Snider, 1996). Postman (1996) wrote that computer technology has not equalized schooling because individuals and schools will always have unequal economic access to hardware and
software. Yet another limitation of technology is that “the placelessness of the Web leads to an ethereal randomness of thought” (Rothenberg, 1997, p. A44). Palmer (1998) wrote that this placelessness has sometimes removed or disconnected us from real life:

Many Americans found the Gulf War acceptable, even popular, because it was fought with a technology that allows us to do violence to others at distances that keep us safe. We killed tens of thousands of Iraqis in the Gulf War, but all we saw were shadowy images of destruction—images that were applauded in TV rooms throughout the land, so grateful are we for the capacity to kill at great remove…Contrast this with the war in Vietnam…our soldiers came face to face with the enemy, our civilians came face to face with the deaths of fifty thousand Americans, and we sank into a national slough of guilt and grief (p. 53).

Still another limitation of technology is that the addictive nature of computing contributes to the isolation of students. Students may have taken their cue to isolate themselves from society via electronics:

…Numbers of Americans have isolated themselves in gated communities; home schooling has become a growth industry; de facto racial segregation is on the rise at many universities; and even such mundane shared experiences as shopping are being reduced by the two fastest-growing forms of retailing—catalog and electronic shopping—without ever having to rub elbows with one’s citizens (Collins & Holsti, 1999, p. 199).

In some cases the isolation and addiction occurred early:
For a shy kid like Adam, the computer was a godsend...But the 18 year-old now recognizes that it caused some problems, too. ‘It gave me a reason why I didn’t have to go out’...noting that he never had many real-world friends. He also stopped playing sports and slacked off in school. Sometimes, he’d play [a computer game] for so long that he’d stop blinking, but he’d keep going anyway, tears streaming down his face (Kelly, Lord, & Marcus, 2000, p. 52).

Stulman (1999) believed that his peers on a notebook computer campus isolated themselves via technology and that technology was not a positive influence. He observed that students routinely stayed awake all night chatting with dormmates on-line, and that they often would not walk a short distance to have a conversation when they could chat on-line—even if it took longer. And in other ways computers were not positively enhancing the lives of Stulman’s peers. He noted that many students relied solely on their computer for research, but he believed serious research still meant he must walk to the library. In Stulman’s opinion, he and his peers needed no more than a word processing program and e-mail, unless they were Computer Information Systems (CIS) or mathematics majors.

Technology has been blamed for making people slaves to computers (Snider, 1992), resulting in wasted time in and out of class. The Internet has gone down at inopportune times. computers have crashed, and e-mail has been lost in cyberspace (Parks, 1999). “You certainly don’t want to take any chances on the reliability of your connection. It can be pretty embarrassing if you have 30 people on site and 30 others somewhere else, and the technology doesn’t work” (Van Horn, 1999, p. 411).
There are some who believe technology has made information-availability synonymous with learning. Calcara (1999) wrote that the “primary impact [of technology] in the classroom is how students receive information and, therefore, learn” (p. 34F). Whitehead (1929) worried that education filled with “inert ideas is not only useless: it is, above all things, harmful” (p. 13). But it was Postman (1996) who argued that schooling never was about getting information to students; however, “the computer vaults information access to the top” (p. 42). Access to knowing and learning are far from identical (Scheffler, 1965), but students may have erroneously come to believe that all necessary knowledge is easily accessible via the computer. Therein lies another limitation:

Of course, you can’t blame students for ignoring books. When college libraries are diverting funds from books to computer technology that will be obsolete in two years at most, they send a clear message to students: Don’t read, just connect. Surf. Download. Cut and paste. Originality becomes hard to separate from plagiarism if no author is cited on a Web page. Clearly, the words are up for grabs, and students much prefer the fabulous jumble to the hard work of stopping to think and make sense of what they’ve read (Rothenberg, 1997, p. A44).

A professor at the New Jersey Institute of Technology, Rothenberg noted another limitation of technology. He observed a “disturbing decline” in students’ writing ability which he attributed to a dependence on technology (p. A44). Among the problems associated with “the latest, easy way of writing a paper via the World Wide
Web” were bibliographies without references to books, out-of-date citations, pictures or graphs “masquerading as original work,” unattributed quotes, and the like. “One finds few references to careful, in-depth commentaries on the subject of the paper, the kind of analysis that requires a book, rather than an article, for its full development” (Rothenberg, 1997, p. A44).

Schulman (2000) admitted that although she was initially optimistic about [e-mail/technology] because it would make more frequent and better writers of us all, her optimism had been dampened because of a seeping sense that interpersonal skills were now waning. She believed electronic communications are touted to keep people closely connected, yet communicating via e-mail allowed students to exchange their voices for the stroke of a key, and typed words on a page or screen.

Kraut et al. (1998) wrote that electronic communication negatively impacted the participants involved in their research. In a study of 93 Pittsburgh-area families the Internet left people substituting “poorer quality social relationships for better relationships” (p. 1029). Although some students may believe e-mail is a lifesaver because they can e-mail their parents or friends when convenient, “even strong ties maintained at a distance though electronic communication are likely to be different in kind and perhaps diminished in strength compared with strong ties supported by physical contact” (p. 1030). On-line friends may be less likely to understand the context of electronic conversations, making discussions difficult and whole populations of people “intimate strangers” (Walker, 1996, p. 43).
There may be a similarity between television and technology and their impact on education: “If people use the Internet primarily for entertainment and information, the Internet’s social effects might resemble those of television” (Kraut et al., 1998, p. 1018). Howley and Howley (1995) wrote about the similarity between technology and television, the latter developed for the “interests of power. Television numbs and misinforms as well as amuses; much more rarely does it educate. But the major purpose of television as an industry is the accumulation of wealth, a purpose that some futurists also claim for software and for education generally” (p. 128). Perhaps society should contemplate the rush to technology, having learned from our experience with television:

Here was [television] that entered every home in the United States, brought imagery nightly into every brain for many long hours, reorganized family life, community life, political life, human understanding and experience and, through their advertising and their domination of program content, gave corporations an unprecedented degree of centralized power and control. Yet no one had thought to argue that we might be better off without it...Saying no to a technology, any technology, was (and still is) beyond us. Virtually unthinkable. It does not even occur to most of us that we have the right or ability to turn back a whole technology. No precedent and no support exists for it in our culture (Mander, 1991, p. 41).
Just as television can draw us away from human connections, Kempel and Strand (2000) suggested that technology can disconnect students from one another. Their research indicated there were other negative aspects to classroom technology use:

1) Videotapes and texts on CD-ROM were less likely to be effective uses of media and technology, and instructor-developed PowerPoint presentations were likely to encourage passivity in students.

2) “Collaborative learning was not strongly promoted by technology in general” and technology offered students “ample opportunity to wander from the task at hand.”

Collaborative learning and connection to others has been suggested as essential to learning (Rice & Wilson, 1999). But Alvear (1999/2000) sagely noted that “a funny thing happened on the way to the communications revolution: we stopped talking to one another…The more connected we get, the more disconnected I feel. Every advance in communications technology is a setback to intimacy of human interaction” (p. 143). The very nature of community is human interaction, and Palmer (1998) suggested that schools may not facilitate a sense of community:

Academic institutions offer myriad ways to protect ourselves from the threat of a live encounter. To avoid a live encounter with teachers, students can hide behind their notebooks and their silence. To avoid a live encounter with students, teachers can hide behind their podiums, their credentials, their power. To avoid a live encounter with one another, faculty can hide behind their academic specialties. To avoid a live encounter with subjects of a study,
teachers and students alike can hide behind the pretense of objectivity: Students can say, 'Don’t ask me to think about this stuff—just give me the facts.' and faculty can say, ‘Here are the facts—don’t think about them, just get them straight.’ To avoid a live encounter with ourselves, we can learn the art of self-alienation, of living a divided life (p. 37).

Some have observed that as our campuses move toward increased use of technology in classrooms, business managers, not educators, will run colleges and universities. Bowen (as cited in Press & Washburn, 2001) noted that, “behind all of this technology there is a very real concern about a seismic shift in the control and direction of the university—from people who have spent their lives teaching, to managers who are under pressure to decrease costs” (p. 38). Furthermore, at the same time administrators are trying to reduce costs, the cost of technological education skyrocket: “Ever-newer technology always upstages the bells and whistles of last semester. Technology drives technology in that new software often demands new hardware and vice versa. Administrators can’t resist a $300,000 distance education item, though they cannot find $300 for a wall map” (Martin, 1999, p. 34).

The bottom line in whether technology is more beneficial than limiting appears to lie in the middle of the technology continuum, “somewhere between the optimism of advocates and the pessimism of critics. Some uses of technology are probably conducive to academic achievement and other positive educational outcomes, while other uses of technology are not” (Educational Testing Service, 1999, p. 1).
Conclusion

No matter what educational tool is used, "most school teachers and college faculty will probably acknowledge that their best students are those who, while engaged, are also willing to probe and to challenge" (Green, 2000a, p. 1). The impact of technology has not been fully researched, but we have continued to prepare our students, utilizing technology, to live in an Information Age (Cooke, 1995). Although technology use in schools has grown (Tomei, 1999), positive change in our learning environments will not happen quickly, and change will evolve over time (Mehlinger, 1996). But Snider (1992) wrote that computer technology will eventually "dominate our consciousness and help us define reality both in and out of school" (p. 316). Nonetheless, computers as presenters of information cannot be matched by human beings (Mehlinger, 1996), because human brains remain "the best pattern-finding machine there is" (Koller, 1996, p. 189).

Teaching has not and will not completely change. It remains a "hand-to-hand, face-to-face encounter" (Snider, 1992, p. 316), but faculty can be aided by technology: I believe that the successful teaching of English in the twenty-first century depends on our realization that we are teaching a 'wired' generation, students whose cognitive mapping renders them not only fearless of but also fascinated by computer technology. We can no longer accurately speak of 'computer-assisted' classes if we implement technology to the extent of a laptop school. The changes I am advocating are deep; they are far more penetrating than showing the film version of a novel to 'enliven' our teaching. We cannot let our
own fear and ignorance point the way; instead, we must ‘move over’ and learn from and with young people in a mutual quest for knowledge...As teachers entering the next century, our love of literature will stay the same, but the way that we teach it must change forever (Civello, 1999, p. 93).

Technology might aid us, but as Reimer (1977) suggested, “Unless people enjoy, in the main, good human relationships, they can neither be educated nor educate themselves” (p. 23). I have reviewed the literature on technology and education in Chapter II. In Chapter III I will examine my research methodology.
CHAPTER III  
METHODOLOGY

This research project has been conducted and analyzed in a qualitative research format guided by the research question, “What is the sense students at Notebook Computer University (NCU) make of learning on a notebook university campus?” My conclusions are based upon interpretations of the collected data.

Sections included in Chapter III include an overview of qualitative research methodology, descriptions of the setting and participants, data gathering and analysis techniques, and the timespan of the project. In addition, two figures are included in this chapter to assist the reader in visualizing the coding and categorizing process, which resulted in identifying patterns and assertions.

Qualitative Research Methodology

Qualitative research is a method that relies on a few participants and many variables, where researchers spend an extensive amount of time in the field observing, writing field notes, interviewing participants using primarily open-ended questions, and perhaps reviewing documents through which researchers gain an “insider perspective” (Creswell, 1998, p. 16). Maykut and Morehouse (1994) write that the process of indwelling, or existing within the environment as a participant observer, is also reflective in nature. Researchers participate in, then remove themselves from, the study and reflect on the meaning of their experiences. Participants are observed in their own
settings, and researchers continually journal about these and other observations during
the course of the project; their perceptions often become valuable additions to their
work. Qualitative research assertions are not as widely generalizable as quantitative
research results; however, "rich, thick description...enables readers to transfer
information to other settings and to determine whether the findings can be transferred
'because of shared characteristics'" (Creswell, 1998, p. 203).

Giacomini and Cook (2000) wrote that there are "four essential aspects" of
qualitative research:

First, the participant selection must be well reasoned and their inclusion must be
relevant to the research question. Second, the data collection methods must be
appropriate for the research objectives and setting. Third, the data collection
process, which includes field observation, interviews, and document analysis,
must be comprehensive enough to support rich and robust descriptions of the
observed events. Fourth, the data must be appropriately analyzed and the
findings adequately corroborated by using multiple sources of information...
(p. 357).

A qualitative research project begins with a concept that researchers would like
to understand. They do not look for a cause and effect relationship or a comparison of
groups, as would be expected in a quantitative research design. In planning a
qualitative research study, researchers plan "a general approach to the study; a detailed
plan would not suffice given emerging issues that develop in a field of study"
(Creswell, 1998, p. 18). In a carefully planned and executed qualitative study the
researcher acts as the instrument (Maxwell, 1996), inviting participants to discuss a particular area; however, only participants know what is most important to them and why. Qualitative researchers may guide or influence the direction of the conversation, but participants are fully involved in discussing their particular grasp on the subject at hand (Wenger, 1999). Where quantitative research questions attempt to answer questions, qualitative research questions attempt to understand, and “tend not to ask whether or how much but rather to explore what, how, and why…[and] generate narrative accounts, explanations, typologies of phenomena, conceptual frameworks, and the like” (Giacomini & Cook, 2000, p. 357).

Just as quantitative research methods are deductive and designed to test researchers’ hypotheses, qualitative research methods are inductive and designed to “offer insight into emotional and experiential phenomena…to determine how, what, and why” (Giacomini & Cook, 2000, p. 357). Qualitative research is based on a phenomenological position rather than a positivist one, exploring the “structures of consciousness in human experiences” (Polkinghorne, 1989, p. 51). This method “generally examines people’s words and actions in narrative or descriptive ways more closely representing the situation as experienced by the participants” (Maykut & Morehouse, 1994, p. 2).

Participants’ knowledge is the “meanings people make of it; knowledge is gained through people talking about their meanings; knowledge is laden with personal biases and values; knowledge is written in a personal, up-close way; and knowledge evolves, emerges, and is inextricably tied to the context in which it is studied”
(Creswell, 1998, p. 19). The qualitative research philosophy rejects the notion that there is a single reality, knowledge, or truth for participants; rather, multiple truths exist (Emerson, Fretz, & Shaw, 1995). Qualitative research attempts to represent participants’ knowledge as they understand it (Mays & Pope, 2000) and although there may be subjective differences which exist within participants’ understanding, “there is an underlying reality which can be studied” (p. 50). Seidman (1998) writes that telling stories is a participant’s way of making meaning; participants select details of their stories to share with us. “Every word that people use in telling their stories is a microcosm of their consciousness” (Vygotsky, 1986, p. 236).

The researcher, following an extensive period of time in the field, transcribes and analyzes the voluminous field notes. Creswell (1998) noted that analyzing data is a lonely process as the researcher struggles with the challenging task of coding and categorizing, of looking for patterns and making assertions. But when the task is completed the researcher writes a research paper, a detailed view of the topic, and includes the voices of the participants through their own candid remarks. Readers should almost experience being in the setting with the researcher (Creswell, 1998).

House suggested that no value-free or objective social research exists. Although research has come to mean “true, factual, and real” (Maykut & Morehouse, 1994, p. 20), both quantitative and qualitative research methods are initially founded on researchers’ hunches, and we know that researchers are not always objective, but rather are biased in their selections of the information they will attend (Nisbett & Ross, 1980; Turk & Salovey, 1988). Researchers are often thought to stand objectively outside the
study with their values carefully suspended, but researchers cannot fully remove
themselves from their own biases. Their perception of the research question, the
literature currently published, the research design, and the questions asked of
participants might all be biased and therefore problematic for researchers (Wenger,
1999) naive enough to believe they have no prior impression about the topic
undergoing investigation. In this study, by making my personal valuations known I
account for any biases I might hold.

If qualitative research seems subjective, why should this method be considered
scientific research? Although there is no way to completely erase the possibility of
errors occurring in a qualitative project, there are strategies that will verify (Creswell,
1998) this type of research. Researchers looking for patterns that support overall
interpretation of the project might use triangulation, corroboration between two or more
different sources of data. Peer review provides an external check on qualitative
research (Creswell, 1998). Bloor (1988) suggests member checking is also part of the
process of error reduction. Member checking (Lincoln & Guba, 1985; Mays & Pope,
2000; Seidman, 1998) requires that researchers' accounts are compared with the
accounts of participants and establishes a level of agreement between the two
interpretations. Anc in addition to triangulation, peer review, and member checking,
clearly outlined data collection methods, openly examined researcher biases, and the
effect of personal characteristics which might affect the outcome of the study, need to
be revealed to readers (Creswell, 1998). Peshkin (1991) suggests his own subjectivity
is a trap to be avoided by his examination of "my own untamed sentiments [which I]
have sought out and served up as data” (p. 293). But “recognizing personal ties to the study you want to conduct can provide you with a valuable source of insight, theory, and data about the phenomena you are studying” (Strauss & Corbin, 1990, p. 42).

Creswell (1998) wrote that, “phenomenological analysis requires the researcher to state his or her assumptions regarding the phenomenon under investigation and then bracket or suspend these preconceptions in order to fully understand the experience of the subject and not impose an a priori hypothesis on the experience” (p. 277). In my particular case, I began this research project knowing students were off-task in the university classes I taught, but I suspended my preconceived notions until the students themselves could indicate how much time they spent off-task.

Another strategy to verify qualitative assertions and interpretations is including and examining disconfirming evidence because “deviant evidence analysis helps refine the analysis until it can explain all or the vast majority of the evidence under scrutiny” (Mays & Pope, 2000, p. 50). These authors also strongly suggest that researchers include a wide range of participants’ perceptions. In this manner no one group of participants will ever be presented as the sole majority, or truth, in the research project. Ethical considerations should play a major role in every qualitative research design (Maxwell, 1996).

Minimizing errors and biases and ensuring rigor are necessary in any research project (Yin, 1989). In this study, the following activities lend credibility and truth to the project (Lincoln & Guba, 1985) and make my research process “transparent” to the reader (Maykut & Morehouse, 1994, p. 146):
1. Inductive research methods guard against preconceived notions (Bogdan & Biklen, 1982). Although I myself had taught students who used notebook computers in classes, observations in other classes and areas of the NCU campus (including student lounges, hallways, and campus grounds) permitted me to see the widespread use of notebook computing on this campus. I engaged in purposeful sampling; that is, all interviewees were selected with regard to age, gender, division of study, seat location within the classroom, and self-reported grade point average, allowing the widest variety of participants possible. Varied seat location from which to observe in the classroom was considered, as notebook computer screens were only visible by those seated very close to, or directly behind, the students under observation.

2. Prolonged observation of the groups (Creswell, 1998) permitted a global view of how students used technology. The majority of my observations occurred over two semesters in two different divisions. In the spring of 1999, I observed a 50-minute course once per week for 16 weeks. In this course, “Course #1,” notebook computing was utilized as if students were already familiar with classroom notebook computing. In the spring of 2000, I observed a weekly one hour and 40 minute course, “Course #2,” during which time students were instructed on how to use their notebook computers for a variety of purposes. Other classrooms were also observed as I followed students to their other classrooms to get a broader understanding of how students used their computers during the course of their day.

3. Research questions emerged from the data (Maxwell, 1996). Questions remained adaptable to where the research led. I began with broad-based interview
questions which resulted in the participants' perceptions of the topic at hand. I further clarified their answers when necessary, and as perceptions became remarkably similar I focused and modified my questions to inform my research.

4. Triangulation of the data was implemented (Creswell, 1998; Maxwell, 1996). Data were compared across observations and field notes, interviews, university documents, and member checks.

5. Member checking (Maykut & Morehouse, 1994; Seidman, 1998) requires that researchers produce a recognizable reality by inquiring whether researchers have represented truthful findings. I frequently communicated with interviewees via electronic mail (e-mail) or met briefly in person when questions emerged or clarifications were needed. My conclusions were discussed with several interviewees to be certain the study reflected their experience and would be considered valid.

6. Researcher memos were incorporated into the data (Emerson et al., 1995; Maxwell, 1996). My personal memos reflected on thoughts and emerging issues becoming relevant to the study as the research was in process. Memos allowed me to return to issues for further expansion or clarification.

7. Feedback was solicited from colleagues (Maxwell, 1996). Actively soliciting feedback from two trusted peers assisted in identifying potential biases and assumptions and challenged me in areas where my logic might have been weak. One peer was familiar with the research site, the other unfamiliar, but both were of value in the research process.
8. Simple statistics were utilized (Anastasi, 1988). I determined the significance or insignificance of student responses to affect cards by examining the frequency of response to each card during interviews.

