Laptop’s In Education – Hype or Help?

A Master’s Thesis

Presented to

The School of Arts & Sciences

SUNY Institute of Technology

Utica, New York

In Partial Fulfillment

Of the Requirements for the

Masters of Science Degree

By

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December 2006
Approved and recommended for acceptance as a thesis in partial fulfillment of the requirements for the degree of Master of Science in Information Design and Technology.
Abstract

This study examines the impact of introducing a laptop program for educational teaching in the classroom. By interviewing experts in the field, teachers, administrators, and students at a college level, a phenomenology was completed on the impact of laptops in pedagogy. These ideals were then applied to the Human-Centered Design Theory.

“It was not until twenty years ago that serious progress was achieved in applying the available computer and internet technology to support teaching and learning in schools and institutions of higher education. The technology that was previously only available to large corporations and organizations began to be available in homes, schools and universities. This new shift in technology application has provided both students and educators many new advantages and learning possibilities (Altabib, 4).”

The numerous ways in which professors and their students interact has always been a critical issue in higher educational institutes. With the increase in technological enhancements over the past several years, study is needed on how collaboration between faculty and students advance.
Acknowledgements

This thesis project could not have been written without Dr. Kahn who not only served as my advisor but also encouraged and challenged me throughout my time at SUNY IT. I would also like to thank Jean Boland for her invaluable assistance, guidance and motivation during the project. Thank you all.
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Section 1: The Vignette

Professor Steven Thompson looks over the faces of his students and with a glint in his eyes prepares to hand out this semester’s major project. The project incorporates researching all aspects of a species of tree that interests the student. The project requires two students to work as a team and use some of the libraries references, find at least three articles on the Internet, write a report, as well as present a summary to the class.

Professor Thompson says to the class, “Okay, everyone, you are going to have to do a presentation in class. You are allowed to use the overhead projector or the desktop computer that we have here in the room. If you want to use the desktop computer then remember that it uses Microsoft PowerPoint. You should be able to use the computer lab downstairs if you need too. Now remember, this will count as 40 percent of your overall grade. If you need any help at all I have my office hours posted on my door.”

As the assignment is passed around, Joe is teamed up with Nick. Nick and Joe begin to discuss when they can meet and on what sections of the project each should work. Joe and Nick begin to talk about what should be in the sections they each will complete. Joe says “Well, I live on campus and have access to the computer lab downstairs. I think I should work more on the presentation and getting some reference articles on the Internet.”

Nick replies, “Yeah, I was thinking the same thing. I cannot work on those aspects of the report since I don’t have access to a computer at home. I know that the computer lab downstairs can be an annoyance because everyone is trying to do their projects this time of year.”
Joe begins to realize that completing this assignment is going to be much more difficult than he previously had thought.

Joe thinks to himself “Nick is a commuter student with no computer at home. How am I going to collaborate with him on this project? I suppose I could call him and meet him at school outside of class a few hours a week?”

As the class ends, Joe walks out the door and thinks to himself “I’d better get down to that computer lab. This time of the semester it is always busy with everyone trying to get their projects done and I may end up waiting for my turn on the equipment.”

As Joe enters the computer lab he finds that his worst fear has come true and the lab is full of students. Joe looks around with a scowl on his face but then notices his friend Rick working in the corner. Joe walks over to Rick and says “This is crazy! I ran down here right after class and there isn’t any computer to use. I really need to get a laptop. Even though the cost of getting a laptop is a great deal, it still beats coming down here and waiting for a computer to open up.”

Rick replies “Yeah, it really is too bad we all don’t have computers of our own; we could meet anywhere we wanted to. I hate having to meet in places where it’s way too noisy and we can’t get anything done. It would be great to meet where we feel the most comfortable, but I am leaving in a few minutes so you can have my seat.”

Joe sits down to do his initial research on his project. He goes out to the Internet and uses a search engine to find articles on the Norway spruce tree. He finds a few pictures and begins to create his section of the presentation.

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**Section 1: The Vignette**

5
Joe thinks to himself “Well, I could email my section of the presentation to Nick if he had a computer and an email address. I guess I will save it to my floppy disk and I can meet with him later on.”

After working for a few hours Joe is well on his way to finishing his presentation and decides to go to dinner. On his way out he notices a flyer on the wall and becomes very excited. The flyer says “Announcing ThinkPad University.”

**About ThinkPad University…**

*SUNY Morrisville students can now travel the world, search international databases, and gather global information without ever having to leave the college campus…thanks to the ThinkPad University program.*

*In partnership with IBM, SUNY Morrisville has become a ThinkPad University providing students with a laptop computer that will allow them access to technology anyplace, anytime.*

*Students in four of SUNY Morrisville’s 70 academic programs – Architectural Technology, Computer Information Systems, Travel & Tourism and Aquaculture – are currently participating in the pilot program.*

*Twelve more programs will join the initiative in the fall of 1999. These programs are Business Administration, Electrical Engineering Technology, Engineering Science, Mechanical Engineering Technology, Design and Drafting, Plastics Technology, Restaurant Management, Medical Laboratory Technology, Computer Science, Journalism, Accounting, and Agricultural Science.*

Joe thinks to himself “Oh, wow! This is great. I will be able to do my homework on the computer in my dorm room. I won’t have to compete for a space down in the

*Section 1: The Vignette*
Joe walks down to dinner his mind is filled with many different thoughts about the possibilities of the upcoming laptop program.

Computers in the classroom have become an educational staple. Teachers strive to come up with new concepts on how to best use this technology to better help students. Collaboration and communication are also common issues of concern before the diffusion of a laptop program into a campus community. What are the effects of a laptop program on educational use in the classroom?

This paper will look at the results of that changeover. It will focus on and will critically evaluate whether those promises and expectations have, in fact, occurred.
Section 2: Problem Statement

This phenomenological study analyzes the effects of a laptop program on educational interaction inside and outside of the classroom. The author interviewed and observed administrators, teachers, and students to study these effects firsthand.

This study of a laptop program in a campus setting analyzed its effects and influence on educational instruction and interaction. It focused on the concept of applying laptop and wireless technology in the classroom in an attempt to view the impact that it has had on the campus community.

Problem Questions

This study focused on a main research question while an analysis of sub-questions helped formulate a more thorough and specific response. The main research question was “What impact has a laptop program had on educational teaching in the classroom?”

The sub-questions were:

- What kind of impact has this new shift in technology had on student/teacher interaction?
- Did the laptop program improve the quality of the instruction?
- Did the laptop program improve student understanding of the material covered?
- What kind of impact has the laptop program had on teacher/student interactions?
- What kind of impact has the laptop program had on student/student interactions?
Section 2: Problem Statement

- Has there been an increase in the quantity of material instructors were able to teach?
- What have been the obstacles to a successful introduction of the laptop program?
- What were the technical obstacles faced during implementation?
- Were obstacles compensated for or overcome and if so, how?
Section 3: Phenomenological Approach

This study was conducted using a phenomenological approach, “a type of study that describes the meaning of experiences of a phenomenon for several individuals. In this type of study the researcher reduces the experiences to a central meaning or the “essence” of the experience” (Creswell 236).

The phenomenological approach was used here to understand the concepts that have created and supported the laptop program diffusion effort. This study utilized a qualitative approach to collecting data, allowing for a much more reflective approach to the phenomenon. This led to the development, creation, and identification of themes.

This study involved the concept of analyzing the impact of a laptop program on classroom educational activities. To better understand the ideals of the laptop program and classroom activities, the author interviewed experts in the field, teachers in a variety of curricula, and students in their classes. Several observations were done with students who utilized laptops in various social and classroom settings noting what software they were using.

Several themes emerged from the research including collaboration, communication, inclusiveness, and nomadic environments. All these themes were derived from interviews, observations, focus groups and a literature review. Overall, those involved indicated a positive feeling toward the laptop program on campus, which was reflected in several of the themes. Also, noted was concern about the consistency of the laptop program throughout the college.
Section 4: Themes

While researching this topic, many themes emerged. Some themes supported the notion that the laptop program had an immense impact on the campus community and instruction in the classroom. Still others indicated that the overall laptop program could be improved. The four themes that became the focus of this research follow.

Collaboration is defined as “the interaction among two or more individuals that can encompass a variety of actions, such as communication, information sharing, coordination, cooperation, problem solving, and negotiation” (Bitpipe Dictionary online). As regards the laptop program, interviews from Rodriguez, an Automotive Technology major, and Virrler, a Network Administration major, and observations of group work, collaboration, and student interaction showed that establishing relationships and teamwork played a crucial role in bringing people together. As Rodriguez stated, “group work has been really easy because you can expect everyone to have a laptop with the same software and programs like Instant Messenger so it’s a lot easier to work together.”

Another important aspect of collaboration is called contextual collaboration.