Qualitative research is not for those lacking patience and tolerance for ambiguity (Creswell, 1998; Dingwall, Murphy, Watson, Greatbatch, & Parker, 1998); but for those who can withstand the lonely, and often frustratingly long, hours analyzing voluminous data, a qualitative research design may well be suitable.

Description of the Setting

The setting of this study was a small, rural, “notebook computer” campus located on the Great Plains. This university’s 60-acre campus includes 18 buildings. The most recent enrollment count available, during the fall semester of 2000, indicated there were 644 full time equivalent students enrolled with a total headcount of 776. The NCU Office of Admissions and Records confirmed that there were 593 students registered as full time. During the same semester, a total of 63 faculty members were teaching; of those, 40 were full time faculty members and 23 were part-time faculty members. NCU’s Academic Affairs Office indicated just over one-third of the faculty were part-time during that semester. Notebook Computer University reported small class sizes; two-thirds of their offerings included classrooms with fewer than 20 students and an overall student-to-faculty ratio of 14 to 1.

The NCU Office of Admissions and Records verified that Caucasian students significantly outnumbered other races on this campus, and the same office provided other race-based information. The race breakdown of United States citizens on the
NCU campus during the 2000 academic year was 92.8% Caucasian, 2.1% Native American, 0.8% Hispanic, 0.6% African American, and 0.3% Asian. In addition, there were 3.2% of students in the non-resident category, and 0.3% were unreported. Twenty-five students held "non-resident alien" status. Of those, 21 were Caucasian, two were African American, one was Native American, one was Hispanic, but there were no Asians.

This university had six divisions: Business and Computing, Communication Arts, Health and Physical Education, Humanities and Social Science, Science and Mathematics, and Teacher Education. Notebook Computer University offers [many] programs of study mainly in [nontraditional/multimedia] classrooms. Notebook Computer University had traditionally been known as a teacher's college; however, Faculty Senate minutes recorded that with the adoption of the notebook initiative, the area's perception of NCU had become similar to a "tech school." Each student in every division paid a $427 technology fee for one semester's use of an NCU notebook computer for his or her use in and out of class.

Description of Participants

Interviewees consisted of 20 student participants selected from two courses, Course #1 and Course #2. During spring semester of 1999, I observed Course #1, which included 20 Caucasian, three African American, and two Hispanic students. Of these students, 16 were male and nine were female. I invited five male and five female students to participate in this research based on gender, race, and seat location within the classroom. Three male invitees refused to participate, including the Hispanic
student, so I replaced those three students with other students in that class. Another male Caucasian simply did not respond. Because Course #1 did not include any nontraditional students, categorized as age 24 and above, all Course #1 interviewees fell into a traditional age category ranging from 19 to 23 years. The final sample of 10 students who agreed to be interviewed from Course #1 were traditional age students and included three male Caucasian students, six female Caucasian students, and one male African American student.

Course #2, observed a year later during spring semester 2000, consisted of 22 students ranging in age from 20 to 45 years. Of those students, all 22 were Caucasian, including seven male and 15 female students. Two of the students in Course #2 were nontraditional students, one male and one female. Course #2 had two male students who were invited to participate but refused, complicating the already low, male, potential interviewee pool. In addition, one male student did not regularly attend, and one Course #2 male student had already participated during Course #1. The final sample from Course #2 included two male Caucasian students and eight female Caucasian students. Of the students in the second sample, both the male and the female nontraditional age students consented to interviews and their perceptions are included in this research. Every student who participated in the interviews received, at the conclusion of the interview, a 60-minute long distance phone card for sharing his/her time with me. In addition to the students formally included in interviews, I often chatted with various students as I lingered on the NCU campus.
Eight of 40 full time faculty members were invited to participate and all accepted my invitation. This group consisted of at least one professor from every division except Health and Physical Education (HPE). Health and Physical Education, however, was included in observations, and several student interviewees were either majoring in the HPE department or were student athletes. The remaining interviewees consisted of two of four administrators on campus, two staff personnel, and one business representative closely associated with the software industry and "in partnership" with NCU. Totals for participant interviews were, at minimum, 20 hours of (20) student interviews, 17 hours of (12) faculty/staff/administrative interviews, 32 hours of classroom observations, and a half hour interview with one software industry representative.

Why a Qualitative Research Study Was Appropriate for This Study

Although a quantitative research design might have offered participants an opportunity to complete a survey and thus allow me to develop some notion of their experience on a notebook university campus, a qualitative research design made richer sense of students' perceptions of notebook computing experiences in their classrooms. Engaging in long conversations with participants and observing many hours in classrooms, I was able to understand more about participants' attitudes and beliefs associated with notebook computing. Research of this type often unearths unexpected features quantitative designs would not accommodate; moreover, qualitative research designs can uncover areas researchers had not previously thought relevant. Consequently, in some cases, "[qualitative] studies might well yield more useful and
important information than a controlled experimental investigation” (Heppner, Kivlighan, & Wampold, 1992, p. 10).

Data Gathering and Analysis

This qualitative research project utilized classroom observations and personal interviews, field notes from a variety of locations on the NCU campus, archival records, researcher memos, and quantitative data provided by NCU. Classroom observations mainly refer to repeated observations made in two particular classrooms, but classroom observations also refer to observations made while visiting other classrooms on campus, at least one classroom in each division. Personal interviews refer to confidential interviews with students and faculty. Two administrative personnel were also interviewed; however, both opted to leave their doors open or have secretaries in the room or nearby making confidentiality, in those cases, impossible. Field notes refer to observations made during visits to the university and subsequent notes written during or immediately following observations. Archival records accessed for this research study include local newspaper columns written by an administrative member, minutes from various meetings, and copies of other documents provided by individuals on campus to support their perceptions and beliefs. Also included in this category are documents published on NCU’s website. Quantitative data includes research data provided by NCU concerning student satisfaction, use of notebook computers, and perceptions of learning.
Timespan

State Board of Higher Education minutes indicate a technology fee, and thus the notebook initiative, was approved during a 1995 meeting, and this fee was to be assessed to Notebook Computer University's students no later than fall semester, 1997. This study spanned two academic semesters, the first during spring semester of 1999, and the second during spring semester of 2000. Observations and interviews were conducted throughout both semesters.

Data Collection

I began my research into student understanding of notebook computing as a student of advanced qualitative research. During the initial project when I observed Course #1, I requested and received written permission from the division chair and from the professor whose class I would observe. Both the division chair and the professor suggested I also request permission to study notebook computing from the dean of the university. During a meeting with the dean, I was granted verbal permission to study notebook computing, and the dean was interested in my project stating, "We need more research which will support what we are doing here." When I began the second semester of research, I received written permission from the professor in Course #2 as well.

Formal interviews were conducted three times with the professor of the first course, and twice with the professor of the second course. I conducted at least one formal interview with each of the 20 students in the courses I observed, but I also contacted students for brief meetings or clarification when necessary. I selected
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interviewees based on gender, age, and location in the classroom, attempting to select a wide variety of students. I initially contacted students via e-mail after having received each student's e-mail address either from students personally or from the “technology assistance center.” Interview times and locations varied depending on the needs of the participants, but generally each student met privately with me in an office on the NCU campus, and I audiotaped interviews for accuracy and for transcription purposes. In addition, I shadowed at least five of the Course #2 interviewees to their other classrooms to gain a fuller understanding of their classroom technology use. I alone selected interviewees; there was no faculty input into whom I would select. Each of the 20 students who elected to be interviewed signed a written consent form indicating their rights as participants (see Appendix A). By signing, students indicated they were over 18 years of age, and age was verified by NCU’s enrollment office via FERPA, the Family Educational Rights and Privacy Act of 1974.

Interviewee's names were coded and known only to me. Consent forms, field notes, and audiotaped interviews were transcribed and all materials were kept in separate locked fireboxes in my home. All research materials will eventually be destroyed, but materials must be retained in the locked file until the mandatory three-year period concludes.

The goal of interviewing participants was to gain an understanding of students' thoughts, attitudes, and beliefs about notebook computing in the classroom. In addition, interviewing allowed me the opportunity to compare my observations with participants' experiences. I was especially interested in talking to students about their
perceptions of how technology helped them learn. As the research progressed, I also became interested in discovering more about how professors on a notebook university campus teach and respond in a technologically rich learning environment.

Questions for interviewees were open-ended and participants discussed issues they believed salient. General descriptive questions asked of students were: *What was your educational experience prior to attending Notebook Computer University? How did Notebook Computer University’s use of classroom technology influence your decision to attend this university? What is it like to be in a technologically advanced classroom? If the state legislature prohibited notebook computer use at all colleges and universities, how would you respond? How does a notebook computer help you learn?* Questions for professors and administrators included: *What was the process undertaken to transform this campus into a notebook computer university? What is it like to work in a technologically enriched environment? What are the benefits and challenges associated with a “smart” university campus?* A question asked of all participants was: *Tell me about a really great teacher. How did he/she convey knowledge?*

In addition to observing and interviewing, thirteen modified word prompts on index cards, each listing a different construct, were used in student interviews (Gershman, 1984). The cards were intended to elicit reflective responses from student interviewees without any particular line of questioning. Students were invited to reflect on any or all of the cards, and the constructs included were “important to me.”
Fieldwork and interviews permitted the opportunity to refine my study. When an observation or interview response seemed generalized, I asked respondents to elaborate on specific instances. In this manner I was able to invite further exploration of interviewees' “evidence” (Rubin & Rubin, 1995) and gain an understanding of how they came to their conclusions. Refined questions, which resulted from emerging response patterns, included:

1. How many classes are you taking now, and of those, in how many are you permitted to make Ethernet connections in your classrooms?

2. What does education mean to you?

3. Tell me about off-task computer use in the classroom.

4. How do you plan to use technology in the future?

These questions allowed me to further explore respondents' attitudes and beliefs concerning classroom computer use, increasing the likelihood that I was gaining an accurate assessment of participants' meanings (Seidman, 1998).

Data Analysis

Creswell (1998) noted that a theory is generated from the phenomenon undergoing study. *The Ethnograph v5.05, A Program for the Analysis of Text Based Data* is a qualitative research software package, designed to facilitate the analysis of data obtained in qualitative research (Seidel, 1998). This software package allows researchers to import word processing files and then code highlighted portions of
interview dialogue or field notes. In this manner, interesting concepts within the collected data are more easily noticed, and coded data can be searched and retrieved for further analysis (p. 1).

Data was collected inductively and imported to *The Ethnograph* according to participant, date, and event. Various references for the study, including persons and a range of documents and transcripts, have been imported to *The Ethnograph*. After careful review and re-review of the data, I have attempted to articulate the results in the form of a narrative statement in Chapter IV (Creswell, 1998; Strauss & Corbin, 1990).

Code words were selected and sorted into emerging categories and then into patterns and assertions. Key code words and categories and their definitions used in this research are displayed in Figure 1.

Qualitative research begins with an intuitive process that leads to a linear process. When I began collecting interview and field observation data and subsequently imported those files into *The Ethnograph*, I noticed that the comments concerning perceptions of education on a notebook computer campus seemed to split into three groups or categories: administration, faculty, and students. Code words identified participants' perceptions as remarkably similar. When I made a visual concept map identifying my codes and categories, I began to notice developing patterns of participants' beliefs or patterns of participants' behavior. From those patterns, hypotheses were generated and tested against the database to confirm or disconfirm the evidence, resulting in my assertions and subassertions. For example, in the student category the code "job tech" was connected to the code "meaning of education"
<table>
<thead>
<tr>
<th>Code Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADMINISTRATION*</td>
<td>references to administration or administrative strategies</td>
</tr>
<tr>
<td>enrollment</td>
<td>improve/focus on enrollment</td>
</tr>
<tr>
<td>niche marketing</td>
<td>a type of marketing or advertising</td>
</tr>
<tr>
<td>“Aha!”</td>
<td>slang word used to designate constantly evolving strategies implemented by administration</td>
</tr>
<tr>
<td>FACULTY*</td>
<td>references about or from faculty</td>
</tr>
<tr>
<td>job stress</td>
<td>faculty tension</td>
</tr>
<tr>
<td>morale</td>
<td>faculty sense of worth</td>
</tr>
<tr>
<td>paranoia</td>
<td>faculty suspicion about administration and administrative strategies</td>
</tr>
<tr>
<td>great teacher</td>
<td>characteristics of great teachers and how they convey knowledge</td>
</tr>
<tr>
<td>human connection</td>
<td>connection to and relationship between teachers and students</td>
</tr>
<tr>
<td>STUDENTS*</td>
<td>comments or observations about students by faculty, administration, the researcher, or students themselves</td>
</tr>
<tr>
<td>off task</td>
<td>using computers for other than classroom exercises while in class</td>
</tr>
<tr>
<td>convenience</td>
<td>student-expressed preferences for ease of communication and uncomplicated research</td>
</tr>
<tr>
<td>learn</td>
<td>student-expressed explanations for how they learn</td>
</tr>
<tr>
<td>job tech</td>
<td>students’ perceptions of their future computer use in the world of work</td>
</tr>
<tr>
<td>meaning of education</td>
<td>definitions of how participants understood education</td>
</tr>
</tbody>
</table>

*Categories listed as all caps and in boldface. (See Appendix B for a complete listing of code words.)*

Figure 1. Emergent Categories and Key Code Words.

...for students, and “convenience” was connected to “library” for research. The “how students learn” code was not connected to any other code because students had difficulty describing how they learn via technology. Many of the other codes related to the student category, “off-task,” “e-mail,” “games,” etc., indicated the other students uses of, or unintended consequences of, technology (Figure 2). It is important to note that The Ethnograph does not sort codes themselves; the researcher must ask the...
Figure 2. Concept Map.
software program to sort specific codes before it will do so, allowing the researcher to look for patterns and make assertions. File output, as generated through search procedures using *The Ethnograph*, supported my patterns and assertions. My assertions, which will be explored in Chapter IV, included:

**Assertion #1: Students perceived the benefits of notebook computing.**

*Subassertion #1a:* Students wanted to keep their notebook computers citing convenient access to technology, ease of communication, and uncomplicated research methods.

**Assertion #2: Students perceived the limitations of notebook computing.**

*Subassertion #2a:* Students noticed that notebook computers were not uniformly utilized in their classrooms.

*Subassertion #2b:* Students indicated their notebook computers were communication tools that could interfere with human interaction.

*Subassertion #2c:* Students viewed off-task computer use as problematic, distracting, or as an addiction.

*Subassertion #2d:* Students could not describe how they learn via notebook computing.

*Subassertion #2e:* Students related education to job training; faculty correlated education to liberal arts.

*Subassertion #2f:* Students, faculty, and administrators did not correlate a good learning environment and great teaching with notebook computing.
Subassertion #2g: Students recognized their learning environments could, in many cases, be improved by removing notebook computers from classrooms.

My aim in formulating and presenting these assertions was to report "rich, actual data, particularly verbatim excerpts from in-depth interviews which are interwoven into and illuminate the discussion of research findings" (Maykut & Morehouse, 1994, p. 150). My research methodology was explored in Chapter III. In Chapter IV I will present my research findings and the data to support my assertions.
CHAPTER IV
PRESENTATION OF FINDINGS

Established in the late 1800's as a normal school or teachers college, Notebook Computer University (NCU) has now been recognized as one of several in the nation to adopt 24-hour notebook computing. The purpose of this study was to gain an understanding of the student experience on a notebook university campus. The data presented here were collected according to the research methods outlined in Chapter III. The descriptions and analysis of the data reported in this chapter result from participants' perceptions of their experiences on a notebook computer university campus. All participants' identities are confidential and as such, gender, divisions, and all other identifiable characteristics have been altered. A faculty and administrative narrative precedes my findings, assertions, and subassertions; although I did not aim to study faculty and administration perceptions, I could not ignore this unexpected piece of the research. I have concluded Chapter IV with a summary of my findings.

Faculty and Administrative Narrative

Although this study's aim was to understand the student experience on a notebook computer campus and not necessarily explore faculty/administrative relationships, faculty morale and job stress issues became so prominent, so remarkably similar, and were discussed in such a visceral manner, that I could not ignore this piece of the research. This section is included here to portray the faculty perception that they were not then, and
not now, "on board" with many of the administrative strategies developed for them. As I previously noted in Chapter Three, qualitative research designs often unearth features of the research that researchers had not previously thought relevant; this is clearly the case here. Faculty perceived a much different experience than did NCU's administration.

Administration's strategies and guidelines for how they would work with faculty and staff were listed on the NCU website, although faculty members indicated they had not experienced working with administrators who abided by their own guidelines. Moreover, the faculty I talked to were not aware of administration's "guiding principles." Nonetheless, Notebook Computer University's web site stated that the NCU administrative team "has personally endorsed the following statements of principle describing how the campuses want to work together and with others. We hold the following expectations of ourselves and everyone else on campus:

Trust:

1) I am worthy and trusting, completely open with information, glad to explain any decision I've made, interested in the ideas and suggestions of others.

2) I reject the use of fear or coercion. I do not criticize my colleagues in their presence or elsewhere.

3) I ensure that those who are affected by a decision have meaningful opportunities to participate in the decision. I do not make decisions when others are in a position to do so. I enable others to make their own decisions.
Useful Work:

2) I speak up when I am asked to do useless work, and I do not ask others to do useless work. If I cannot explain the value of work I ask others to do, I will withdraw the request.

Improvement:

3) I have high standards for myself and seek feedback on how I can improve. I ask others to do the best they can do. I do not evaluate them; they evaluate themselves.

Support:

4) When I am in a managing role, I give clear and helpful guidelines and support the work of others. My job is to help them do their job.

5) I help my colleagues solve their problems; I do not solve their problems for them.

6) I see my colleagues as valued individuals and take an interest in their happiness. I do all I can to ensure that work is both satisfying and fun. I celebrate the freedom of the human spirit.

7) My job is to say “yes” to others. Presented with a request I cannot support, I do not say no. Instead, I inquire into how my concerns might be handled, until either I am satisfied or the presenter sees the need to change or withdraw the request.”
Paranoia

The guiding principles for the ways in which administration would work with faculty were not synonymous with the ways faculty perceived their experience at NCU. The references to job stress and low morale were apparent in the first faculty interview. I asked a professor to tell me what it was like to work at NCU, and his response became the mantra for many of the faculty I interviewed: "You don't want to work here!" Of course I needed this participant to provide examples of how he had come to his conclusions, but like most faculty, this professor was first deeply concerned that "administrators might be able to identify me." He suggested, "The walls have ears." Said another, "This is not a happy place to work." In fact, seven of the eight professors interviewed for this project would not speak with a tape recorder running and would only allow me to take notes. One faculty member refused to meet with me on campus. Only one faculty member allowed me to audiotape his interview, and that interview was conducted in the professor's office on campus. When I asked the audiotaped professor how he differed from others who generally preferred not to be recorded and labeled themselves "paranoid," he noted he was:

no longer interested in doing things to promote this institution because I've got to take care of myself first....See, my great revelation is that I don't care what I say anymore because I'm going to have to determine my own future. I'm not going to tie myself to [NCU] so I'm a lot less concerned about saying things that people might disapprove of....I'm not going to count on them being around anyway. It is a them vs. me now. No, it's [faculty] operating independently--it's not
necessarily an adverse relationship—but it’s. I feel more like an independent contractor now.

Many of the faculty members in this study said they would not complete faculty surveys prepared and distributed by administration because their identities might become known. One said this: “A couple of years ago Dr. A sent out a survey and the response rates were so low that [administration] couldn’t use the surveys in any meaningful way. [Faculty] were afraid that their surveys would be traced back to them.” Another faculty member suggested that, “It’s true people are afraid to speak out about the lack of the emperor’s clothing….Anytime anyone speaks out against whatever [the administrators] want it is thrown back at them that ‘they’re hurting the college. You’ll close our college.’”

In stark contrast to faculty being unwilling to be audiotaped, both administrators, Drs. A and B, readily agreed to interview with a tape recording running. These administrators talked to me with their office doors open, and in one case a secretary sat in the same room while Dr. B and I talked. In that situation not only could the secretary overhear our conversation, but voices of several other people who entered the office were audible on the audiotape as well, indicating many people could overhear us. In the second administrative interview the office door was left wide open with an administrative secretary sitting at her desk just outside the door. These two interview situations were diametrically opposed to the very guarded, “paranoid,” confidential nature of faculty interviews.
Aha!'s

The Aha!’s were a series of administrative strategies or implemented ideas imposed on faculty that, according to the faculty in this study, either never got off the ground or were sometimes dropped by administrators shortly after implementation. Each faculty member I talked to indicated that the Aha’s were the brainchild of Dr. A., and that it was a term that she regularly used on campus. “Aha!” was, to faculty knowledge, not an acronym for anything in particular. The word Aha! was attached to any strategy or implemented idea Dr. A. considered exciting.

The Aha!’s were described by faculty as Aha! #1, Aha! #2, etc., and faculty were cynical about the Aha!’s. One faculty member noted, “Customized learning, that was an Aha!. We never did get a definition of what that really was.” Another faculty member tried to list all the Aha!’s he could remember: “When did [Dr. A] come here? 1993? 1994? The first Aha! was cooperative learning, then Total Quality Management (TQM), then the Langford competencies...then came the technology/notebooks...I’m sure there are more!” Another faculty member echoed, “We’ve not had a completed project since the year Dr. A began work here. One faculty member indicated he was tired of the “string of incomplete projects, from TQM to laptops, to information systems, to on-line courses, to software partnerships. We never really know what is going on here.” A faculty member said that he was “tired of [Dr. A’s] string of Aha!’s that never pan out.” Yet another said, “Dr. A has announced that he’ll soon be having another Aha! coming down the pike. I’m too tired for another one of his Aha!’s.” One faculty member echoed: “The Aha!’s...we change directions almost monthly. It’s unstable.” Perhaps a
faculty member best summed up the Aha!’s: “I’m tired of the Aha!’s. I just want to do what I do best. Teach.”

Faculty were remarkably similar in their perception that the fundamental problem at NCU stemmed from varying administrative strategies: the Aha!’s.

There are lots of things other than the notebook initiative where we do get things started and never, and never really get them done. And that has had some negative impact on even this division....(Such as?)....Well, have you heard about the Aha!’s? We have so many, lots of great starts to things that never get past stage one, because as soon as we start thinking about them the next day there’s a new Aha!, and that’s not the next day, but seems like the next day. And there really is no direction. there isn’t a direction for this campus. And I do think [Dr. A] is a major problem with that.

The sheer number of initiatives and Aha!’s on campus also seemed to confuse Dr. B. When I asked the interview question, “Tell me about the beginning of the notebook initiative, how did the vision emerge?,” he said, “Initiative. Which do you mean?” (The notebook initiative.) “Notebook initiative?” Although this administrator had been e-mailed a copy of the questions I was to ask, including the aforementioned question, he was puzzled about which initiative I was interested in discussing.

Dr. A acknowledged that his strength was brainstorming ideas and strategizing ways to market and improve the university. He noted that:
I can’t say it succinctly, but generally speaking I think I’m a change agent—and I envision future states—and I do it based on input from the present and try and help the people in the present move to those future states...

But it was because of this constant move toward future states that one faculty member noted, “Dr. A is a great thinker, reader, organizer, but he has no idea of what will work and what won’t. Thusly, he spends a lot of time in hibernation reading and then comes out with pie in the sky type of ideas.” But Dr. B defended the constant flux on campus and said it should be expected as a routine part of any administrator’s job and not necessarily understood or experienced by faculty:

As a faculty member, you don’t work with the state board [of higher education], you don’t work with legislative groups, you don’t see all the statewide big picture, why [the SBHE and the legislature] are stressing these things, why they want campuses to do this….It’s really the administration’s job to look at the bigger picture and try to relate that to what we’re doing here. Try and weave that into the curriculum.

At least one faculty member suggested the legislature may not have a complete picture of the notebook initiative. In noting what he called the legislature’s headlong rush to technology, he was perplexed and said, “The courses anytime, anyplace. The legislature is buying it.”

The faculty perception that administration was not loyal or supportive to them was evident in faculty and administrative interviews. All of the faculty I interviewed stated their perception was that IT personnel were being brought in at higher salaries than
faculty who had given decades to the university—and this caused many faculty to find fault with "equitable" salary schedules and a lack of support for traditional faculty. I asked one administrator how he justified paying IT personnel more money than faculty in other departments who had been at NCU for years. Dr. B, possibly revealing his professional bias, responded, "Yeah, it's a consideration. It's (exasperatedly), you don't pay somebody to paint your house the same as you pay your doctor or your dentist, though."

Dr. A noted that equitable salary schedules were one of the most challenging areas associated with notebook computer universities. He remarked, "Challenges [of being a notebook computer university?]. IT staffing....the whole thing really has forced us into [a tight] market.... It's not a comfortable thing to go through this." I clarified that he was saying IT personnel earned more money than faculty who had in some cases given decades to the university, and that it wasn't sitting well with other faculty. He responded, "Right," and quickly changed the subject. But Dr. B had hopes the university would eventually find a solution to this complex problem:

Hopefully we can keep [IT people coming to work here] and hopefully we'll be able to train more of our own. We have [a faculty member] where we're allowing her to get her advanced degrees and keeping on and teaching her and, well, there's ways to do it. But it's a challenge. And, like anything, the market will loosen up after a while.... [The IT personnel market] can't be this hot forever.
Low Morale

Although trust was listed as a “guiding principle” at NCU, lack of trust between faculty and administration seemed to be a large part of the job stress and morale problem. When I asked a professor if he trusted administration he remarked, “Oh, no! [When you go up against administration] they light little fires and put you on the hot seat. It’s sophisticated and subtle.” Another faculty member dropped his voice to a whisper and noted, “I don’t trust Dr. A...[he] lied to me. I don’t trust him. I absolutely don’t trust him at all. It’s as though he’s pulling crap out of the air. What am I going to say? ‘You’re a damn liar?’ That doesn’t endear you too much.”

Perhaps administration had suspected there was a problem with faculty morale. All the professors I interviewed said there had been a campus-wide faculty meeting where Dr. A had asked for a show of hands indicating how many were afraid to express themselves on campus. One professor reflected on that meeting and said, “Many more hands went up than I’d expected, and I know that there were people there that were too afraid to put their hand up. (What were they afraid of?) “Afraid of losing their jobs,” came the sad reply.

A faculty member noted his own low level of morale stemmed from the fact that he “Is sick of hearing from an administrator about how NCU’s graduates are currently making more money than the professors who taught them.” Dr. B would “proudly proclaim that [former students] make more money than tenured, long term professors. I told Dr. B that I don’t want to hear this again. We are all perfectly aware of the slave labor that exists on this campus.”
Even a faculty member who was initially excited about the notebook initiative stated that he was frustrated by administration. This professor’s belief was that administration was not solidly behind the notion that there be high expectations for students. “[Administration] wants us to dumb it down, dumb it down, dumb it down, until I’m at a junior high level...the [major universities] think we’re teaching high school. I say they’re wrong! I’m teaching on a junior high level!” In another case a faculty member said, “[An administrator] was putting pressure on [my division chair] to waive several students out of my [class] because it’s too hard. They let one person waive it already!”

**Top Down Management**

Dr. A noted that the transition from traditional liberal arts campus to a notebook computer university was not exactly straightforward and did not have overwhelming support from faculty:

> My perceptions of various peoples’ response to the notebook initiative....? As we went through the decision-making process my sense is that there are, were, among the faculty, there were a few interested people and a lot of people who didn’t, I guess maybe I’d say they, it’s not that they didn’t care, but they didn’t think [the notebook initiative] was going to gore their ox, and they figured if it was a train on the tracks they weren’t going to get in front of it. We’ve had some [faculty] who are just really way out on the edge of this exciting, pedagogically exciting, things here, and I don’t want to minimize that...I don’t think they dampen the
activity of the people who want to pursue [technology], but they dampen the atmosphere in resisting.

One faculty member noted that, “everything here comes from a single agenda at the top.” In fact, another faculty member noted that he had had a discussion with Dr. B about how decisions were made, about how “top down decisions were the easy way to rule. Yeah, that’s a good analogy—like lecturing is easier than doing cooperative learning activities.”

I initially thought one faculty member might give a different perspective on the top down nature of NCU administration because he had openly stated he was not paranoid. His description of the NCU work environment: “[It’s] bureaucratic, excessive micromanagement, threatening, over stressful, unreasonable workload, paternalistic, and undemocratic. Our work environment is put in place by administration. There has been a steady decline in camaraderie, more sniping and short tempers, and clashes with colleagues...[Administrative] decisions come from the top down. Meetings are lip service, then the edict.”

Several faculty participants described an example of administration’s top down ruling. During a campus-wide faculty meeting called by administrators:

Faculty were supposed to meet in groups and brainstorm ideas that could benefit the university. One administrator moved through the faculty groups...[while] the other administrator sat on the sidelines...But after the meeting the pronouncement came from administration that they had looked at faculty ideas but faculty were told that instead the campus would be moving in the direction of Information Systems Technology.
Faculty participants in this research study were concerned that administrators, to help guide the university in their endeavors, had formed a new "academic task force." Several faculty members reported that division chairs "had requested to be a part of the group but were barred." Another professor noted that, "I don't know what, exactly, the task force is supposed to do except maybe divide and conquer the chairs." One faculty member's sentiments about the IT task force were typical of the rest of the faculty I interviewed:

The IT task force is fueled by [Drs. A and B]...[and] is made up of vulnerable [to administrators] and non-tenured people. They were handpicked people. Some [faculty] asked to be on it, and were denied. The membership ranges from computer addicts to the vulnerable who can be appropriately persuaded. There is no room for dissent on the committee.

Seven of the eight faculty members I interviewed perceived that the IT Task Force was a committee formed and imposed by top administrators to rubber stamp administrative strategies and ideas.

This faculty and administrative narrative reviewed the level of disenfranchisement faculty perceived on the NCU campus. It is not clear what role faculty experience played in students' perceptions of learning at a Notebook Computer University.

Findings: Assertions and Subassertions

The assertions and subassertions described below are from the perspective of the participants in this study (Figure 3). Characteristics of participants have been changed to protect their privacy, and all italics indicate a participant's emphasis unless otherwise
noted. My final conclusion, based on participants' perceptions, was that students were ambivalent about notebook computing and their "constant access" to technology:

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Figure 3. Findings: Assertions and Subassertions.
Assertian #1: Students perceived the benefits of notebook computing.

The following assertion and subassertion relates to student expressed preferences for notebook computing.

Subassertion #1a: Students wanted to keep their notebook computers citing convenient access to technology, ease of communication, and uncomplicated research methods.

Convenience

Mehlinger (1996) noted that people throughout time have used technology to make their lives richer and more comfortable. The students at Notebook Computer University would add that they used technology to make their lives more convenient. One student’s response was typical:

It’s really a hassle [at other universities] when there’s [sic] 15 computers on a campus and there’s 700 students and it comes to semester time and everybody’s trying to type all the papers, and everybody’s trying to get all the assignments done, and it’s just kind of convenient when you have your own computer. If you live off campus you can still type it up and bring your computer to school and print off [the assignment] when you get on campus.

Indeed, many students preferred to work on assignments when it was convenient for them, not when computer lab time was available, and many students seemed to complete projects “at two or three in the morning”; “[With notebook computers]...you can write that paper at two in the morning...or five in the afternoon, or eight in the morning, or whenever you want to write it”; “I’m the type of person where I’ll be sleeping, and I’ll...
wake up and write a three-page paper that's due in two weeks. I can't sit down and say.
'Ok, I'm going to write this paper now,' and I go and get my materials and write the
paper. It just doesn't work for me that way." A student recognized his college
experience was more convenient than his brother's experience, even though they had
both attended the same school but in different years:

You can sit in your room and do your homework at three o'clock in the morning
if you want to. With a lab, they close at 11 o'clock or whatever. I don't even
know! Because when I came here it was [notebook computers] right away. But
when my brother went here, they closed [the lab] at [midnight] or whatever, and if
you're not done, you're in trouble.

Another noted that, "I'm used to getting up at four a.m. to finish up something. You
know with a lab room you can't do that. It's not open 'til, say eight." One student could
no longer imagine life without the convenience her personal notebook computer affords:

I can't imagine not having [my computer]. I was just giving a tour today to a
student from [another college] and she said that in her dorm there were six
computers and a 24-hour lab, so that it was open to everybody. And there were
people e-mailing when she was trying to type a paper, and she said it was
irritating. And I couldn't imagine doing that because I can sit in my room, type
my paper, print it from my room, run down to the lobby and get it.

A Computer Information Systems (CIS) transfer student who had experienced the
technology system available at another state institution indicated that "I know at other
schools you have to sit to get into the lab and wait in line forever, and I just can't
imagine... I would gladly pay whatever because [having constant access to a computer] is a great convenience for me. It really is.” A non-traditional student who lived off campus also benefited from the convenience of technology: “It’s easy access, because obviously when you live out in the middle of nowhere and you need to write a paper you need to find information. I can’t just up and go at nine o’clock at night to a library. I wouldn’t even know what library was open at nine o’clock at night... [instead] I can just connect and get what I need.”

Students also believed working in their career fields would be made easier via the convenience of technology. One said:

Teachers more and more now are incorporating the Internet. I’m not so much a big fan of the Internet. But PowerPoint presentations, things like that... That type of technology is a lot easier than, say, where the teacher has to sit down and write everything out, and put it on a transparency, and put it onto the overhead, or write things out on the board, or make 50 copies and hand them out to the class by hand, whereas now they can send it by e-mail or they can put it on their home page and you just fire up your home page during class.

Ease of Communication

Students adamantly stressed their preference for ease and speed of communications with their instructors via e-mail messages. Students suggested that e-mail is “pretty beneficial... e-mailing your friend to tell them what time you’re going to leave for the game that night, or talking back and forth with instructors if you have questions”; “It’s nice to be able to get information quickly, like when [the professor]
wants to tell us something he can just e-mail and we'll know"; "Having a computer at your fingertips is really convenient...teachers communicating with students, class is cancelled, you know, it saves you a lot of trips especially if you live off campus or are commuting..."; "E-mail, I use it a lot. Everything from communication with people to—our coach uses it a lot for [names a sport] purposes"; "My schedule is so hectic that I often don't have time to run to [a professor's] office and say 'Here's what's happening.' So it's easier just to send them a quick message. Or if something comes up last minute..."; "Since I'm off campus, I really like the e-mail system. It's easier and nicer to e-mail."

Students kept returning in our conversations to the ease and convenience of e-mailed communication. They viewed e-mail as unparalleled: "I guess [e-mail's] just a convenience type thing where you're across campus and [you send a friend who is across the campus] a note that says 'What are you doing for lunch?' one of those type of deals." I asked him why he did not just pick up the phone and call his friend, and this student responded, "A lot of times people will grab lunch and go to the [names room where students have Internet connections] or the library to check out stuff on the Internet or play some games on their computer. You [are more likely to] catch [friends] on-line."

Students suggested it was also convenient to receive class notes from professors via PowerPoint slides. "[The instructor] sends out the PowerPoint slides with a section to put little notes so you can just bring up the slides and print them and those notes, too...I think that's a big advantage"; "The lectures seem more varied, and [I like PowerPoint because] sometimes I can't read the teacher's handwriting." A third student indicated:
In [a course] where you get PowerPoint slides is nice because then you have a copy of it instead of just sitting in class and looking at it and having to write everything down. That aspect is nice, but the teacher could also, without the computer, copy them and give them to you...[the teacher] wants you to print a copy off in case, because [the e-mail system] goes down from time to time, and he wants you to have a copy.

A student believed professors should make more use of PowerPoint than they already were: “I think it would be a cool idea if all the professors had at least a Word document or PowerPoint or something written up for what went on in that class period, so if you’re really ill or if you had surgery or something, they have a record of what happened that day so they can just send it to you.” While some professors used PowerPoint to present material, I found that professors ordinarily used notebook computers to beam information on a screen. In effect, faculty members were using PowerPoint slides in the same manner they would use a chalkboard and short notes, employing the transmission method of instruction (Miller & Seller, 1985). As previously noted, Foa et al. (1999) indicated it was common for teachers to start out by “patching” technology into their teaching strategies. Teaching does not just involve “the transmission of knowledge from teacher to learner, but rather is the interaction of teacher with learner” (Borich, 1988, p. 27).

Research

The students interviewed for this project indicated they enjoyed electronic research because it allowed them convenient access to references: “I think that’s nice,
too, that instead of having to go out to the library you can just do it from your own computer, be able to go to [the library's] site"; "And then with OSIN (Online [State] Information Network) in the library you don't even actually need to go there to get or search for the books. You can search for them in your room and write down the numbers, run over to the library and get them and check them out. It's just so convenient"; "Right now [my research] is all done with the computer."

Although students stated they regularly made use of search engines such as "Yahoo!" they could also "go on NCU's home page to the library, go to OSIN, pick the library you want and just type in a regular search like you would on Yahoo!" A student pursuing an elementary education degree suggested there were many sites worthy of selection, not just scholarly sites: "There are cool web pages for elementary science teachers, like Bill Nye, the science guy. You can get cool projects and stuff off there. That's good stuff." But students apparently had an understanding that "the cool projects and stuff" presented on the World Wide Web might not be scholarly or refereed work. "I suppose I rely more on what the Internet says for information rather than a book, which to some extent is good, but you know can be detrimental, too. Because you're not actually getting to look something up like in a library. It has its good points and bad points." Another student said that:

I guess sometimes with the web it can be a great tool for researching, but I think people often forget about the library. And when you're trying to search for something on Yahoo! [or other search engines] you'll find the articles you need, but then there's a bunch of other personal pages that just happen to have a term in
them that you were researching. So it's kind of a lot of garbage sometimes, too, and that can be distracting.

Although students' computers were issued with OSIN loaded on the desktop, they consistently indicated the OSIN system was unacceptable or complicated. A student said:

To tell you the truth, I haven't used OSIN since I've been here. I used it a little bit in high school... the research papers that some of the teachers ask for now, they ask more for Internet sources and it's a lot easier. Just get on a search engine, type in what you're looking for, and browse through the Internet. So OSIN, I don't do a lot with OSIN.

Assuming students had been freshmen at NCU and had taken freshman English, students had been trained in using the OSIN system. A senior in the education division stated that one of his education classes was going to visit the library that day "to go over OSIN."

His friend, sitting at the same table in the lunchroom was exasperated: "That's another area of duplicated coursework. We learned OSIN in English 101 and English 102. Now we have to do it again in [an additional course]." But another student recalled a different experience:

The Internet and stuff, that's one of the best ways to get research, because I don't know OSIN for one thing. I know our school has it, but we were never taught it in [English] 110, but in 120 we're supposed to know what's going on. I don't seriously know what's going on, and I've had where I'm asking [librarians] and
they’re like, ‘TTF43.’ It’s like, what does it mean? I don’t know what they mean, so I just go to the web.

One student, in response to the prompt card that read “Library Services: OSIN” said, “I don’t like OSIN. I don’t understand it. I’ve tried! It’s really confusing. There’s [sic] been many times where I’ve worked in groups and we’ll go into the library to find stuff on OSIN. And my whole group won’t know what to do. We’ll have to ask the worker or whatever.” And a student athlete who used a lot of humor in his responses indicated the previous student might be right about whole groups of students not understanding and using the OSIN system:

Interviewer: So what if your teacher says to you, ‘I want you to get a refereed journal or something like that. How do you get that on the Internet?’

Joshua: Maybe you can get all the [NCU] students together to see if anyone knows how to do it (chuckles).....I guess one advantage OSIN has over the Internet or over Netscape is that the material you’re getting is always going to be backed up by some kind of research, whereas when you’re talking about the Internet you don’t know if it’s true or if it’s just somebody’s opinion.

Overall, student interviewees were pleased whenever they could avoid visiting the library and complete research assignments electronically: “Yeah, you can type and see if they have what you need or, if they don’t, you don’t have to waste your time...You can just go ask somebody else or go somewhere else”; “The web is a good thing, because you don’t have to, you know, go to the library. It’s handy”; “Yeah, I’d be in the library a lot more often and, like, looking up stuff more ‘cause I [wouldn’t otherwise] have Internet
access and it'd be less convenient I think”; “[Going to the library electronically] is a good way, you don't have to walk to the library all the time, even though it is good to go to the library and find out for yourself.” One student bypassed all technology when she went to the library: “I've never used OSIN. I know it's available, but it's easier for me to just walk in and pick something...I don't like to go [to the library], but I do.”

Several faculty members confirmed that students were taught how to use OSIN in the general education courses. In addition, students were given the opportunity to review OSIN in a few upper level courses. Librarians, both student workers and full time employees of the library were helpful when students asked for assistance. On several occasions I observed in the library as students asked for help on the OSIN system; each time the librarians offered to share their time and talents with students. Still, students talked about avoiding the library whenever possible, and the library's own statistics of library use were down in the spring of 1999. With so much distaste for on-site library research evident, I decided to speak to a librarian about library use. She indicated that publicizing the lack of student library use to faculty had helped to increase traffic, although unfortunately at that time she believed the library was still underutilized.