Contextual collaboration is a “new approach to collaborative software that involves embedding all the relevant applications, such as word processors, enterprise instant messaging (EIM), shared calendars, and groupware, into a unified user interface that uses presence technology to enhance collaboration” (Techtarget Online Dictionary). For this research, this means that from within any of the applications people could communicate and instantly share resources. The goal of contextual collaboration is “to make online collaboration as simple and intuitive as it is to work with people in the same
Communication is defined as “a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior” (Merriam-Webster Online). Communication in this study describes the many different methods that information can be exchanged between students and teachers. Some of the methods of communication used by individuals on campus included instant messaging programs, email and social web pages, such as MySpace and FaceBook.

Inclusiveness is defined as “comprehending stated limits or extremes” (Merriam-Webster Online). Inclusiveness in this study described how inviting the laptop program was to the campus community. The study also looked at the lack of inclusiveness in the laptop program. The concept of inclusiveness was also referred to in the theory Human-Centered Design by Mike Cooley. Human-Centered Design viewed inclusiveness as in the system should be inviting and tend to invite you to participate and make you feel part of a community of activities with which you are familiar and on friendly terms (Jacobson, p. 68).

Nomadic Environment is the idea of being mobile or capable of moving or being moved easily from place to place. This concept emerged from interviews and observations of individuals and groups of people being able to move when and where they wanted to without losing the ability to communicate. The concept was apparent when walking around campus or in the academic buildings. Frequently there were small groups of students in lounges, work areas and even in hallways communicating with others with their laptops.

Section 4: Themes
Section 5: The Design

Human Centered Design Theory

Mike Cooley discussed “Human-Centered Design” by asking, “What do we mean by design and how do you design information?” Design, he said, or the process of designing, is completely separate from the process of doing. The two are most often seen as hand-in-hand. An example of this would be that once a building is designed, it only requires workers to read plans to create said building.

Cooley explained that Human Centered Systems provided a powerful alternative for systems design and broader educational and societal development. He contended that Human Centered Systems strongly criticized the scientific method because it only accepted the predictable. Human Centered Systems rejected the notion of the “one best way” and “sameness” because these were the scientific method. Human Centered Systems used intuition, subjective judgment and tacit knowledge as a basis for its foundation which differed greatly from the scientific methodology. Great importance was placed on providing a motivation to reflect and enhance cultural, educational, and product diversity. Human Centered Systems emphasized “knowledge, wisdom, and action rather than data and information” (Jacobson, p. 65).

Presently, most technology is used to make people’s jobs easier. Directions are made simpler and easier to understand so that most everyone will be able to follow them. Human Centered Systems proposed the opposite. Systems should be designed and developed so that people’s needs dominate the process. This proposed system allowed for enhanced creativity of workers and promoted the use of conventional skills that the workers possessed.
Of course this type of system required that the workers possess certain skills in order to be successful. Cooley listed the important skills needed as the ability to: absorb new knowledge and transform it; draw conclusions about the unknown from the known; take initiatives; make decisions; work with a team; adopt a systematic approach; plan independently; and take on responsibility.

“Those involved in systems design will need to be competent in the design of adaptive tools that accord closely with the traditions and practices of the domain area” (Jacobson, p. 68). Systems will have to be designed to be integrated into a workplace environment. There are nine characteristics that must be included in design of the tools and systems. They include:

*Coherence*

The embedded meanings, if not immediately evident, at least must not be cloaked or obscure. A related concept here is transparency, which means rendering highly visible what is going on and what is possible (Jacobson, p. 68).

*Inclusiveness*

The system should be inviting and tend to invite you to participate and make you feel part of a community of activities with which you are familiar and on friendly terms (Jacobson, p. 68).

*Malleability*

A possibility to mold the situation to suit, to pick and mix and sculpt the environment to suit one’s own instrumental needs, aesthetic tastes, and craft traditions (Jacobson, p. 68).
**Engagement**

A sense that one is being invited to participate in the process and which creates a feeling of empathy (Jacobson, p. 68).

**Ownership**

A feeling that you have created and thereby own parts of the system. A sense of belonging and even companionship as traditional craftsmen may feel with a favorite machine tool (Jacobson, p. 68).

**Responsiveness**

A general sense that you can get the system to respond to your requirements and your individual needs and ways of doing things. A system makes visible its own rules and then encourages one to learn them and to change them at will (Jacobson, p. 68).

**Purpose**

The system is capable of responding to the purpose the user has in mind and then encouraging him or her to go beyond it (Jacobson, p. 70).