**Assertion #2: Students perceived the limitations of notebook computing.**

The following subassertions relate to students' perceptions that there were limitations associated with notebook computing.
Subassertion #2a: Students noticed that notebook computers were not uniformly utilized in their classrooms.

Administrators described their campus as one where students would use technology “constantly.” One of the pieces of literature NCU had available on brochures and on their website stated, “Pencil optional. Notebook required.” Advertising materials, no matter the form, often mentioned “universal access. Every student, no matter the major, receives their own notebook computer”; “Each student gains technology skills through full-time use of a notebook computer. Smart classrooms and network connections in every dorm room make the world a 24-hour-a-day classroom. This powerful technology enhances all fields of study, giving students new ways to learn as well as a major advantage for employment.” A 2000 NCU recruiting letter to high school seniors read, “Named one of the nation’s most wired colleges, instructors at NCU incorporate technology constantly [researcher’s emphasis] in the classroom.” And a cooperative education brochure read, “Notebook computers have expanded the NCU education beyond the walls of the classroom...NCU students bring their computers to class, where they are provided with Internet access. Students are allowed to interact with professors’ computer programs during class and can e-mail the faculty with questions afterwards.”

Students told a different story. Many said they were not constantly using computer technology in their classrooms. Moreover, one said, “At the beginning of the semester [professors] will say there might be two or three days that you’re going to need your Ethernet cord, so don’t even bother bringing that [cord] because you know [if you
go off-task] they’ll make you restart your computer.” One student noted that professors might use notebook computers in class, but when computers were used they were used judiciously:

Most of [the faculty] will not allow [computers] in the classroom except on special days when we need to look at the Internet for something or not allow them at all and say, ‘This is your homework: Go look on the Internet for this site. Tell me what you think or find this, print it out.’

Other student comments indicated teachers were not using notebook computers in classes. Students said, “Maybe NCU adopted the notebook initiative to give students here a one-up, but it doesn’t give them a one-up if professors don’t use it. One professor even put up a sign [that says] ‘Do not open up your notebook [computer] today’; “I don’t know why we pay for computers that we don’t use.” Some students said they did not bring their computers to class because, “In algebra, you can’t bring your computer. Well, if you do, the algebra room doesn’t have hookups so nobody does, they just take notes on paper.” A transfer student soon learned about variable classroom computing by observing her peers:

Interviewer: But in the majority of your classes you’re not actually connected during class.
Sarah: No.

Interviewer: Do teachers say why when they ask you either not to bring it or...
Sarah: Well, [Dr. Q] just told us we couldn’t. That was the only class that I was told we couldn’t. Then just observation told me that I wasn’t going to in the other
classes, because nobody else has theirs. Being a new student, I just kind of, oh, whatever they're doing.

Interviewer: Even without the professor saying, 'I don't want you to [bring computers] to class,' you're looking around and seeing that students are not bringing [their computers] to classes?

Sarah: And I don't know why. I'm not real sure.

Other students agreed that computer use in class was variable: "I am taking six classes but I can only connect in one"; "My first year I had [my computer] a lot. I carried it all the time, and now, last semester I had one class with it. [Class use of notebook computers] was on and off, you didn't have to bring it every day. And this semester I have one class [where I bring my computer]." A female CIS major offered the only disconfirming evidence that some students were using their computers in every class, and that CIS student in particular was enrolled in five CIS courses and two business courses. Not surprisingly, students in the CIS department, a department where the expectation is to learn to manipulate a computer, would probably have more access to "constant" computing than other students.

A faculty member summed up the discrepancy between administration's "constant use" promotion and students' comments and/or my observation and interview data that faculty were not using computers constantly in classrooms: "Well, it's a contradiction. Faculty are interested in good teaching, and administrators are interested in enrollment." Indeed, in the courses I observed across campus and across divisions, I did not often see notebook computers in use in classrooms.
Subassertion #2b: Students indicated their notebook computers were communication tools that could interfere with human interaction.

It has been previously noted that students preferred to maintain notebook computer use on the NCU campus for ease of communication, but students indicated they often favored one-dimensional e-mail messages, composed and sent in isolation, rather than oral communication with friends, family, or faculty. A nontraditional student believed that “[Students] are just getting used to sanitized information like that. Personal contact requires a lot of work. A verbal exchange, body language, there’s all sorts of things that are involved in personal relationships that aren’t involved in one-dimensional communications, and I think it’s just too easy for them [to rely on e-mail].” Other students believed it was more convenient to communicate in written messages rather than speak directly to other people, and many students found e-mail to be an inexpensive form of communication. In addition, “You can still communicate as deep as you want… and [you don’t have any] awkward silence where no one has anything to say.” One student in this study noted e-mailed communications were impersonal. She said:

I still think people need to have more of a personal touch to things. [With a] computer, everything is the same font, you read the same thing over and over, where if you have a handwritten paper, it’s got a personal touch to it. [When] someone sends you a letter and it’s handwritten, it’s a little more personal than when someone has typed a letter to you.

Overall, students enjoyed electronic communications but admitted technology could remove the human element from teaching: “I think with a physical one-on-one, or a
physical teacher standing in front you could go up there and talk to them, where on
[Interactive Video] you can’t unless you call them on the phone, you know. I think that’s
a disadvantage of technology, one of them.”

Subassertion #2c: Students and faculty viewed off-task computer use as problematic,
distracting, or as an addiction.

How were students actually using the “24-hour-per-day classroom?” When I
began my observations during spring semester of 1999, I was stunned by the amount of
class time students spent off-task. Off-task behaviors ranged from playing games and e-
mailing to viewing scantily clad women. Although I frequently changed my position
around various classrooms so I would get a global view of student computer use, I found
similar actions and behaviors among students in classrooms across divisions. Most
students with computers in classrooms were off-task a majority of the time, and all
students who consented to be participants in this project were willing to openly discuss
this phenomenon with me.

Students were able to describe when a peer was off-task, and they frequently
wondered whether teachers could discern if students were off-task. One student said, “I
think that for the most part instructors know, but they probably don’t really realize how
much students are [off-task].” Students said they knew a classmate was off-task simply
because they could observe other screens, but they could also tell by their peers’
nonverbal behaviors. They noted that students who frequently had their heads down,
made continual tapping noises on their keyboards when there were no notes to take down,
or displayed emotions that did not match the instructors' lessons made it easy to identify off-task students. And professors noted the same thing. One said:

You know, one of the most obvious things that says 'I am not paying attention' would be people who are behaving out of line with how a normal person would react to materials. For example, one day the girl right there (points to a student's empty seat) is giggling, and she's smiling like this (grins), when I'm talking about how British mothers centuries ago rolled over on top of their girl babies and killed them because they just couldn't feed the kids. And [British parents] wanted boys, not girls, and [that student was] giggling. That happens over and over again...

That particular off-task student had been focused on her notebook computer and games or e-mail and had missed the details of infanticide. I happened to be observing in that class when the professor disciplined his student for her off-task behavior: "Do dead babies make you smile?" The student didn't seem to understand and only stared at her teacher. "You were doing e-mail, weren't you? You need to stop doing e-mail in class." The professor went to his office, and the student turned and made a face at her peers and laughed.

Distraction

Examples of the distracting nature of notebook computing were evident. A student believed computers made her:

[Distracted] because I'll look around me and everyone is playing solitaire, doing e-mail. I'll see people laughing and things while [the teacher's] talking, because they get something funny on e-mail. And you can just tell the whole class is
doing something else. That’s kind of distracting for me, when the guy behind me is laughing...

Another student said, “There is a lot of distraction, because I’ll look around me, and everyone around me is playing solitaire. I’ll see people laughing...because they get something funny on e-mail.” A former NCU student suggested that, “In my estimation, notebook computers are very comparable to having a cell phone or beeper in class. It becomes nothing more than a distraction, especially if you can e-mail your friends and family at the same time.” Only one student offered disconfirming evidence that he was not distracted by technology, but that meant *not having his computer wired in* if he wanted to stay on-task:

I’m not really distracted by other people doing e-mail. I don’t have that happen very often where I get e-mails during class because if they do e-mail me my e-mail isn’t up. ‘Cause you can’t do e-mail without your [e-mail account] being activated during class, so if you just have your [word processing program running] it’s pretty tough not to be attentive to what the teacher is saying. Students who are [in class] to take notes and pay attention *can* do it.

A professor echoed the frustration of constant technological distractions evident in his classes. He knew his students were not paying attention by observing their nonverbal behaviors, the surest way to discern if a student was on or off-task. This professor’s classroom appeared to be an outstanding learning environment where students could easily have been on-task; that is, the professor was routinely observed to be dynamic, energized, humorous, and knowledgeable in the content area; however, this
professor struggled to get and keep students with him, and the general pattern was for students, both on and off-task, to come into the room and check their e-mail before class began. That professor noted, "A lecture can only keep people for so long, but that's based on the premise that you can actually get them during minute one and two. And if you can't get them during minute one and two, because the computer is interfering, well, there's no point in [students] being there, really."

The distraction in classes was also evident by listening to the constant tapping of keyboards when there should have been either silence or audible student voices. A CIS student noted that, "For the classes I'm in right now the notes are already there for you. You can bring them in as a word document, they're there, and the only time you'd be typing is if you're taking notes. Lots of times the professor will stop talking and there's this [makes sound of typing on desk] of people typing." This response was typical:

A lot of times [the professor] will put the notes on the overhead and then you'll hear a lot of typing in class, and a lot of times maybe he'll put diagrams up on the overhead, and it's not really anything that you could take notes on. Maybe you could, but when there's a lot of typing going on, when you think that there could be, should be silence, more than likely you can tell those students are probably the ones that are on e-mail or doing the games or something.

I often observed students attempting to type very quietly when they went off-task so as not to be a distraction to the class: "You try to type slow, or like not push it so hard so it doesn't make a noise." Another student suggested that the disruptive tapping was cyclical: "Yeah, there's a flush of tapping when he puts up the notes but then the tapping
continues even after.” The constant key-tapping of notebook computers, even when students tried to do it quietly, was very often distracting to students and professors. My observations in courses across the NCU campus where Internet connections were allowed demonstrated that classroom dynamics were characterized by silence or by tapping, and the silence was sometimes broken only by the professor’s voice. A few students did speak to each other out loud, but if they did it was to ask another student to look at what had come up on a computer screen, or to ask how to do a particular task on the computer. In fact, during all but one of the 15 hours I observed in a particular classroom where Internet connections were not only accepted but encouraged, I did not see any student ask a question or engage in dialogue with the professor. Although this particular professor had the uncanny ability to take concepts and make them apply to his students’ lives, students did not orally engage with their professor. The only exception to this rule was when the professor made a comment during one of his lectures about a city, and it resulted in a student from out-of-state asking, “What’s [names a city in this state]?” Later in the semester, when the same professor had been frustrated by his disengaged students’ off-task computer use enough to terminate students’ ability to connect to the Internet, no students engaged enough with the professor to inquire about the sudden inability to connect to the Internet. The professor told me later that the only person to ask about the unannounced, striking transformation to an Internet-free classroom was a non-traditional male student in one of his other courses.

Off-task students became the norm in both classrooms in which I observed, each for a full semester, and in other classes across divisions. I asked each student interviewee
to estimate the amount of time he/she or those around him/her spent off-task in their classrooms. Student estimates were staggering; a typical student response was that he/she or those around him/her were off-task between 50-90% of class time: "I’ll copy the notes down, but what [the professor] says, like I don’t really comprehend much of it. Because I’m paying attention to the computer"; "Eighty percent off-task consistently"; "Me? Probably 85% of the time I’m off-task"; "Over half the time. Over half. I’d say a good 70% of the time. The only time they’re on-task is when those notes are up there and they need to be taken down."

One student noticed that many of the off-task students around him have games loaded on their computers. "I’ve been in classroom situations where a student next to me will play solitaire or play a battleship game or something the whole hour...It’s tough for me to know how they can get anything out of the lecture that the teacher gives...Even if there is class participation [game playing] goes on a lot, too.” But another student noted computing did not necessarily cause the off-task behaviors of some students: “I don’t think it’s a problem with the computers but just the actual students. You know you’re always going to have that [off-task] problem.” Another agreed: “It’s just like any other students in a normal class, [you have] ones that don’t pay attention, draw and stuff like that. Well, they’d be on their computers [if they had them]. And people that would regularly pay attention aren’t on their computers.” A nontraditional student indicated she was never off-task: “I’m never [off-task] because I’m not here to play games on the computer. I mean, I’m just too old for that business. As far as the others [around me
being off-task] I would say 99 percent of them are...You’d be lucky to find one person actually on-task.”

A student in a general education course I observed during spring semester, 1999, indicated my observation that he was off-task much of the time was an accurate assessment of his situation. He discussed his experience using notebook computers in that class:

I did [e-mail, games, chat rooms] in the beginning of the year, and I caught myself: I needed to start paying attention and you know, take more notes....it’s like, gosh, I have a laptop, I can do whatever I want now. The teacher won’t catch me, you know....and then I kind of learned from the consequences, you know, of not doing so well on quizzes and tests....

Divisions such as business or CIS would seem to have more applications for technology than others. Would students in those divisions notice a difference in off-task computer use in the classroom? I asked a business student:

Interviewer: When you go to a business class are you going to see the off-task behavior that you see in [other courses]?

Tania: Oh, yeah, yeah. Like with that 50 percent [I said previously were off-task], it’s kind of broken into two groups: that 50 percent, and there’s one group that is constantly off-task.

Interviewer: And these are business students you’re thinking of?

Tania: Both [business and other students]. (sighs). Yeah, both.
What about students who were taking courses in the CIS division? Would they notice as much consistent off-task computer use as students in other divisions? I asked a CIS student to comment on her experience in classes where students were learning how to program computers:

Interviewer: Tell me about CIS classes—about off-task computer use in those classes...

Judy: [In] all of them...Especially in Main Building, every room has hookups. I know a lot of people, during class too, not always just e-mail, but they’ll have something else they need to get done for class and, there’s a lot of that going on, too, sometimes.... There’s a [CIS] class I’m in right now with four people in it, and [our teacher] doesn’t really ask a lot of questions in it. And everyone will be sitting there, like, ‘Hmmm, what did he say?’ you know, not knowing what he said, not being able to answer his question. He did that the other day in one of my classes. Lots of times, I’m sure, he knows [we’re off-task]. He’s got to be able to know because no one’s answering him, no one knows. And I think definitely typing constantly all the time--I mean, you can hear that. And...the teachers that I know who cared, they know you don’t type, you’re not typing when they’re talking. It just doesn’t make sense. They know you’re doing something.

Interviewer: This is a CIS class with only four students, and you still have students off-task?

Judy: Yeah. Well, sometimes. That class is actually one of the better ones, because we participate and stuff. That’s probably one of the first times that we’ve
ever just like, I don’t know. One of the girls I know just wasn’t even listening, she was daydreaming. We all sit at the same table and we started laughing. [The teacher] didn’t even care and he said, ‘Yeah, really nice day outside.’ But, it happens... The bigger classes I think are the ones that are the worst, because you don’t have as much communication where you have to participate, and the bigger classes there are—you don’t really have to worry about being called on or paying attention. But in smaller classes, for some people anyway, you know you have to pay attention and listen, and [you can’t do as much e-mail, either]. It’s just kind of the way it is, because one of my computer classes I had last semester, one of the biggest classes I had, there was like 30 people in there. I don’t think anyone listened in that class. That was bad! You’d just look around and everyone would be looking at their screen and typing away and [the same CIS instructor] is up in front of the class talking. That [CIS course] was a much lower level. [The teacher] doesn’t say much about, he doesn’t seem like he cares, which I don’t understand. ‘Cause me personally, it annoys me to sit there and watch everyone doing that, too, because I don’t know how some people just can’t listen.

A common pattern in many classes was that students arrived in their classrooms, connected to the Internet, but then went on-task when class started. Unfortunately, the moment there was “down time” students reverted to e-mail or made other off-task connections. This pattern was readily apparent when I observed a course during spring semester of 2000. A field note read:
I see that the class is watching [the other students present their newsletters] for the most part, and some have their [desktop screens] up. Many have their newsletters ready to go. I am really quite amazed that no one is [off-task] on [e-mail]. I realize that [the instructor] has asked them not to be connected to the network while they [present their newsletters] for this part of class [because it causes technical glitches]. [Ted] sits down, and [Lacey] comes forward to present….I notice there seems to be a pattern of the students who are done presenting immediately going off-task. I decide to watch for a continuing pattern…

Indeed, students remained on-task and watched their classmates’ newsletter presentations until they themselves were through presenting. The moment students who had just completed their presentations sat down they would connect to the web and “leave” the classroom electronically. Another field note read, “I can almost set my watch by them!”

A student in that class indicated, “Some [students are off-task] a lot more than others…Some of them will completely do it the whole class period, look at forwards, send e-mails, look at other stuff constantly. Others will probably do what I do, you know, open important [e-mails], throw away other stuff and close it. Open it, do your business, close it.”

Several students in this study believed that professors should take a more active role in policing students’ use of technology in class; consequently, they believed it was someone else’s responsibility to monitor appropriate computer use. One student suggested that even if faculty did discipline students for being off-task during class time, “People just keep on doing it until [the professor] picks somebody out and embarrasses
them. And I don’t think [students will] change.” Another student thought her professor did not care to discipline students in class about off-task computer use, “because it’s college...it’s your responsibility to come to class, to pay attention, to get good grades.” In that course I observed students being off-task a majority of the time, and apparently the student was right. Her professor said:

I don’t care [about off-task use in class]. My class is outcome based. [Students] have to turn in an assignment to get credit, but I have an in-class final. If they cheat and get someone else to do their assignments they won’t be able to pass the final. But if I’m lecturing or showing the class something, I’d probably just walk over and drop the lid on that student. In that case, I wouldn’t stand for it.

But he did stand for it during many class periods. A research memo read: “[Dr. E] either doesn’t realize or doesn’t care that the whole class is generally off-task whenever he’s teaching something in class...”

A female student suggested that PowerPoint played a role in off-task behaviors, and she saw a potential downside when professors focused on PowerPoint presentations and lectures: “When other students know class notes will be provided [via Powerpoint slides sent from the professor] some students automatically go off-task.” Another noted the lack of connection between faculty and students in a classroom where PowerPoint is utilized: “I think [PowerPoint in class] limits interactions between students and between students and teachers. Once you get students staring at their computers, they [go off-task and] don’t look up.” The passivity and disengagement associated with PowerPoint were what concerned one student: “There’s no [student] input at all...you just sit there and
watch this show for [the whole class period], and the only input you get is the instructor. There’s nothing from the students, not even a question of, ‘How many have seen this?’”

Lessons could suffer if professors relied solely on PowerPoint presentations and lectures. As I walked through the halls at NCU one day I overheard two students, a non-traditional female student and a traditional male student, talking about a professor and his teaching methods:

Diane: He uses PowerPoint exclusively. It’s so boring!

Grant: Yeah, I know.

Addictive Nature of Computing

Students openly discussed what they called the addictive nature of technology and computing, and they recognized how off-task behaviors and the addiction to notebook computer use affected their academic performance. There were many comments concerning the addictive nature of technology: “Games, I guess, I don’t really (laughs) play any games except Same Game. I mean, everyone’s addicted to the game. It’s a very addicting game”; “I think a lot of people get addicted to e-mail. And like [e-mail] and stuff where that overtakes a lot because you can get on this [e-mail] and you feel like you’ve been on there for like, half an hour, and you look at the clock and it’s like four hours later….like you don’t realize how much time is passing”; “E-mail can be bad, too, you know. Some people, it’s almost like it’s life or death if they don’t get on and check their e-mail every day or every so often, which can be the case when you’re waiting for an important e-mail.” A student suggested that notebook computing:
is [addictive] though. It’s so hard like, there are times when it’s nice when teachers actually say you can’t hook up because you go in there, you hookup, you bring up your e-mail, and it’s not a problem if someone doesn’t start e-mailing [me]. But if someone does start e-mailing [me], [I’ve] got a conversation going and who cares about class? [I’ve] got something to do and it is [addictive]! I mean, for me anyway. I’m okay unless someone starts e-mailing me in the classroom and then [I] can’t stop! ...But yeah, you have to be able to seriously close your [e-mail system] and pull your cord out to listen [in class]. Even if it’s important in class or something, you know you’ve got to listen, but still it’s hard if you’re hooked up.

Another student believed the computer:

makes it, you really want to go on-line and like, not pay attention in class. It seems weird because when you’re listening in class, listening to [the professor] talk and then you see everybody else looking down and stuff that it makes me want ta [sic], you know, nobody else is paying attention, so, why should I?