**Panoramic**

Most current systems tend to encourage the user to converge on narrower activities. Good embedded systems should also provide windows or apertures though which one can take a wider or more panoramic view. This encourages the acquisition of boundary knowledge and allows the user to act more effectively and completely by locating what he or she is doing in the understanding of a wider context (Jacobson, p. 70).

**Transcendence**

When operating the system, the user should be encouraged, enticed, and even provoked to transcend the immediate task requirements. The possibility of acquiring
boundary knowledge and a macro level vision of the process as a whole should be self-evident (Jacobson, p. 70).

**Literature Review**

The literature review was used to provide a better understanding of the topic and to survey what research had been conducted to this point. This allowed the researcher an opportunity to get a clear picture and to assess Morrisville State College’s laptop program and the potential it had to offer in the area of education.

**Journal Article Summaries**

Moshe Barak in “The Use of Computers in Technological Studies: Significant Learning or Superficial Activity?” This study investigated the impact of introducing computerized means, mainly simulation and the Internet, on teaching and learning electronics in Israeli high schools. Computers in electronics studies were, at the same time, part of the subject matter and a means for teaching and learning. Data was collected through interviews with pupils and teachers and by examining pupils' laboratory experiments and projects. Computerized, in this context, meant only a slight influence in teacher-controlled activities, such as class presentations and discussions. Teachers and pupils still preferred conventional lessons as the major framework for learning theoretical concepts. The use of technological means for tasks that were only partially controlled by the pupils, such as standard laboratory experiments, enriched methods of information gathering, analysis and presentation, but did not change the nature of pupil learning. The question was how to avoid turning 'playing' with computerized means into a pseudo symbol of serious learning and a cover-up for superficial activities. Barak felt using computers and communication technologies in learner-controlled tasks, mainly projects,
was likely to increase motivation, promote deeper learning, encourage cooperation and knowledge exchange between pupils, and foster a joint development of ideas.

This study adopted a “phenomenological” research approach. The aim was to collect as much information as possible on the ways teachers and pupils used computers and the Internet for teaching and learning. Data was collected by visiting each school three or four times during one year. During every visit, the researcher met with 6-10 pupils in each of the 10th, 11th and 12th grades in the electronics laboratory. The pupils were working on their current laboratory experiments or projects using conventional electronic laboratory instrumentation and computers. The pupils were interviewed in pairs for about 15 minutes each time. They were asked about their involvement in theoretical and practical electronics studies and how they used computers in the school and at home. The researchers examined the electronic circuits the pupils were working on, as well as their computer files, experiment reports and portfolios for their final projects. During the study, a total of 20 visits and 200 interviews with pupils were held. Each school visit was comprised of informal talks with the teachers, during and after the meetings with the pupils. The teachers responded to pupils’ positions and added their own viewpoints. Data collection and analysis was an iterative process, aimed to organize findings, break them down into meaningful units and synthesize them so that critical themes would emerge. This process continued as long as significant new facts or conclusions were found.

Patricia A. Edwards in the "Impact of Technology on the Content and Nature of Teaching and Learning," wrote about Excelsior College’s web-based graduate nursing program that focuses on clinical systems management and health care informatics.

Section 5: The Design
Excelsior’s system incorporated a variety of technology-based educational strategies: synchronous and asynchronous collaborative communication, project/activity-based learning, and web-based interaction and feedback. The pilot study was undertaken to examine the relationship between the use of technology and outcomes in two computer-mediated courses in the program. Questionnaires, interviews, standardized scales, and course assessments were selected or developed as needed, and existing demographic information and evaluations were accessed and compared. The analysis strategy was specific to the data, the sample size, and the types of questions posed. The tools developed for and used in the study can be applied across the curriculum to enhance evaluation of learning and program effectiveness.

Another article “Hand-held Computers in the Classroom and the Library: Teaching and Learning Resource Issues Resulting from Widespread Deployment at the University of Minnesota Duluth” by Linda Deneen and James Allert, discusses the University of Minnesota Duluth (UMD) requirement that all incoming freshmen in computer science and engineering disciplines purchase hand-held computers in the Fall of 2001. The authors described how the initiative was implemented and the effects it had on the structure of the teaching and learning environment at UMD. Special attention was paid to its impact on library concerns and the evolution of the relationship between hand-held computers and electronic reference material.