A female education major made two analogies concerning the addictive nature of technology:

I think having technology in the classroom is like having a room full of six year olds and giving them each a toy. Then you say to the group, ‘You can have a toy, but you can’t play with it.’ It’s also like having a room full of alcoholics and you’d give them each a beer and say, ‘You can have a beer, but you can’t drink it.’
The addictive nature of computing had not escaped professors’ notice. One
discussed his frustration with the apparent addiction to notebook computer use:

I’ve talked about the addictive behavior I’ve seen, and there’s definitely an
addiction to the screens, it’s just, it’s amazing. There might be a day [students]
stopped, or two, but then they’re back at it. And that’s again one of the reasons
that [some faculty] believe there’s an addictive element there, it seems very clear.
[Off-task students] are hostile to suggesting that they have committed an error in
doing e-mail, games, whatever, during class. And that brings it back to addictive
behavior. They are in denial that [addictive behavior] is there. I discussed the
problem with an off-task student, and when I questioned her the other day she
said, ‘Yeah, I’ve got to stop.’ But yesterday she was back to it again.

In striking contrast to the student and faculty perception that there was a serious
off-task computer use problem on campus, Dr. B seemed surprised that students and
faculty recognized the extreme amounts of time students spent off-task and the addictive
nature of computing. At first Dr. B was incredulous, but he soon contradicted himself in
this passage:

It’s….so difficult to turn it off? Well, again I can only [think back to] my own
classes [when I taught]. I just said, ‘Hey, you’re not going to do that, you’re not
going to do it anymore either or there’ll be consequences,’ and [the off-task use]
stopped. It wasn’t that hard because they weren’t going to pass the class if they
didn’t. I told them, ‘You’re going to lose [the computer], [I’m] not going to
tolerate it.’ Consequences are [the students’ problem] then. I just didn’t give
them that choice. It’s not that hard to turn the off button or pull the cord out if I have to. If you let them get by with it, they’ll take it. Some are kind of addicted to computers. There’s that computer addiction, I feel there are people like that. I don’t know what the percentage is, but some people are addicted to alcohol and they don’t even show up in class. We got, we got lots of problems; I think drinking is a far bigger problem than any of these other things we could talk about. That’s only my personal opinion, but, kids party and then they don’t come to school and get in trouble and next thing you know they’re behind in their grades and they end up dropping classes or getting all F’s, and that’s sad.

Several students and faculty noted that it was not easy to stop students’ off-task computer use. Indeed, in one class period I observed a professor who stopped mid-class and said to no student in particular, “I could tell you to stop doing e-mail, I could say and do things to make you feel like a midget (scrunches face and smiles) and I could nail you to the cross, but I don’t.” A student in that class smiled when the professor made his ‘nail to the cross’ comment, while the majority of students nervously giggled. Predictably, the tapping on keyboards stopped for 30 to 60 seconds, then continued as usual. A research memo to myself read, “Even as an observer in this class, I feel defeated.” One faculty member said when he disciplined students for falling into an addictive pattern of computing and becoming consistently off-task, “[students] generally close [their computers] up and then 20 minutes later I can see [their computers are] open again.”

The faculty members I interviewed said the off-task computing problem was compounded by lack of administrative support for the job they were trying to do: “And if
[NCU] weren't a consumer place, [I] could walk into class and say, 'Pull those plugs' [instead of just suggesting it]. It's inappropriate here....Because [administration's] on [the student's] side. 'I have a right to do e-mail.'" This professor acknowledged that he would like to do as an administrator suggested, to pull the cord out, but "that creates hostility in the classroom right away, because you're interfering with [students'] rights."

His response illuminated a much more complicated problem, and so I was surprised when, during my seventh observation period, he had indeed "pulled the cord" on technology by manually disconnecting the server at the main box in his classroom without prior administrative approval. I asked him to comment on this modification:

I believe in the old ways [of teaching and learning], and I really have trouble with the consumer model of education. I know that if people are allowed to do what they want, they're not going to get anything out of college, and who's it going to come down on? Well, the accreditors will come down on me, that I didn't [teach], and the student [evaluations] tell me I have no right to tell them not to do e-mail. I'm caught in the middle here. I have no answers, and we don't have an administration that understands the problem. [Our administrators] have defended [computer use] in the paper, defended it to the state board, and there's a severe gap between [administration's] perception of how all this works and those of us, especially who teach freshmen, [know] how it works. We don't have an administration that's willing to do anything [about discipline]. I don't think administration knows or has any sense that students are that bad at the electronic show. [By advocating the consumer model faculty] have been totally robbed of
power [within the classroom]. I don’t expect to be backed up on any attempt to make order here. The problems couldn’t be that we have the computers, it couldn’t be that we have students who are unqualified, it’s (sarcastically) obviously because of something faculty has done.

But it really should not have been a surprise to administrators that there would be an off-task computing problem. Notebook Computer University Student Senate minutes from October 24, 1995, a full two years prior to students receiving their leased personal computers, indicated that there were “student concerns that there should be a time limit on those individual students who use the computers in main building for e-mail or the Internet for entertainment purposes. This has been limiting the time for students to use the computers for homework purposes.” And again on November 14, 1995, NCU Student Senate minutes indicated “Advisors report...the computers on campus are being misused.”

Subassertion #2d: Students could not describe how they learn via notebook computing.

Students at NCU believed they would fight the removal of notebook computers from their campus because computers assisted them in their learning. In response to a hypothetical interview question, “The [state] Legislature recently prohibited notebook computer use at all state colleges and universities. How would you respond?,” most students stated they would oppose such an idea, albeit not for educational purposes: “I don’t know why they want to restrict people from using the technology that’s there for them. I mean, it’s just so much easier. And, it’s more efficient”; “Some students come here not knowing a thing about computers. And when they leave they’ll know a lot more
Students might have believed they were getting a better education because of
notebook computer technology, but they were unable to formulate an answer to the
straightforward question, “How does the computer help you learn?” Responses were not
only vague but almost always had nothing to do with students’ learning processes.
Responses included: “Hmmm. [Notebook computers] make a big difference, because
I’m not used to reading on the computer screen. I’m not really sure if I like that...”;
“I
guess a lot of teachers have their home page, and it has everything there that you need to
do, when you need it done, and that’s kept me more on track. I can look back at that, I
don’t have to be asking someone, I know it’s right there”; “[The computer helps me
learn] because I have the option of the Internet.” Even an on-task, motivated, and dean’s
list student did not seem to be able to identify how the computer helped him learn: “I
think it’s helped probably just because of availability of information... It is easier to take notes sometimes on computers."

Many other students could not seem to pinpoint exactly how computers helped them learn. In fact, most students confused learning to use computer hardware and software applications with learning in general. One student said:

[Notebook computers] are just a wonderful tool for education. You learn a lot more than you would by not having it. I mean, you learn how to take care of it, you learn more than just using the computer, because some people are afraid to use it. And you know, some people just absolutely can’t use them. But then they come here, and they use them [and say] ‘Hey, I can do this; I can do anything.’ It helps them conquer something that they’re afraid to do.

Another student believed computers helped her learn to write correct sentences:

Well, you learn...sentence structure whereas if you’re just writing notes [on paper] you can just scribble notes. It doesn’t even have to be spelled right. If you’re taking notes on your computer, you can see if it’s spelled right, because it comes up. I mean my sentence formation has been better. I know it hasn’t been as fragmented and all that because I’ve been using [the computer] more.

There were many comments on how notebook computing did not make a significant difference in classroom learning: “You can write your notes out...but the book is on the computer [and] it helps a lot...[having the book on the computer] wouldn’t seem like that much to read ‘cause the page ain’t [sic] that big. And the letters aren’t that small...”; “I don’t think [classroom computing] makes that much of a difference [in how
I learn] because basically all you’re doing is taking notes and you can go...to a few web sites...but otherwise it’s not that big of a difference, I don’t think. Because most of the classes you have the book right there, you can go look it up yourself.” Another student’s assessment of classroom notebook computing included the notion that computers in classrooms were not often necessary and did not significantly impact learning:

Internet links, so you go to the syllabus and click on that link and it’ll have a video you can watch or different information you can watch from the author of the book or something where they actually use the technology. But other than that, I’d say [classroom notebook computing] doesn’t have much of an effect at all on how you learn.

And another student’s thoughts on classroom computing sounded like a frustrated cry for help:

I find [learning] more difficult [with classroom computing]...I don’t know everything about computers, and the stuff [the professor] assigns and the stuff we’re doing now, I’m lost. And it’d be easier if I had a sheet of paper and [the professor] told us what to read and handed stuff out that I can see right away. And if [the professor] would just explain stuff on the computer and you look at it later, you can’t remember what he said [and] you get totally lost. And you’ve got to find the right ways and it’s just totally confusing. I know a lot of my friends have that problem. They’re lost. They don’t even know what to read or anything, because they can’t find the right place on the Internet.
One student was confused just by the question of how notebook computers helped her learn: “Well, the teachers, that’s like their main thing is using the computer and stuff so, it’s always there and stuff, and like you can compare it to high school, and it’s just different.”

Although many students insisted that they learned best “one-on-one” and that one-on-one learning was what drew them to NCU in the first place, several suggested that, “The kids that [sic] want to learn, I think, would learn so much better if they were on-line during class.” I asked that particular student if she would be in favor of, or sign up for, courses offered exclusively on-line. “Not unless I had to,” came the reply. I asked her to say more about her thoughts about on-line learning:

I think it’s very impersonal. Um, I don’t think you’d [learn]. I don’t know. There could be, you know there’s so many different learning patterns, that that’s how [some students] learn, but in the future there’ll be a classroom where that’s how they learn. But when I’ve grown up I’ve always had the teacher right in there, right in front of me, physically in front of me to help me. And not on a computer screen or a TV screen asking me if I need help.

Furthermore, a student believed even if he did not need help he would want a teacher physically in the room with him, and independent of technology:

I’d really noticed when some of the professors get very dependent on their technology I tend to lose a lot. I process better and I think a lot of people process better in the old lecture and learn method. We had notes on the board, you’re copying notes because there’s a learning process translates from the brain to the
hand in the writing. And they can do a PowerPoint presentation and send me the notes, and I can write them two or three times, and my reading skills I consider excellent, my retention’s good, but it’s not up-to-par compared to when I’d write the notes and then go back and read them again...

A CIS student interviewee indicated that the computer is a necessary tool for her to learn how to use and/or program computers:

Well, for me being in computer classes, probably having my computer there a lot of the times, we’ll be doing programming and you have to do it on your computer...being able to have your computer in class is nice. I can’t imagine all the problems [if] I was in my programming classes having to go to a lab and running the problems and no one’s there to help you. It really helps to be in class...and I know it’s helped me a lot, just ‘cause it’s always there and you can take it with you everywhere and do the things...And during class I can follow along and do things that [the teachers] do. It helps [me] learn when [I] do it too, and not just watch someone.

That student recognized computers were not exclusive learning tools; indeed, she realized she learned best with a teacher physically present. In addition, she was responsible for her own learning, and she needed to extend some effort in order to succeed in school:

Well, for me, I have to listen...I mean, [my CIS professor] sends out notes all the time and I have it in front of me, but it’s easier for me to listen to him. I just learn better and I know that....I know from my experiences that if I go on e-mail I know that I’m not going to learn anything, and it’s tough when it comes around to
assignment time. I know there are students that just don’t care, though. There’s a lot of students that don’t care [lowers voice] how they do, and I do. So, that’s a big factor [in learning] too, I think.

A student believed that the computer helped him learn just by using it: “I think being able to use [notebook computers] everyday and since they’re such a big part of everyday life that [I’m] just so much more comfortable with them.” It was hands-on learning, learning to use the physical machine that he preferred. But when asked to process the issue even further, this student noted that:

Well, even I forgot about my physical science lab. We, there’s an implementing technology section in each of the labs where you hook up your computer through this machine and then you actually run experiments through the computer. It’ll do different graphs and, so that I was actually surprised because I figured that, you know, in the science labs it was mostly mixing chemicals and looking at things under microscopes but we actually, the computer did, we downloaded, I think it was Labworks [courseware].

Dr. B, when asked how he believed notebook computers helped students learn, indicated there were too many variables to be sure:

That one’s almost impossible to pinpoint. We’ve done some studies, controlled studies, and some classes say students have learned an average of seven points better per test. Others [showed] no significant difference….This process is so complex you can’t control all the variables….If today’s the day you do your little test and we get your input from you maybe you’ll perform better and maybe
not. [Students] might have been sick or had a cold that day. You get all that stuff when you start trying to really narrow down what made this click in this person’s head.....I guess the barometer is in how well the students do and the employers. [Employers] like [our students]. And that we monitor. That’s going very well...

Dr. B correlated students’ ability to perform well on a test, or as an employee, with academic achievement. It was students’ skill level and employer satisfaction that was the yardstick by which he measured the educational achievement of his institution.

Subassertion #2e: Students and administrators related education to job training. Faculty correlated education to the liberal arts.

When student participants were asked to respond to the question, “What is education?” their answers consistently correlated with jobs. “[I want] a degree to do what I want to do in life. It’s job related. Everyone else goes to college to get a job. I need certification to work as a teacher”; “...[Education] will help me with my job at the [gym]. It already has! I use technology for managing the [store at the gym] using a spreadsheet”; “The definite goal of school is to find something that you like to do and get paid for it.” And one student indicated her education on a notebook computer university campus would eventually save her a lot of time on the job: “When you get out into the teaching field...you won’t have to go to the summer six week credit courses [to learn technology], you know?” Many students believed technological applications would help them in their jobs now and in their career fields: “[Faculty] just want us to do books and papers? Ok. so we get out into jobs and somebody wants us to have experience in [more than word processing], what are we going to do?”; “I made a spreadsheet of all my
videos, so I have a record of them if they’re checked out. A spreadsheet will also have all my grades on them. It’s a good way of organization, a good way to put everything together regardless of whether you’re in business or running a daycare.” Another suggested that education was the difference between a job and a career: “I think you need to have more [education] to be out in the real world, in a job that’s going to mean something. Anybody can work at Burger King…you need that extra step to really get out and pursue a career.”

A student noticed the difference between salaries in career fields. She had “changed my degree from elementary education to psychology where I can go further (up pay scales): “I’m not saying I’m very materialistic in life, but when it all comes down to it everyone bases their life around money. That’s the only reason we go to school, to get better jobs, to get a better education, to get a better job to make more money. That is the only reason we go to work every day is to make money.” The education/money theme continued:

Being able to use a computer is going to make, help in the future with money. It’s just something that’s needed for everything. I’m thinking of majoring in business management, but minoring in CIS considering somewhere in business there’s going to be a computer and you’re going to have to know how to work the computer and in order to run that business. “Cause everything’s on the computer, so I’d say knowing how to work a computer can bring you money.

A nontraditional student said she believed just the fact that NCU was one of the first to adopt a notebook initiative would mean more doors would be open to her in the
marketplace. “If [employers] knew NCU’s background, that they were one of the first ones to implement notebook computers, [NCU students] would have that little added edge.”

There were five of 20 student interviewees who identified education as more than job training. Of those five, two were nontraditional students, one male and one female student, and three were traditional female students. Of the dissenters, the female nontraditional student believed the meaning of education meant, “Being able to teach a child or somebody something, and they actually learn it, and watching [students] be proud of learning!” A female traditional student believed that, “Furthering your education can help you mentally get ahead in life.” Another thought that, “It’s more important for me to learn how to educate people rather than just be educated myself, but [at the same time] continue my own understanding of life.” The third female traditional student believed her college education was an extension of her high school education, and “it just gives you new experiences, because even aside from the class activities, I get to interact with other people and instructors, and [I] grow as a person, not just intelligence-wise. I think that’s important, too.” The male nontraditional student believed experience was the essence of education and that education should be as diverse as possible: “It’s not cut and dried…it’s a continuing process.” He noted that:

I value experience more than anything. I’d rather take $10,000 and go hunt in Africa for two months than buy a new car. I’d rather pack up the family and get on motorcycles and drive around the perimeter of the United States rather than buy a new house (chuckles). As long as what we have is adequate, warm,
comfortable, and safe, everything else should be dedicated to experience, and experience translates to education. If you’re out doing things and not learning, then you’re an idiot. You got your eyes closed. You need to be out in the world. That’s where the greatest lessons in life are learned, through experience. Classrooms, great, but you need to take that knowledge and apply it to the outside world, and if it doesn’t work you need to trash it maybe and back up and reassess. But even this student was not oblivious to the correlation between education and employment:

You [may have] all the experience in the world, [but the job they are advertising] requires a bachelor’s degree. Not even in the field, but requires a degree.....I can see where a lot of people benefit from technology or a minor in technology. I don’t think it’s necessarily going to get you a better life or anything. I think the only thing that’ll give you a better life is your own attitude.

Like most student participants, Drs. A and B related education directly to job training. I inquired about the apparent doublespeak Dr. B had used in discussing this issue:

Interviewer: You said two things that were of interest to me. Skills and training. You’re training people? That sounds more like technical skills [than] liberal arts education. Is there a shift going that way?

Dr. B: No, I think maybe just the opposite. People want to hear the word training associated with vocational education. I use training more liberally, as you’re learning and studying, but there are technical skills that people need to do your
job everyday which we didn't have before. So that's part of the package. You still have to critically think and have good reasoning skills, otherwise your tool doesn't do any good. But you need to know how to run the tool now....So, do we call it education, can we call it training, I choose not to get tied up in that terminology because it's all part of the package, you know.

This administrator believed the technical training NCU students were receiving would provide necessary skills for jobs, and that his state had the potential to absorb graduating NCU students:

The state of [names state] says we need to diversify our economy, we need to go in areas that are hot and not dying. We see the information technology industries growing....The fact that we have an out-migration of people, we can't build industries without good trained [sic] people. And I see our people being hired just, easily, because of [their] technology skills.

Dr. A went further than suggesting education is the means, and employment the end of education. and tied university training directly to jobs and business:

Just to brainstorm...we have a technology center, intended to be a business incubator, and we already have a number of students working at [the business incubator on campus]. I'm thinking there might be a market for us to have a for-profit side enterprise, which I'm thinking of as a virtual technology center. So for example, we would sell it in the form of an IT temp service. We have a variety of students with some time to learn, and a variety of skills and the universe of software and languages, computing languages out there is [sic] changing so fast
and becoming so diverse that a lot of businesses are having trouble keeping
up...Maybe [business] needs program X for a certain project, but they don't really
need that all the time...They need 25 people doing something instead of 10, or
whatever, so it might be seasonal work, it might be specialized one-time work.
I'm thinking that we could aggregate that into work for students, that the faculty
would oversee and make sure of the quality. And get paid extra for doing it, and
the students would get a very nice little [salary] right from the campus. Well, if
that, or something like that comes true, at some point it might be the case that in
effect all of our students, or all that [sic] wanted to, could have an IT job on site.
In fact, Dr. A preferred the students at his university have a “list of competencies they
can hand to an employer” which sounded very similar to what Levine (2000) suggested
traditional degrees would become: educational passports. These passports would outline
the specific knowledge or information the student knows or the skills that student is
capable of performing.

In contrast to students and administrators, seven of the eight faculty I interviewed
discussed the value of a liberal arts education and the belief that the liberal arts were
necessary for students to become well rounded, well educated persons. Professors
recognized the need for vocational education, although they did not believe liberal arts
and vocational education were the same or traditionally had the same outcome. In fact,
of the professors I interviewed only one seemed concerned that students use their
education and their computer training for web pages to market themselves. That
professor told one of his classes during a lesson that “Next year I’m still hoping to get permission to have some of your web pages on our server to market [students].”

The majority of faculty participants in this study were concerned that administration was shifting focus from being a traditional campus to a job-training center, which would further cement the perception students had about the relationship between education and job training. One faculty member said:

In my opinion [administration] would like to focus on an IT worker production center, where they would train rather than educate. [I think] that is the wrong focus. [Administration] is not pro liberal arts and culture. They want a professional training center, train them quick, get them out. I think they would dearly love to reduce the general education requirements. [My philosophy of education] is that it should be liberal. Not just a major or minor pursued in one area, but students should be exposed to diverse courses in other areas so they’ve had a liberal smattering of other areas. I’m very pro for those gen ed courses. I don’t think students go to college to be trained in a specific interest area they have, but to be educated to become a thinking person. Students need some sensitivity to art, music, speech, have a sense of history.

Subassertion #2f: Students, faculty, and administrators did not correlate a good learning environment and great teaching with notebook computing.

Every interviewee in this project described similar characteristics of great teaching and good learning. Great teachers played a major role in building good learning environments, and great teachers were often cited as those who used humor, who were
knowledgeable in the content area, who were engaging, and who made themselves physically and emotionally available to students. In all the interviews I conducted with students, faculty, and administration, only one CIS student interviewee mentioned technology in association with great teaching, but did so only in passing:

Interviewer: Tell me about someone you consider a really great teacher. How does that person convey knowledge?

Enid: Even if it’s not a computer teacher?

Interviewer: Think about a teacher that you think is terrific and tell me about his or her characteristics.

Enid: [A lot of the teachers], they’ll throw up a lot of the notes up on the screen and they’ll just kind of talk? For me it’s easier when they actually stop and talk to me, you know, without the notes getting thrown up on the board. I mean, show things on the board...there’s a difference between teachers, some are easier to talk to, and they’re willing to help. Others, you can just tell they’re busy...Good teachers....explain things more, you know. Instead of just reading stuff out of the book. It's right there, we can read it. Explanations are usually nice.

There were more comments about great teachers and how they help students learn: “A great teacher is one who “interacts with students more. The student involvement type of thing”; “A lot of one-on-one with [students]. Some closer contact”; “[A great teacher], she’ll sit down with you, that’s what I’m trying to say. I mean, she physically sits down with you, and looks at you one-on-one, and she will sit and talk with you about, you know, what needs to be done.” More students said great teachers helped
them learn by: “Kind of [by creating] a bond with every student in a way. I don’t know if [they] even tried, but I think [they were] always there... We had really good group discussions... but we definitely learned from it. I think a lot of my good teachers were the ones that involved everyone and just didn’t sit there and talk at you the whole hour”; “I tend to think that teachers who get involved with the class communicate [with us], instead of just assigning chapter after chapter and having you read and take tests”; “[Great teachers] made a personal connection with their students and really got to know you and seemed to care if you were there.”

Interviewees often discussed humor as a common thread woven into the tapestry of good learning and great teaching. Students said: “[We] had fun [in his] class... he cracked jokes, [did] impressions, kind of kept the kids’ attention which was easily lost. And there was a couple of kids in his class that had reading problems. So he was giving them one-on-one attention”; “[My great teacher] just kind of made it like a social class but yet we still learned. He just like, you know, give [sic] jokes every once in a while, and involved everybody in the class, and it’s just, we didn’t have to, you know, worry about him being so strict and yelling at us and stuff. It was kind of down to our level”; “[They] taught at everyone’s level, and it was so easy to talk to them”; “I think [great teachers] talk about [content] a lot in class and give us notes, at least the subjects they want us to know about, and I guess I don’t really like it when teachers say you have to know this and this and this and don’t tell us exactly where to get it and things like that”; “[Good teachers] are really good at telling stories and things that relate to the information. Giving us ways to remember.”
Other students said this about good learning environments and great teachers:

"Great teachers [give] examples more than just flat notes... but if they associate it to things that I'm familiar with, then I learn a lot better that way"; "[Dr. T] is a great teacher. He brings his personal experience to it, and yet he'll broaden your horizons... you know what he expects and he's very supportive"; "Interactive environments... where we felt like we were learning, but we could also ask her for... advice on things as well"; "Maybe [great teachers use] worksheets and then discussion, 'cause one teacher is like that, and I felt totally comfortable talking back and forth like that, and I learned a lot more that way." And one student spoke for many when she said, "Well, if [great teachers] are excited about what they're teaching, then it makes you want to learn more. And, um, if they talk more at your level, 'cause they know everything they're teaching and you don't... then it makes you want to learn." A male physical education student discussed what he considered were the characteristics of great teachers:

What I consider a great teacher is somebody who can relate to students in a manner that [he/she] understands each student learns differently. You're not going to be able to reach each student every time, but if you are able to mix it up enough or use enough different strategies where you're going to catch students the majority of the time, I think that's what I'd consider a top-notch teacher... energetic, knowledgeable, even if a teacher is new to the field and doesn't know everything... just being up front and honest [about that are] other characteristics of [great teachers]...
When I reviewed my field notes the teachers who were most often identified as
great teachers in good learning environments were those who used humor and were
intellectually and physically close to students. Accessibility to students was also often
mentioned as a characteristic of great teaching and good learning. Students cited one
division in particular as having at least two really great teachers in good learning
environments. One of those great teachers, Dr. K, did not place his desk between himself
and his students, but came out from behind it and circulated among students. He made
himself available to students academically, physically, and emotionally, and he
consistently encouraged his students. Someone in his class asked a question, and this
professor said, “Very good! Someone’s thinking ahead!”

The other teacher who was very often identified as a really fine teacher, Dr. S,
used a lot of humor interspersed in class discussions. Someone in his class asked about
“worksheets,” and this professor had a very funny response. My research memo read,
“[Dr. S] rushed over to the door when he heard the student ask about worksheets, put a
finger to his lips and said, ‘Shhh....don’t use that word in this room! Worksheets!’ [Dr.
S] stuck his head out the door to see if anyone was outside listening when the student said
that ‘awful, awful word, worksheets!’ The class laughs loudly.”

In another class period the same professor was instructing his students in a lab.
During this class the students were learning how to teach a marine activity to fifth or
sixth graders. As the professor moved around the room he said to the class, “After this
activity you’ll all run out and rent Crimson Tide, Hunt for Red October, they’re very
good movies. Maybe I should have brought one in to set the scene for us!”
notes recorded that the class laughed again, and a research memo written to myself read that “I am enjoying the class as much as the students.” I asked students if I had just caught this teacher on a good day or if all his classes were this enjoyable. One student responded by saying, “No, this is a regular day.” The other students around him smiled and nodded in agreement.

Interestingly, there was a time when a particular teacher, repeatedly designated as “great” by many students, referenced technology. After he had set up an activity and his students were busily working on a lab activity that did not include technology, the professor said to no one in particular. “Okay, you guys keep working. If you need me I’ll be in my office on the Internet.” The class erupted in laughter, and of course the professor did not leave the room. Although there were some Internet connections available in this professor’s room, no computers were connected during the times I visited his classroom. Notebook computers were either in their cases at his students’ feet or not brought to class. That professor did make use of the overhead, however, and although he had a television and VCR available to him. I did not see him use either. Perhaps that is because as one professor in another division noted, “Technology will never take over teaching because it’s so impersonal. Good teaching requires human interaction.” Several students affirmed this and one said: “Who wants to sit there for a class 50 minutes long and it’s nothing but technology? I...wouldn’t like sitting through a whole eight hours of that every day. I mean, you’ve got to have that [student/teacher] interaction.”
A nontraditional student thought really great teachers were human beings first and offered a learning environment with plenty of student/teacher interaction second. His description:

One really good example [of a great teacher] is something that really struck me. [My professor] has the reputation for being really hard-nosed. 'If you miss a class, you should have been there. You get the notes from somebody else. I don't care, you should have been there.' I had an ambulance run right in the middle of [my course]. I came back and [the professor] said, 'Well, was it serious?' I told him, yeah, we had a fatality. We had to pull a gal out of the ditch. And he said, 'What are you going to do for notes?' I said well, right now I'll find somebody who's got the notes. He said, 'What are you doing right now?' I said well nothing, going home. The teacher said, 'Let's go sit down.' We went to class and he gave me the full half hour that I'd missed, the lecture complete with overhead, bells and whistles.

And what of the two administrators, Drs. A and B, interviewed for this project? What was their perception of really great teachers in good learning environments? Like the student and faculty participants in this study, neither Drs. A or B indicated technology was an important aspect of great teaching or good learning, although Dr. B stated that great teaching kept him away from technology [researcher's emphasis]. Dr. B suggested that when he had been in a good learning environment with a great teacher he did not get distracted or "want to go do e-mail":
I've had a lot of good teachers and they've all been very different from each other. To me, the biggest thing was enthusiasm. They were very in love with their material, and you could just tell they wanted to teach you all about it. They just had that knack of instilling [a desire to learn]. And then sitting down and reading that textbook wasn't hard, taking notes wasn't hard, coming to class wasn't hard. I didn't want to go do e-mail because, well, I'm into this [researcher's emphasis].

Interestingly, e-mail systems were not widely available during the years that this administrator had been in school, but his response incorporated classroom technology and how technology was not necessarily part of good teaching and learning.

Dr. B also suggested great teachers in good learning environments used various forms of media in instruction. This administrator spoke of students in a class where the professor used music files loaded on his computer, music from a particular era that corresponded to course materials, in an attempt to set the stage for good learning that day:

You know [Dr. J's] students have heard some of this music before and you can just see the wheels turning and to me that's good when you use different media in instruction. And being enthusiastic about it. You can tell [Dr. J] is into it...but that's just one example, we've got a lot of good teachers who do the same thing.

What made this portion of our conversation particularly interesting was that I had already observed in Dr. J's classroom where I had heard the use of music prior to class. The students were very animated during that time, and I do believe the music engaged them. But what was fascinating was that when Dr. J began his PowerPoint slides students
immediately went off-task and started surfing around on the web. I followed up on this phenomenon with a student who was in Dr. J’s class:

Interviewer: How do you do it, being off-task while [Dr. J] is teaching?

Bob: In [Dr. J’s] class, there’s not a whole lot of notes you have to add to what his PowerPoints are because he’s the type of teacher who just kind of puts it out there and reads it off and adds something to it. Every once in a while you might have to type in, but you can tell by the sound of what’s going on or what’s not [whether you have to pay attention and get some additional notes down].

Dr. A’s response to being asked to describe a really great teacher elicited a narrative about a benevolent undergraduate teacher in his “most memorable” incident:

My best teachers expected me to learn to high standards. No threats, no cajoling—just an assumption that I could and would do it. My most memorable incident: a college prof in a 300 level English class, essay final exam. Question was to identify the poem certain lines came from, the poet, the context, and the meaning. I wrote an entire answer, about 4 pages in the blue book.

Reconsidered. Drew X’s through all four pages and wrote another entire answer based on a different poem. The instant I walked out the door, I realized that my first answer had been right. I never saw that professor again. The post card I had left for my grades reported an A for the final and an A for the class. He gave me full credit for the answer I crossed off.
This administrator's great teachers expected that he would work to his potential, but his "most memorable incident" was based on a professor's personal interest in his student; the professor recognized his student really had mastered the material.

Subassertion #2g: Students recognized their learning environments could, in many cases, be improved by removing notebook computers from classrooms.

Although students were overwhelmingly in favor of having notebook computers at their disposal "24/7," and many students recognized that computers were not uniformly utilized in classrooms, when computers were used students believed they had neutral, or even negative, impact on the learning environment. In several cases students advocated removal of notebook computers from their classrooms. One nontraditional student saw the potential for both classroom technology and a good teacher, although he understood the potential problems associated with encouraging classroom notebook computer use:

Technology is good. You need a basis in technology. Technology is not a god. It doesn't replace the teacher....I could see some good points [to classroom technology, [but] I see more bad points, actually. Like I say, [people have] become too computer dependent. Another bad thing I've noticed walking by classrooms is [a professor will be up there lecturing, everybody will have their [notebook computers] up and this guy over here's got a baseball site, this one's got a nudie site, and yeah, it makes you want to slap [students]...[Off-task use is] going to be part of the problem with using technology.

There were other comments about the negative effect of classroom notebook computing: "You can go to a few web sites to look up stuff, but otherwise [classroom computing] is
not that big a deal, I don't think"; "In some classes it's good. But in some it's not. I mean, I like [classroom computer use] but I wouldn't. I wouldn't need it. I wouldn't need to bring it to class"; "In [one course], you really don't need to be hooked up during [class] time. And in [another course], it isn't necessary, either."

A student athlete indicated that professors in the physical education department did not often use notebook computers, but they did use computer technology when appropriate:

There's not really a need for [computers]. Because a lot of what we do over there is in the gymnasium, is hands-on. and [Dr. F], he's more of an old-fashioned type handout, write things on the chalk board and explain things as he's writing, type of [professor]. We do use them in [one class], which is like a problem statistics class...we go to the tool bar. do a couple of things, and...before it would have taken an hour, hour and a half worth of work just to figure out those, so [the computers] are really nice that way.

The same student athlete was similar to his peers when he described the lack of positive impact classroom notebook computing made on his education:

Um, (sucks in air) as far as learning in the class, I can't say that it's--with the exception of maybe one or two teachers that I know of--I wouldn't say that [having notebook computers in class] is any better than not having them. It doesn't help.

Another student agreed that classroom computer use should be minimized:
Katie: I think [notebook computers] contribute a lot to education...[but] they could minimize their use, I guess.

Interviewer: Minimize their use in what way?

Katie: Like not having them set up during class or something like that. I wouldn’t say completely not, it’s nice to have a computer, too.

Interviewer: So if, for example, the professor had a switch to flip at 11:01 he could flip it, and everybody’s word processing programs would still be available—you could still type notes and things, but the Ethernet connection would be gone—would that be acceptable?

Katie: Yeah, I think that would be better.

Many students agreed with removing computers from classrooms because of the problems associated with off-task game playing in class. One said:

I think it would be a good idea [to remove notebook computers from classrooms] just because of the games... You have a lot of good resources [on the computer] but they’re also bad because I’m sure you’ve seen a lot of kids play games. I know from personal experience that if you’re in a classroom where [I am] bored or just don’t really feel like being there that day [I] will open [my] computer and play games. And it’s really hard to get away from that when it’s sitting right in front of [me]. Where, if it weren’t, [I] would be listening no matter what. I think that takes away a lot from education...I know I would pay attention a lot more if I didn’t have [my computer] with me. My suggestion would be have [computers], but not in the classroom. Because I think they’re great at home doing papers,
typing, because I can’t haul a big computer up here you know, and [notebook computers] are very spendy, and I think it would be great to have [notebook computers] at home to do papers and stuff, but not to have them in the classroom...maybe stick to [paper] notebook and pencil for notes in the classroom...I think if we do use computers too often people are going to forget how to write with a pen.

A few student interviewees thought that while the computers should stay the games should go, and this response was typical: “I think we should keep on having computers at [NCU], but discontinue all the games or whatever and take them all off and not even like, somehow not even offer...the computers unless you’re out of class...not have us hooked up to [anything other than access to educational materials]. I think that would help.” Like several others, this student noted that notebook computers were often not needed in class:

Thomas: [Notebook computers are] good. But in some [they are] not. I mean, I like [computers], but I wouldn’t, wouldn’t need it. I wouldn’t need to bring it to class.

Interviewer: Okay, tell me about a case where it’s good [to have computers in class?

Thomas: Well, see for me it’s not really good in any way, because I can do just fine taking notes on paper. Some people can’t keep up or some people can’t do it that way, so they need to type faster on the computer so they can keep up. But I can do fine, just fine, on paper, and actually I prefer paper because then I know
that paper is with me, that paper's not going anywhere. I'm not going to lose it on the computer. So for me, I really don't see a benefit during class. Out of class, like for information on the Internet, for papers, it's great.

A male CIS student also advocated the removal of notebook computers from classes because of off-task use: "Well, I probably shouldn't say this since I'm in [the CIS division], but [teachers] could remove the computers from the classrooms." This student believed that while computers might be necessary in computer courses, "computers aren't necessary in [most] classroom[s] while teaching is occurring." A female CIS student concurred: "There are students out there that really don't need their computers..." She also suggested that, "I don't think teachers should allow [students to connect to the Internet] unless it's needed...that would definitely [cut down on] e-mail and surfing the web and stuff, games."

According to some of the students and faculty involved in this research project, notebook computing would only sometimes enhance the classroom learning environment; furthermore, computers were not always considered by participants as essential learning tools. Many faculty had already restricted the use of or removed notebook computers in an attempt to improve the learning environment. But it was a CIS professor who made this reduction in computer use clear when I observed during spring semester of 2000. He stated that computers were not always the best tool to use for teaching and learning, even in CIS courses. During an observation period in a CIS class, as students were packing up their computers at the end of the period, this particular CIS professor said, "I want you to turn in your handwritten homework assignments. Not the ones you do on the computer,
your handwritten assignments." Because this professor put such emphasis on the handwritten portion of the assignment, I stayed after class and asked him about it. The CIS professor stated that, "I've noticed when students cut and paste their homework assignments on screen they don't seem to get as good an understanding of the work. But when they write the homework on their [paper] notebooks by hand, they seem to get a better understanding."

A female student took a moderate approach to technology use in classrooms, and thought perhaps it should not be the computers removed from the classrooms, but the students who are not disciplined enough to use them judiciously: "Those people who can't stay on-task and are going to get bad grades should make the decision to go to a different school. Because you have to know what you're getting into when you come here." But overall it was a student in the business department who probably best summed up students' preference for removing computers from classrooms with her wistful belief in the power of a traditional classroom and a physically present teacher. She said:

I still believe that we should have books in the room. I don't think we should totally go to technology where everything's on a computer, no more books, no more writing. (Because?) Because kids need to learn how to write, too, you know. They just can't type. And it's okay if they get influence off the Internet or influence from other directions, but I think the main direction should be from your teacher in front.
Summary

I organized Chapter IV by assertions and subassertions as I presented student perceptions of schooling at a notebook computer university campus. The findings of the student experience were interesting in that students readily admitted the massive amounts of time they spent off-task in classrooms. A surprising addition to this study was the faculty piece in which faculty identified low morale and a sense of being disenfranchised on their own campus. In Chapter V I will explore in-depth a discussion of the findings of this study in relation to students' perceptions of teaching and learning on a notebook computer university campus.
CHAPTER V
SUMMARY, DISCUSSION, IDENTIFIED PROBLEMS,
AND RECOMMENDATIONS

Notebook Computer University’s (NCU) administration adopted a notebook
initiative in response to enrollment pressures brought on by demographic trends. The
adoption of the initiative was seen as a necessary step toward NCU’s continued survival
in a rural state where universities compete with each other for students. Through
continued exposure to computer technology, NCU students were to become comfortable
with computing through in-class assignments, homework, research, and the development
of technological job skills.

The faculty participants in my study indicated I took a great risk by researching
on the NCU campus. I suspect much of their opinion was derived from so often being
told, “You’ll close our school” whenever they disagreed with administrative strategies.
Nevertheless, as a researcher I am bound to present and discuss my participants’
perceptions, believing I am ethically charged to do so.

I presented the findings of this study relating to student perceptions of a notebook
computer university campus in Chapter IV. Chapter V includes a discussion of the
findings to gain a richer understanding of the student experience on a notebook computer
university campus. The following sections are included in this chapter: good teaching,
technology and good teaching, expensive toys, information availability and knowledge, identified problems, recommendations, and a conclusion.

Introduction

Administrators, faculty, and students held widely divergent views on the purposes and benefits of technologically enhanced education. For administrators, technology was seen as a tool to boost enrollment, to build the university’s reputation as a cutting-edge place, and to enhance graduates’ success in the world of work. At the time of this writing, there had been no appreciable difference in enrollment. Administrators had also hoped to support economic development or maintain a major industry in the community (Hawkridge, 1983; Killion & Smithwick, 2000).

The professors I interviewed believed technology was just one tool in their educational toolbox. They expressed an appreciation for technology in terms of grading, communication, and other housekeeping tasks. Although faculty believed technology could sometimes supplement their teaching, they, like Reynolds and Anderson (1992), noted the extensive prep time associated with incorporating technology into the curriculum.

For students, technology was an enhanced communication and convenient research tool, but job-minded students also believed regular use of technology would serve them well when they departed to the world of work.

The literature was also widely divergent. Of the approximately 79 articles that I reviewed specifically pertaining to technology in classrooms, only nine articles were research studies; of those, seven articles focused on technology and higher education, the
others focused on K-12 education. In addition, I could find only one research project concentrating on “notebook computer universities,” even after I inquired at two notebook universities and at two K-12 school districts. Consequently, the vast majority of the literature I reviewed included essays written by authors discussing others’ research or thoughts, or what those authors themselves believed prudent. There are still too few studies to warrant serious consideration of the implications of adopting 24/7 classroom computing.

Disenfranchised Faculty

Although I did not aim to study or understand the NCU faculty experience, a few words about faculty and their experience might be useful. NCU was a small public university with business-oriented administrators who were attempting to construct the university’s future via technology by attracting larger numbers of students. Administrators were adapting the campus to a spiraling-down, rural economy, and according to faculty, administrators made “pseudo participation” (Freire, 1973/2000, p. 51) decisions without including faculty in any meaningful way. Someone once said that life is like picking raspberries—you miss so much if you only approach it from one angle. Remarkably, all eight faculty I interviewed described their relationship with administration as oppressive no matter the angle they viewed it. Freire (1973/2000) wrote that:

...revolutionary leaders often fall for the banking line of planning program content from the top down. They approach the peasant or urban masses with projects which may correspond to their own view of the world, but not to that of
the people. They forget that their fundamental objective is to fight alongside the people for the recovery of the people’s stolen humanity, not to ‘win the people over’ to their side. Such a phrase does not belong in the vocabulary of revolutionary leaders, but in that of the oppressor. The revolutionary’s role is to liberate, and be liberated, with the people—not to win them over (p. 75).