“The Use of Mobile-Wireless Technology for Education” by Hasan Altalib centered on the use of mobile wireless technology for education. The article looked at the use of mobile wireless technology in three higher educational institutes and how those institutions were using this technology to help enhance their students’ perspectives in the
real world. Altalib found that “computer technologies allowed students the ability to gain access to a tremendous wealth of learning opportunities, research materials, and resources that were not available to them in earlier times.” This article detailed the different types of scenarios that each style of educational institution used and their outcomes.

James Dvorak and Karen Buchannan in “Using Technology to Create and Enhance Collaborative Learning” highlighted Oklahoma Christian University which had implemented a computer program where every student and faculty member was equipped with a laptop and connected to a wireless network. The article looked at several different ways for students to communicate with instructors using this new technology. Blackboard and Microsoft NetMeeting were two pieces of software that instructors used to better collaborate with students.

Dvorak and Buchannan found several interesting facts which were discussed in their “Findings and Discussion” section. They found that 50% of the students agreed or strongly agreed that the technology used in their online course enhanced their ability to learn the material required. “Because the lectures were online and because the technology allowed them to communicate with each other so much easier, they found themselves engaged in the course material even on days the class was not meeting (Dvorak, 5).
Section 6: Data Collection & Data Analysis

Data Collection

For this study, initial data was gathered from documents, interviews, and observations regarding the use of laptops and other technological advancements in the classroom. From there, using individual research, a series of questions was developed (see Appendix C).

Morrisville State College was selected based upon its history of laptop use in some of its programs. Jean Boland, Vice President for Technology Services, has helped spearhead the development and overall implementation of Morrisville’s laptop program. Through Boland, several teachers and students were identified, and all were interviewed. Ultimately, the portrait of two students’ in the vignette was based on their experiences with the laptop program.

A data collection matrix illustrating the types of information gathered is presented in Figure 1. As shown here, most of the primary research involved student and faculty interviews.

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<th>Interviews</th>
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<td>Scholarly Journal Articles</td>
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</tbody>
</table>

Figure 1 - Data Collection Matrix
Data Analysis

After collecting the data through interviews, observations, and focus groups, I developed qualitative responses, which I then organized and reviewed. From these responses, I was able to categorize the data based on similarities. Then using these categories I was able to develop a series of themes based on the responses of the experts, administrators, teachers and students. Their responses helped clarify the direction of this project.

A History

Morrisville State College’s current computing environment status includes maintaining computer support services for around 3,000 students and 500 faculty and staff. With the help of corporations such as IBM, Microsoft and RayLink, the college has become noted for its cutting edge technology in New York State, according to Boland. Morrisville State College was one of the first schools in the nation to go wireless throughout an entire campus. IBM manufactures around one thousand laptops per year for the college while Microsoft supplies Windows XP as the operating system. RayLink provides the wireless access points which are dispersed throughout campus.

According to Don Smith, Network Engineer, at Morrisville State College’s Technology Services Department, the computer department supports between 30-35 servers that handle all computing functions on campus. Network equipment includes routers as well as numerous switches and approximately 285 wireless access points. These wireless access points use the original 802.11 standard, which uses Frequency Hopping Spread Spectrum that can covering up to a 500 foot radius. It can travel
throughout buildings more easily than other wireless standards. The transfer rate for the wireless network is currently at 2 mb/s.

Technology Services Department has about 14 members and is overseen by one of the vice president’s of the college. There are two help desk coordinators, a network engineer, three server administrators as well as one technical specialist who keep the core of the department up and functioning.

*ThinkPad Program Implementation*

According to Boland, Morrisville State College’s ThinkPad program was conceived in the summer of 1998 with 13 proposed curriculums. The committee selected four curriculums for the initial pilot program which was started in the fall of 1999. They were: Architectural Technology, Travel and Tourism, Computer and Information Systems, and Aquaculture and Aquatic Sciences. The pilot program involved 12 faculty, 106 students, and 20 courses, Boland said.

Boland said that before a curriculum could be accepted into the colleges ThinkPad program each faculty member in the program had to answer several questions derived from committee meetings:

- What is the curriculum and which faculty are to be involved?
- How will laptops be utilized in the program?
- How many laptops are needed for incoming freshman?
- How many laptops are needed for faculty?
- What additional laptop facilities (such as laptop classrooms or labs) will be needed?
- How will laptop use be integrated into the curriculum?
- What is the computer expertise of the faculty?
- What computer skills are required of students?
- How will this affect admissions, retention and outcomes for students?
- How will this help fulfill the mission/vision of the college?
There had to be a general consensus that moving to a laptop environment was in the best interest of the students with each faculty member signing off on the program.