Faculty might not have perceived themselves as disenfranchised if administrators had solicited faculty support for their educational innovations rather than imposing them from the top down. It remains unclear how the perceived disenfranchisement of faculty members impacted good teaching and learning strategies at Notebook Computer University. It appeared that if faculty relied on technology in teaching they were most likely to use a “transmission” of information method via PowerPoint (Miller & Seller, 1985). Curiously, only one faculty member thought to mention his philosophy of education during all the interviews I conducted.

**Good Teaching**

Whether one believes that the primary purpose of education is to prepare students for life or to prepare them for a job, many have suggested that it is neither the transmission of information nor diverse teaching methods that are essential to student learning (Borich, 1988; Griffín, 1999). No particular teaching style is to be preferred over others when examining student achievement (Dubin & Taveggia, 1968), and good teaching simply cannot be reduced to technique. Good teaching necessarily includes a human being:
Reduce teaching to intellect, and it becomes a cold abstraction; reduce it to emotions, and it becomes narcissistic; reduce it to the spiritual, and it loses its anchor to the world. Intellect, emotion, and spirit depend on one another for wholeness. They are interwoven in the human self and in education at its best...good teaching cannot be reduced to technique; good teaching comes from the identity and integrity of the teacher (Palmer, 1998, p. 115).

The standards have changed from what was originally identified as good teaching:

A good teacher [at the turn of the century] was a good person—someone who met the community ideal for a good citizen, good parent, and good employee. At that time, teachers were judged primarily on their goodness as people and only secondarily on their behavior in the classroom. They were expected to be hardworking, generous, friendly, and considerate and to reveal these qualities in their classrooms by being authoritative, organized, disciplined, insightful, and dedicated. Practically speaking, this meant that in order to be effective all a beginning teacher needed was King Solomon’s wisdom, Freud’s insight, Einstein’s knowledge, and Florence Nightingale’s dedication (Borich, 1988, p. 1).

Those teacher characteristics lacked clear objectives and were replaced by psychological characteristics that were also not helpful in assessing effective teaching. In the twenty-first century, effective teaching is identified by patterns of teacher-student interaction that influences achievement (Borich, 1988).

The influential relationship between teachers and their students is one of knowledge, care, and concern, and these characteristics are considered the primary
components and the foundation for student learning and the learning process (Ericksen, 1984; Good & Brophy, 1997; Grambs & McClure, 1964; Higett, 1950; Morris, 1970; Wolfgramm, 1995). Human contact and care are essential for both the personal and the academic growth of students (Terez, 2000; Riemen, 1986).

Exemplary teachers build trust and are available to students; they make themselves vulnerable in students’ presence (Brookfield, 1990; Higett, 1950; Palmer, 1998). Exemplary teachers respect their students and understand the concept that students have “different ways of thinking and knowing…alternative epistemologies” (Hooks, 1994). These teachers operate in classrooms where students learn the value of structured flexibility (Freire, 1973/2000) which he believed was essential for learning. Good teachers in good learning environments take advantage of every opportunity to demonstrate human contact and care (Noddings, 1984). Noddings believed care was key in teaching and learning relationships and she wrote, “…the primary aim of education is the maintenance and enhancement of caring” (p. 174).

For NCU students, it was the sense of teachers having enough time to listen to students that students regarded as “caring.” Students reported that they preferred close contact with teachers, and no participant in this research study made a connection between great teaching, good learning, and technology. Participants described great teachers as people who physically sat with them, talked with them, listened to them, and helped them over the difficult bumps in the road; however, one NCU professor noted that computers were barriers to human contact and care:
The computers are offering [students] anonymity that's bothersome by having [computers] in classes. People are just looking at those screens and human contact in the class is just very much reduced. [Students] do things on their screens, and one will call the other in to see something on the screen, and it results in there being a sense that it's a larger thing now, and it's being allowed by that computer being there.

If a relationship between teachers and students is necessary for learning, the advent of educational technology, allowing us to stop talking to each other, may negatively impact achievement. But perhaps it is true that technology itself is neither positive, or negative; it is the ethical use of technology in our classrooms with which we must concern ourselves.

Notebook Computer University students said they knew when teachers were caring and available to them and when teachers were not, citing some professors as "busier" than others. It was the sense of not having enough time for students that students regarded as "not caring" for them. In her study of nursing students, their professors, and care, Riemen (1986) wrote on the importance of nursing educators modeling care to nursing students: "The demonstration of the [caring] attribute must be evident for nursing students to see in nursing educators that allow students to develop care for patients" (p. 290). In the same manner, teachers in all divisions should model care to students, because teachers teach as they have been taught (Griffin, 1999). In short, the NCU professors who students described as "great" were connected to their students; they listened, and they cared.
When I talked with NCU students, I discovered that at least two teachers were regularly mentioned as being excellent teachers who cared for their students. I elected to observe both of those teachers to gain an understanding of why they were so often described as “great teachers,” and I interviewed them to discuss their particular teaching relationships and strategies. I discovered that these teachers were far from identical: one taught in education and the other the hard sciences; one was female and the other male; and though they focused on different teaching strategies—one was student-centered, the other lecture-oriented—both were similar in how they encouraged student learning and achievement via contact and care. I have highlighted the similarities I observed:

- Both teachers were warm, funny, and approachable human beings.
- Both considered their relationships with students to be critical to student learning and achievement.
- Both teachers wandered through their rooms making contact with every student.
- These teachers seemed to know their students personally, or at least had some grasp of who students were as individuals.
- Both teachers held very high expectations for students.
- Both teachers were open to, and often used, a mix of teaching methods.
- Both professors did not allow students to connect their notebook computers to the Internet during class without prior permission; computers were allowed only for word processing notes or for activities designed by these teachers for their own classrooms.
There will always be individual differences between teachers, but truly effective educators probably have many of the same characteristics and use many of the same methods including clear learning goals, increased time on task, and frequent assessments (Borich, 1988). I discovered that these professors, consistently described by NCU students as “great,” understood that relationships greatly impacted student learning and that they must demonstrate care for their students. They believed that as educators they must teach and model good teaching and learning relationships, knowing many of their students will eventually teach classes of their own. In addition, these teachers taught their students that technology was a tool for study and research, not a replacement for research or a replacement for human relationships. They noted the value of being physically present in the classroom. Said one: “I want [my students] to know they’re still being taught by a human being. I want to see my students face-to-face.”

**Good Teaching and Technology**

The aim of this research study was to gain an understanding of how students experienced classroom technology on the NCU campus. The students at Notebook Computer University, while being educated to become fully effective citizens and “well rounded employees,” preferred sustained human contact with teachers. It did not escape my notice that the professors I observed tended to restrict classroom computer use either to word processing notes or special research activities in class, and the result was that very often students were either word processing or not using their computers at all. Faculty restricted computer use in class because they believed students arrived in the classroom already tech-savvy; furthermore, the faculty I interviewed believed technology
could play a role in disconnecting students from teachers, and thus from the learning process. Removing the human element of their teaching would remove professors’ contact and care for students. In the classrooms I observed, students either were not bringing computers to class or they were not removing them from their cases.

Students supported this report of underutilization. The vast majority of students included in this research project indicated they were quite comfortable using technology. If they were allowed to connect in class they were typically using notebook computers for note taking or for purposes other than on-task classroom computing.

Despite students’ desire for technology and the administrative rush toward it in classrooms, I am concerned about an educational tool that encourages students to disengage via electronic communications or virtual relationships, rather than engaging with professors via oral communication or human relationships. As early as November 20, 1996, Curriculum Committee minutes reflected that Dr. B, in discussing “virtual university offerings,” stated “Eventually we will be interacting electronically more than in person.” But we’ve long understood that teaching is a complex business involving educational strategies and good human relationships. Weston (2000a) wrote that:

Much is known about improving learning without using computers...best are cumulative approaches with clear learning goals, robust curricula, increased time-on-task, improved teacher competencies, incentives for teachers and students, frequent assessments, skilled leaders, proven models, strong student relationships with caring adults, and involved parents and communities. This means that the
computer-achievement connection must become more rooted in proven pedagogy in order to produce learning gains (p. 1).

And that means faculty who want to improve teaching and learning via technology will first have to utilize technology. Teaching that includes technology cannot be enhanced or improved if computers remain in students’ cases or in their dorm rooms.

Why was faculty less than committed to utilizing technology in classrooms? Six of eight faculty members confirmed that their experience with on-line classroom computing was similar to one professor’s experience who, over the 14-week period I observed him, was exactly the type of teacher students identified as great: engaging, humorous, enthusiastic, knowledgeable in the content area, good at telling stories, and available to students. And yet, during the first part of the semester when on-line connections were not only allowed but encouraged, the majority of students in that class were completely focused on their notebook computers, with apparent disregard for the professor. Curiously, the NCU students who remained on-task--indicated by attention paid to the professor--generally were students who did not use their computers in class.

If students focus on machines or technology rather than their human teachers and their peers, would the opportunity to fully communicate with others and argue different perspectives exist? Would electronic teaching and learning seem one-dimensional and sanitized, like an e-mail message from administration informing faculty that a beloved, retired professor had just died? How will schooling change when students and teachers no longer have conversations, when there is no nonverbal communication, either, due to communications keyed all in the same font? This study does not answer those questions;
perhaps more research designed for on-line university courses would help. But clearly the relationships between students and their professors will be impacted by the increasing use of classroom technology.

Unfortunately, the students in this study admitted that notebook computers and the convenience of electronic communication impacted their relationships with professors by removing the human element of care and connection from teaching and learning. When students went to their classes and made Internet connections, they disregarded exactly what students initially said they preferred: closer contact with teachers. Professors sometimes looked out over a group of students with heads bent low over keyboards, talked to the tops of students’ heads, and in one case a professor said she was so disconnected from her students that she would not even be able to identify her students by their faces. That professor said she was losing her enthusiasm to teach because of the lack of relationship with her students. She had initially been energized about classroom computing but recently removed her rose-colored glasses. Although she had been excited about the prospect of incorporating technology into her lessons, her practical experience had been so negative that she was no longer in favor of a technological revolution. Technology was not “turning out right.” That professor added technology had, in many cases, affected her students’ achievement, her enthusiasm to teach, and her desire to connect with her students in the classroom:

At some point [the active e-mailers] will have to make that connection [between poor attention in class and failing grades]. They’re going to flunk out, and they’re going to realize at some point, not right away, but soon and for the rest of their
lives that they’re the ones who have to make some commitment to the human part of the class because the computer’s not strong enough. [I] don’t feel like going and [teaching] in my classroom anymore. In fact, I just saw that I can put [my lessons] on Internet radio. [That way] my lecture will come over the radio. I’ll just sit in my office and talk (sarcastically).

A professor “teaching” from her office reminds me of Freire’s (1973/2000) suggestion that technical pedagogy has moved us toward a “ready-to-wear” education, increasing the distance between professors and students (p. 57). Perhaps not surprisingly, people have generally had the opposite desire—to care for and remain connected to others. Tell (2000) wrote:

The banking industry was absolutely dumbfounded by a study that they sponsored, the results of which were reported a couple of years ago. The bankers thought that people wanted more efficiency, quicker tellers. They discovered that people wanted more human contact from their banks. I think we’re going to find out that technology is not going to bring us wisdom (p. 198).

The professors I interviewed at NCU believed in the power of the student/teacher relationship, that a school cannot exist without interaction between faculty and students, and that technology cannot be a substitute for interaction. Good teachers are involved in social interaction with students and that can preclude technology. What computer can teach a student what it is like to go on a nature walk with a group of future biologists? Being in Berlin when the wall came down was a very different experience than viewing the same event on screen, and getting a hug from a parent is different than seeing a parent
on screen and kissing a camera. Technology cannot substitute for real life experience or interaction. Virtual relationships may bridge a gap, but computers cannot reach out and connect to students who want a connection to their teachers.

Human contact is essential and it does more than just feel good. Rubin (1997) wrote that denial of touch has biochemical consequences; a mother's touch aids in the moderate production of hormones linked to memory and learning. Children who had wide peaks and valleys in their hormone level, such as institutionalized Romanian orphans, scored lower on motor or mental ability tests. So if we are to educate students, professors and students should be physically present in the classroom. Machines cannot care about students, or connect to students the way that only human beings can. Still, we sometimes fool ourselves into thinking machines have emotions, are interested in students, or care about students' learning. Participants in this study were often heard making animistic comments about their machines as if they were capable of human emotion: "My computer hates me!"

Those who design technology apparently understand the impact of human relationships on teaching and learning and have attempted to duplicate the human experience, via hypermedia, to improve learning. Hypermedia is an "advance" in technology that will hopefully increase access to information and increase learning (Holdren & Blankenship, 1998) and is described as the delivery of information in a computerized presentation that "integrates two or more kinds of media including text, graphics, motion video, still video, voice recognition, animation, and sound (Beckman, 1991, p. 190). Hypermedia blends voice and movement on screen to provide an "almost
human-like interface” (Dvorak & Seymour, 1991, p. 190). Perhaps hypermedia is an Information Age response to the lack of shared human experiences via technology, but it is still a virtual experience. It is an interface, not a relationship. Moreover, if hypermedia is shifting to more human-like characteristics, perhaps human relationships in classrooms supplemented with technology rather than interfaced, electronic relationships between students and their teachers, is truly the best way to learn. If imitation is the sincerest form of flattery, perhaps that is why researchers are attempting to duplicate the human experience in teaching and learning.

Clearly the human element is essential to the teaching and learning process. Recall Dr. A’s reference to his “most memorable” educational experience where he submitted two answers, the first crossed out but correct, the second wrong but submitted, as his final answer. His human teacher recognized that Dr. A had learned the material, but that might not have happened had Dr. A submitted his answer electronically. He quite likely would have archived his first answer in an electronic file folder and submitted the second. Although Dr. A is a staunch supporter of technology in schools, the human element in his most memorable incident might fail to translate into practice in a technologically-enriched learning environment. A computer would not have recognized his mastery of the material.

Someone once suggested that none of us can remember or name the last five people to have won a Nobel or Pulitzer prize, or that we often cannot name the last five World Series or Heisman trophy winners. But just ask us to name five teachers who aided our journey through school, or name five people who taught us something
worthwhile, and we are likely to respond by naming teachers sometimes from far back in
our memories. The lesson is that the people who make a difference in life are not the
ones with the most awards, credentials, or money. The people who make a difference are
the ones who care.

Expensive Toys

Adopting technology at NCU was a very expensive roll of the taxpayers’ dice.
Dr. A, in an article on how one notebook university went “laptop,” stated that, “We had
to invent every decision as we went along, and we could only go on faith that [spending
money on an expensive technology initiative] would be worth doing.” Dr. B either did
not know or did not want to admit how much money had been spent on implementing the
notebook computer initiative, but he did say they have “probably” spent over two million
dollars. The cost of implementing technology initiatives mounts quickly. Holleque and
Cartwright (1997) wrote that their notebook computer university and another notebook
university had spent over three million dollars each, almost half of each school’s annual
budget. I asked another NCU administrator, Dr. C., about the annual technology budget
and the total amount spent on technology to date at NCU. His response: “The annual cost
for the notebook initiative at [NCU] is approximately $1 million per year. My best guess
of what the total notebook initiative has cost [NCU] since 1996 [is $5.4 million]. Also,
very important-MOST of the estimated [$5.4] million…was SELF-FUNDED by
technology fees and federal grants.” Using NCU’s own estimates, and if the student
population held steady at 600 full time students, the annual technology fee of
approximately $954 assessed each student, over a four year period, would have amounted to approximately $2.3 million of the NCU administrative estimate of $5.4 million.

If approximately $5.4 million dollars have been spent on introducing technology at NCU, on what research did administrators rely to support their decision to invest public money on such an expensive system? No one seemed to have any idea, including three NCU administrators, a technology researcher at another notebook computer university, and two technology educators in a Great Plains K-12 school district. Two persons stated they were only now gathering baseline data, but people could recall no data that showed technology would be a worthwhile classroom tool at the time schools began adopting technology initiatives. Furthermore, a key management official near the top of this state's university system admitted the transition to notebook computer university required extensive funding, no matter whether the funding came from the federal government, state government, or student technology fees, to implement notebook computing in his state. When asked on what research two state universities based their decisions to "go laptop," she said this:

You may be able to go to [three other notebook computer universities in the nation] and ask your question [about where the research is which the university system based their decision to infuse massive amounts of money into technology]. They implemented multi-million dollar laptop programs...on the basis of emotional rhetoric? There must be something provably enriching (said sarcastically) about the technology environment...
Indeed, in 1997 when NCU adopted their notebook initiative there was little convincing evidence that indicated classroom technology enhanced learning or would do more than differentiate the school from the [number of] others in the state. Today, in the twenty-first century, the founder/director of the Campus Computing Project, the largest continuing study of the role of IT (Information Technology) in American higher education, still cannot cite research that indicates technology makes a difference in learning:

...As [a university provost and I] explored various aspects of the technology conundrum confronting colleges, we affirmed, but did not acknowledge, that we knew too much and at the same time knew too little about technology. We knew too much because we knew, in our heart of hearts, that technology does make a difference, should make a difference, and will make a difference. But because we were both trained as academics, we knew that we could not rely on our hearts alone. Like others, we could believe in the benefits of technology, even describe some firsthand experience. But until we could see the research, our heads were not fully aligned with our hearts (Green, 2000b, p. 1).

Though it seemed professional educators appeared to believe computer technology was progressive, it remains a highly touted educational innovation, but one that lacks the necessary data to support the vast financial investment associated with it. Moreover, expensive technology systems could change humanistic teacher-student relationships to objective, machine-operator relationships. Perhaps Stross (2001) summed it up best: The
push for technology in schools without adequate research “is not the result of calm, scholarly reasoning; this is a full-blown frenzy” (p. 37).

Education Versus Vocational Training

The massive funding associated with adopting technology and the lack of research to support its adoption aside, the education at NCU, according to the NCU strategic plan, was to assist students in becoming desirable and well rounded employees. Notebook Computer University never was a liberal arts school, but it was never a vocational training center, either. I believe that notebook computers are not changing education for the better; on the contrary, computers are presenting a whole new set of problems which educators and administrators may be ill prepared to handle. For example, computers and an information society have profoundly changed the schooling mandate from one of overall preparedness for life to job training and skill building. A 2001 NCU report to investors confirmed that in NCU’s case, “partnerships” with at least two corporations involve curriculum that is customized to [corporations] requirements.

Are liberal arts education and job training mutually exclusive, should the words “education” and “training” be used interchangeably, or should there be some synthesis of the two? At NCU, Dr. B used “education” and “training” interchangeably, an apparent synthesis of vocational and liberal arts education: “So do we call it education, can we call it training, I choose not to get tied up in that terminology because it’s all part of the package, you know.” But consider the difference between these two simple words: “sadness,” and “grief.” Language, doublespeak, and doublethink do make a difference, as Orwell understood when he wrote his popular nove’, 1984. Brunsdale (2000) wrote,
“Orwell...knew that technology could be combined with twisted language
to...manipulate information....” (p. 156). Howley and Howley (1995) suggested that
doublethink “disguises the mechanics of sorting students for the workplace as a process
of self-actualization, the assurance of equal opportunity as a legitimate substitute for
equal distribution of educational resources, and the market’s need for brain-dead service
workers as a mandate for critical thinking in the schools” (p. 130).

Snider (1992) also recognized how language can be used to give old educational
ideas new meanings while remaining the same:

During the first half of this century, visual aids were ignored by textbook
publishers and pooh-poohed by librarians. Beginning with [the National Defense
Education Act] in the late 1950’s, federal funds changed all that. Audiovisuals
soon became known as educational media, while school libraries became media
centers. By 1970 the phrase “instructional technology’ was in general use. Such
terms were sometimes used to designate a new idea, but more often they were
simply new bottles for the same old wine. After all, hadn’t experimental
psychology become behavioral science, and hadn’t garbage become solid waste?
(p. 316).

To call liberal arts education “training” is to change the very nature of the liberal arts.
There is a need for both liberal arts education and vocational job training, but they should
not be mistaken as identical or interchangeable types of schooling. Moreover, schools
that are “training” students for jobs may just want to admit that, instead of stating they
are providing a liberal arts education. Is there anything inherently wrong with NCU
wanting their graduates to stay in the area, work, raise families, and help the region grow? Not particularly, but those were not reasons for a liberal arts education where the goal was to prepare good citizens for well-rounded lives. The schooling at NCU has been directed toward reaching economic goals rather than broader liberal goals. Unlike other state university academic catalogs that list liberal arts goals, NCU administrators seemed unconcerned with the goals of a traditional liberal education: the ability to make informed choices, to communicate effectively, intellectual curiosity and creativity, continuing commitment to learning, capacity and interest in serving others, sense of responsibility both to specific communities and to a culturally pluralistic world, and greater personal satisfaction through access to the larger social, political, economic, scientific, and aesthetic culture.

The pressure for NCU, and other universities in the state system, to become vehicles for economic development might have begun in the state legislature. Notebook Computer University's administration, a "Roundtable" developed by the state legislature and charged with "reshaping" the state's university system (Killion & Smithwick, 2000, p. 21), indicated that the university system should take an active role in the region's economic development:

In a nutshell, the future success of both the state and the university system are linked. It doesn't call for a replacement to a sound liberal arts education; that's still the basis for success, but we must do some things in addition to help with economic development (p. 21).
But it did seem that a liberal arts education was becoming secondary to economic development strategies. The majority of NCU administrators and students I spoke to equated education to job training, and students very often stated their liberal arts courses were a "waste of time" because those courses would not help them find or keep a job.

There was another indication that a current trend is for higher education to prepare workers. Another of the state's [number of] colleges and universities recently produced a Winter 2001 bulletin that indicated their university would "expand and strengthen the University's commitment to research and creative activity, both as a means of enriching the learning environment and as a driver for economic development."

Contrary to the administrative, and perhaps Roundtable, perception that technological skills immediately vaulted students to the head of the class or assisted with economic development, NCU faculty believed that critical thinking and the liberal arts were the foundation for all educational activities. There is nothing wrong with preparing students for jobs in "the real world," the world outside the university. But a conflict may exist when a university and the wider university system focuses on job skills acquisition, training, economic development, and marketing students for jobs, yet still sees universities having different missions than vocational colleges. Nevertheless, NCU administrators seemed focused on preparing students for work, traditionally a vocational college mandate (Agre, 1999; Hawkridge, 1983; Nelson et al., 1996). DuBois (1973) warned that schools must do more than furnish employees for industry. He observed that while earning a living is important, people are more important than earning a wage and students should learn how to make a life, not a living. "The economic adaptation of the
Negro to the South must in education be subordinated to the great necessity of teaching life and culture...the object of education was not to make men carpenters, but to make carpenters men” (p. 63).

Just how important are the liberal arts to the education of young people? If you were to ask a variety of well educated individuals what the two most important college classes are that students should be sure to take, you might expect many would sing the praises of computer technology. But here are the intriguing, “Industrial Age,” responses:

- **Charles Vest, President, MIT**: Contemporary Physical and Biological Science and Literature.
- **Patrick Swygert, President, Howard University**: Logic and any foreign language.
- **Ben Trachtenberg, Yale Student**: Classical Thought and History.
- **Donna Shalala, Health and Human Services**: Shakespeare and Introduction to Computers.
- **Leonard Slatkin, National Symphony Orchestra**: Philosophy, History of Music, or a language.
- **Steve Case, CEO, America On-line**: Two broad-based liberal arts courses.

Of the six people who offered their responses (Strauss, 2000, p. B3), only one advocated technology and it was not the executive who would presumably stand to gain from incorporating technology into the curriculum. Shalala’s rationale in suggesting computer technology was that computer technology will be necessary for any future career, but she believed it equally important to learn about the human spirit via literature. Shalala advocated a synthesis of one introductory-level computer class and literature. Case
believed a broad based, liberal arts education is becoming more important than ever because “having in-depth knowledge about a specific topic is useful...in more chaotic, transformative times, it’s much better to know a little about a lot of things. Generalists will be more valuable than specialists—and that means there will be a resurgence in a liberal arts education” (p. B3). The other respondents suggested the courses they included because they believed students should expand their minds and their ability to think, appreciate the essence of humanity through poetry, or at least understand that even in an electronic age “the printed page remains the most powerful channel for connecting one mind or spirit with another” (Strauss, 2000, p. B3). It would not have occurred to Thomas Jefferson, as it does to our political leaders today, that “[students] should be taught to read exclusively for the purpose of increasing their economic productivity” (Postman, 1996, p. 13). Training students to read only for jobs may not ensure that citizens will “know when and how to protect their liberty” (Postman, 1996, p. 13).

Unlike NCU students, Yale student Ben Trachtenberg was not concerned about the education/employment connection: “If education is to mean something beyond job training, perhaps even the creation of good citizens, it must be grounded in some sense of a shared experience. Without that, it’s hard to imagine Americans sharing a vision for the future” (Strauss, 2000, p. B3).

Perhaps these people have had their lives informed and enhanced by liberal arts courses and they understand technology should supplement courses, not reduce course content to passive transfers of information. Knowledge comes from connected pieces of information, information that connects us to ourselves, to the world, and to each other.
Information Availability and Knowledge

Our society appears to have bought into the “more is better” idea when it comes to information, even when the information available was not critically assessed. Some write that students should not try and learn all the information that is available to them; they need only have access to information. They do not need to learn more material as long as they can easily retrieve information when they need it. Students should focus on learning “knowledge of personal significance” (Grabe & Grabe, 1998, p. 18).

The student and administrative participants in this study often linked the availability of knowledge to learning and education. Students in particular believed that technology helped them learn simply because of the abundance of information available via the World Wide Web. They did not seem to understand that passive availability of information is different from the active process of learning. To say that students have learned because they sat with a computer and had access to vast amounts of information on the Internet would be the same as library patrons believing they were educated simply because they walked through the stacks.

Good teachers understand they cannot simply present information and expect that information will magically transform into knowledge. Teachers and students must do something with information or risk transmitting “inert” ideas (Whitehead, 1929, p. 13). Inert ideas are those that are presented without making connections to other ideas or connections to students’ lives. If the ideas remain inert, we risk presenting too much information and “fact shoveling” (Talbott, as cited in Guernsey, 1999, p. D7).
Education must be active. True “liberating education consists of acts of cognition, not transfers of information” (Freire, 1973/2000, p. 60), and without dialogue there can be no communication and no education (Palmer, 1998). Providing information simply is not enough for real learning to take place:

The problem with our technologically inspired views of education is that we have come to expect learning to be a function of the rationality of the information provided. In other words, we assume that if the material is well organized and logically presented, students will learn from it. Nothing is further from the fact. Students will learn only if they are motivated. The motivation could be extrinsic—the desire to get a well-paying job after graduation—but learning essential to a young person’s self must be intrinsically rewarding. Unless a person enjoys the pursuit of knowledge, learning will remain a tool to be set aside as soon as it is no longer needed. Therefore we cannot expect our children to become truly educated until we ensure that teachers know not only how to provide information but how to spark the joy of learning (Csikszentmihalyi, Rathunde, & Whalen, 1993, p. 89).

Wisdom, to some extent, depends on having access to information and a subsequent accumulation of knowledge. People might become knowledgeable when they have had access to information, but those same people must have actively done something with the information and knowledge to transform it into wisdom. Wise teachers, for example, are knowledgeable, they present and connect information, and they
take into account how the information they present, and their own actions in the classroom, will affect students for years to come (Augsburg Fortress, 2000).

Student Perceptions

Students were hard-pressed to identify how all that available information via technology helped them learn, and they readily admitted the library played little or no role in their education. Only three of 20 student participants recognized that serious research cannot be conducted solely via computer; trips to the library were still necessary. Students were forthcoming when discussing other limitations associated with technology or how they might stay more on-task by removing games from their computers. Suggestions such as those were generally moot, however, because of the contradiction their suggestions represented. In this case the suggestion was problematic because in a “24/7” computing facility students become savvy enough to reinstall their own software. And that was precisely why students were exposed to 24 hour computing in the first place: to become computer savvy and master many applications. Uninstalling games would be pointless.

Students generally believed if games were available they would play them, and that game playing negatively impacted their learning. Students also believed that they were unable to disconnect from the Internet or close their software applications if they so chose. Although students admitted they should be responsible enough to turn off their games and Internet connections, or “unplug,” they viewed their inability to do so as something external to themselves, something they could not control and were powerless to change. The motivation to unplug apparently needed to come from an external source,
most often identified as professors. Students failed to realize they had the power to turn
off their computers, but they gave away their power to do so. Traditional age students
described themselves as simply being unable to push back from their screens and stay on-
task because the tug toward computing was simply too strong. But nontraditional
students were the exception to the computer addiction rule. They more easily recognized
their individual power to turn off their computer and turn on to their lesson. The more
mature students understood it was their own responsibility to remain on-task, and they
were different from traditional students who were very likely off-task. As one traditional
student said, "Those older students...they're here to learn!"

Because technology exists does not mean it will be used effectively or that
students will learn more. When NCU students had computers in classrooms at their
disposal, most students went off-task, appearing bored with their classes. Furthermore, a
few students and one faculty member noted that students seemed to learn more and better
when they wrote their notes or assignments by hand. Prain and Hand (1999) wrote that
students get a positive effect on the quality of their learning by handwriting assignments.
Handwriting assignments required students "to look in detail at their own thinking.
Diversified writing gives students a greater sense of ownership and control over learning”
(p. 151).

Both traditional and nontraditional students suggested classroom notebook
computing was convenient and they endorsed computer use, but several students
observed that their learning environments could be improved by restricting classroom
computing. Without the constant distraction of technology, students said they would be
better able to connect with their teachers. Were students correct that computers were not necessary in all classrooms? Just as students learning to sew need sewing machines, computers are probably necessary when learning to program. But students studying social science, physical education, or other areas might not require a machine to learn. Computer use is, in most cases, course specific.

Integrated Technology

If the foundation of education is the relationship between students and their teachers, why would professors introduce a machine that can provide information yet also become a barrier to the very relationships said necessary for learning? There must be sound pedagogical reasons for inviting technology into our course content. Faculty must know what students will do with technology, with their networked connections, and how networked connections will aid in learning course content. Effective uses of electronic connections in classrooms might consist of science or chemistry experiments, offering students a chance to simulate mixing chemicals without the danger of mistakes. Perhaps a music teacher might send his/her students to an Internet site where students could hear Mozart’s Requiem or could hear one of Beethoven’s symphonies. A teacher might ask his/her students to connect to the Federal Bureau of Investigation’s site to view the latest juvenile delinquency statistics, or go to a Sistine Chapel website to view photographs of the chapel before and after recent renovations.

Effective uses of technology, when carefully selected and integrated by educators, are possible. But introducing technology in classrooms can negate traditional information sources used by generations for learning: "personal observation and sensory
interaction" (Mander, 1991, p. 59). When the decision is made to introduce technology into schools, one of the first priorities should be instructor training: “Teacher training for technology use and integration of technology into instruction had the highest priorities among possible investments in educational technology…” (Westbrook & Kerr, 1996, p. 53). Teachers cannot make informed decisions about integrating technology if they are unfamiliar with the medium. Teachers should then consider why they want to integrate technology into course content, and how student learning will be enhanced. Is the goal to have students do work related to course content, to have students learn how to think, to learn how to learn, or some synthesis of all three?

Roblyer and Edwards (2000) suggested that teachers fully develop a plan to make a technologically enhanced activity a successful learning tool. Teachers should ask themselves where the activity will fit into the existing curriculum, and teachers should be able to articulate the benefits technology will have on the lesson. Will students be working alone, in small groups, or as a large group? Teachers need to be certain the hardware and software they have available to them will support the activity they want to incorporate, as well as whether students will be able to complete the lesson within the classroom or whether they will need to move to a computer lab. And, similarly to teachers using traditional methods, teachers may need to teach prior to a technological activity taking place, and they will need to know how much time students will need with their computers. It must be remembered that Roblyer and Edwards’ suggestions for adopting technology are for K-12 classrooms, but the same integration strategy might be used in university classrooms prior to beginning an on-line activity.
Currently, there are enormous expectations for teachers to integrate classroom technology, often without regard to how learning will be impacted. There has been a general understanding that because something is possible it should then simply be, but just because technology exists or is available does not mean students will benefit. Add to that the high cost of including technology in our schools and there ought to be solid reasons to integrate technology into our classrooms. I believe that technology should be introduced into schools for better reasons than preparing workers for jobs or supplementing a region's economic development.

Much of the literature on integrating technology in classrooms focused on how to get computers and other technologies into the hands of every student, not unlike the situation at Notebook Computer University. Yet I did not observe professors transforming course content by including technology; in fact, I saw professors who enhanced the same lectures or class activities via PowerPoint or music. Pedagogical strategies at NCU, "enhanced" by technology, had not moved far from traditional strategies. Exemplary teaching may very well be supplemented by the integration of technology, but the implementation of technology should be continually monitored to assess the impact of it on student mastery and achievement. Although some promoters of technology focus on the possibility of transforming higher education, the findings of my study do not allow me to make generalizations about a positive impact of technology on education.

Identified Problems

Many students indicated they had come to NCU to be in smaller classes, on a smaller campus, where they would be more than just a number or a body in a huge lecture
hall. But computer technology in classrooms seemed to provide distance between faculty and students—the distance that students had preferred to avoid in the first place. There were a number of other contradictions:

- Students viewed having access to information on the web the same as learning information.
- Students did not correlate good teaching with technical adeptness.
- The student definition of learning was often confused with learning to use computer hardware and software.
- Students and administrators viewed education and job training as the same.
- Teachers providing PowerPoint slides either on screen or via e-mail often made students more passive in the classroom by doing the students’ work for them.
- Notebook computers were convenient but impersonal tools which did not enhance the student/teacher relationships that are essential for good learning.
- Administrators believed that technology would actually improve communication, but in some cases it inhibited communication. Furthermore, if students and professors were uninterested in communicating with each other, how could technology improve communication that had yet to occur?
- Researching any time, any place, via notebook computing gave students the option to avoid the library.
- There has been no differentiation between classroom word processing and classroom computing.
• Technology was adopted without the benefit of research to assure that the infusion of technology was indeed worth the multi-millions of dollars invested in it.

• Students' academic achievement was measured by employer satisfaction.

• The notebook initiative was adopted to improve enrollment; no significant increase in enrollment was noted.

Recommendations

The aim of this research study was to discover how students experienced learning on a notebook computer university campus. We must have continued research into the question of how computer technology impacts student learning and how it prepares our students for life. In this particular case, NCU students would most likely use their computers for off-task use and for job preparation. Additional research on classroom computing is necessary to understand if the experiences of NCU students were unusual or predictable behavior at a notebook computer university campus.

There should also be research which focuses on graduate success in the field. Are graduates truly prepared to be technological experts in the world of work? How often do graduates telephone NCU help desks or faculty for assistance with technological problems they are unprepared to solve? If the majority of what students experienced in NCU classrooms is word processing notes or writing papers, they may be no better prepared than students from a traditional campus to promote themselves as tech experts in their fields. Although there was some discussion and anecdotal evidence about this phenomenon in faculty interviews, this is an area which remains unexamined.
What is needed is credible, broadly supported research on the organizational impact of technology use, and on the anecdotal and unexpected consequences of technology (Levinson & Surratt, 2000). At this time it remains to be seen whether students who pay expensive technology fees receive their money's worth, or if students would be better served by limiting technology use to classes largely attended by more responsible upperclassmen, students studying in their major field. For maximum student success, perhaps NCU attendees should be mature enough to view the computer as a tool for study and research, not as a toy or replacement for teachers.

As leaders on a notebook university campus, administrators could begin conversations with faculty and repair their strained relationships through trust and support, key components for increasing employee morale (Aurelio, 1996). Faculty would need to be willing to work toward resolution, and administration could create safe opportunities for interaction with faculty and staff to achieve follow-through on projects. Considering the high level of fear and paranoia faculty self-identified, faculty need to know they would be working toward resolution in a work environment free of retribution. Faculty need real voice on a variety of issues including how administrators might be more helpful to faculty in getting and keeping students on-task in the classroom. Administrators could choose to take time to visit classrooms in an attempt to gain an understanding of how faculty and students experience classroom technology, or at least review the research conducted on notebook university campuses. Although Kempel and Strand's (2000) research indicated some technologies had more positive impact than others, faculty reported they were unfamiliar with the research, and no conversations
ensued about how to use those findings to effectively adopt technology into the curriculum. If administrators did visit classrooms, perhaps they would see and hear what I saw and heard from many students. Said one: “E-mail....sadly, is probably one of the top two productive uses of the computer.”

Faculty might consider talking with other educators about their experiences with technology in classrooms. It would be useful for faculty to admit to administrators just how much off-task computer use actually goes on in classrooms, urge them to confront this problem, and perhaps begin to work together to solve problems and deal with the unintended consequences of technology in classrooms. Faculty might also consider instituting an informal assessment process in their classes. They could ask students to comment on technology use, teaching strategies, and any other area on which professors desire feedback. Students would most likely be helpful; the student participants in this study were more than willing to be open and honest about their experiences at a notebook computer university campus.

Independent educational researchers should conduct necessary research studies, not the computer industry which clearly has a conflict of interest in proving technology positively impacts education. A case in point is a notebook computer university studying the effectiveness of notebook computing on their campus in conjunction with a large computer corporation, or a computer corporation congratulating the president of a notebook computer university for adopting a notebook technology initiative, telling him he’s doing “everything right.” Said an NCU administrator: “Corporate executives are frustrated with other colleges for lack of vision and courage and with their own company
for its focus on other priorities. They are eager for everyone else to catch on to what we are already doing. We are more special than we realize.” It seemed obvious that computer executives would like more universities to be “special” by going laptop to sell more product, regardless of the impact on student achievement.

Conclusion

Computers will continue to play a role in teaching and learning as society moves further into the Information Age and as we continue to focus on preparing students for jobs. But perhaps the problem is not with computers, but the way in which information is presented via computers. Concerned educators preferred that teaching tools be essential to learning, and do more than provide students a toy with dubious effect on achievement. Unless pedagogy changes to effectively integrate technology into the curriculum, technology will remain on the periphery, an expensive tool to present slide shows, an expensive toy with which NCU students will play.

Wise teachers and administrators must understand the role machines play in impacting the relationship between students and their teachers and how machines can and cannot prepare students for life. There are serious consequences: “If children are separated from their parents by hours of TV, from their playmates by video games, and from their teachers by teaching machines, where are they supposed to learn to be human?” (Kester, as cited in Mander, 1991, p. 62).
APPENDICES
APPENDIX A

CONSENT FORM
Qualitative Research Project: Dissertation
Rilla J. Anderson, Student Researcher
Dr. Kathleen Waldron Gershman, Committee Chair/Supervisor

Dear Students:

I am a doctoral student at the University of North Dakota studying Higher Education. One of the requirements for my degree is to engage in original research which will culminate in a dissertation. I am interested in learning more about student adjustment to mandated notebook computing. I have received written permission from the professor to engage in this study. Research questions will emerge from my observations, although I am specifically interested in student use and adaptability to technology in the classroom. It is my hope that any knowledge gained as a student of qualitative research regarding classroom notebook computer use will contribute to the existing body of knowledge of classroom technology.

My research will involve at least 20 hours of observation in the classroom, excluding interviews with the professor and selected students. I expect to select 15-20 students to interview based on my observations of notebook use in the classroom. All interviews will be conducted for approximately one hour outside of regular scheduled class time, and interviews will be audiotaped for transcription purposes. Tapes will be erased and transcripts destroyed, but I am required to retain data for three years following the completion of the study. Although the resulting dissertation will be published and will be available on the shelves of Chester Fritz Library at the University of North Dakota, this study is completely confidential, releasing no identifying information on any participant. Participation in this study is voluntary; there is no penalty for refusing participation, and a participant may discontinue at any time. If you have further questions, please contact me at 701-488-2660, or via e-mail at jonander@polarcomm.com. Thank you for your consideration.

________________________________________
Rilla J. Anderson, Student Researcher  Date

________________________________________
Interviewee/Participant  Date

By signing this form, the participant certifies he/she is 18 years old or older, which will be verified by [Notebook Computer] University’s registrar’s office via FERPA, the Family Educational Rights and Privacy Act of 1974 (age of student is open information).
APPENDIX B

CODE WORD LISTING

- Code Families
  - ACADEMICS
    - DIVERSITY
    - DUMB STU
  - GENERAL
    - LAZY
    - WELL ROUND
  - GRADES
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