According to Boland, the next step of the implementation process was the formation of stakeholders on campus. The list of stakeholders included:

- Vice president, academics
- Vice president, finance
- Assistant vice president, technology
- General manager, auxiliary corp.
- Director, financial aid
- Director, admissions
- Registrar
- Director, public relations
- Faculty member from each school
- Two academic deans
- Representative from facilities
- Campus network engineer
- Help desk coordinator

Each major that is under consideration for induction into Morrisville’s Laptop Program is subjected to the committee’s requirements. The initial laptop committee had between 13 to 20 members serving and met several times during the laptop implementation process. This committee was formed to determine which programs would first to participate in the laptop program. Since then, this task has been up to the faculty in a department where a program is under consideration for entering the laptop program. The programs in Table 1 are those that have completed this implementation requirement.

Boland stated that two-thirds of the curriculums are currently required laptop programs.

According to Mr. Smith, the next phase of the implementation was the development of new support systems. This included the development of the network infrastructure, which would be able to support wireless devices and supply necessary

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Section 6: Data Collection and Analysis
bandwidth to support students. Laptop facilities were also created including classrooms and labs as shown in the figures below.

![Figure 2 - Laptop classrooms](image1)

According to Ginger MacRae, the helpdesk coordinator, laptop helpdesk and onsite repair procedures, as well as distribution and tracking procedures were written. In the fall 1998 semester there were two laptop classrooms and two labs available for use. By the time that the program progressed to the fall semester of 2003, there were 21 classrooms and 6 labs. By this time a data port and power outlet were available for every seat in the classroom or lab. An example can be seen on the left in Figure 3. Teaching stations were also developed by faculty for faculty. They included data, power, a built in projection unit and monitor. An example can be seen in Figure 3.

![Figure 3 - Data and Power Ports](image2)

![Figure 4 - Teaching Console](image3)

*Section 6: Data Collection and Analysis*
**Legend:**

- **A.A.** - Associate in Arts
- **A.A.S.** - Associate in Applied Science
- **A.S.** - Associate in Science
- **A.O.S.** - Associate in Occupational Studies
- **B.T.** - Bachelor of Technology
- **B.B.A.** - Bachelor in Business Administration

<table>
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<tr>
<td>Application Software Development</td>
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<td>Design and Drafting Technology</td>
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<td>Equine Racing Management</td>
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<tr>
<td>Equine Science and Management</td>
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<td>Gaming and Casino Management</td>
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<tr>
<td>Travel and Tourism: Hospitality Management</td>
<td>A.A.S.</td>
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<td>Web Development</td>
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<tr>
<td>Wood Products Technology</td>
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*Table 1 - ThinkPad® University programs at Morrisville State College*
<table>
<thead>
<tr>
<th>Program</th>
<th>Degree</th>
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<tbody>
<tr>
<td>Automotive Technology (Ford ASSET Option)</td>
<td>A.A.S.</td>
</tr>
<tr>
<td>Casino Careers Professional Development</td>
<td>Certificate</td>
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<td>Early Childhood</td>
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<td>Health-Related Studies</td>
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<td>Horticulture</td>
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<tr>
<td>Landscape Architectural Studies</td>
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<tr>
<td>Liberal Arts and Sciences - Humanities and Social Science</td>
<td>A.A.</td>
</tr>
<tr>
<td>Liberal Arts and Sciences - Mathematics and Science</td>
<td>A.S.</td>
</tr>
<tr>
<td>Massage Therapy</td>
<td>A.A.S.</td>
</tr>
<tr>
<td>Natural Resources Conservation</td>
<td>A.A.S.</td>
</tr>
<tr>
<td>Nursing</td>
<td>A.A.S.</td>
</tr>
<tr>
<td>Renewable Resources</td>
<td>B.T.</td>
</tr>
<tr>
<td>Sports Nutrition and Fitness Management</td>
<td>A.S.</td>
</tr>
<tr>
<td>Teacher Education (Transfer)</td>
<td>A.A., A.S.</td>
</tr>
<tr>
<td>Word Processing</td>
<td>Certificate</td>
</tr>
</tbody>
</table>

Table 2 – Non laptop required programs at Morrisville State College
Wireless Network

According to Smith, Morrisville State College’s wireless network consists of gigabit fiber optic backbone which connects the student dorms and academic buildings back to the main technical center. This backbone allowed Morrisville State College to implement the wireless infrastructure needed to support student mobility on campus. By using a technology called frequency-hopping spread spectrum, the wireless transmissions tend to be more resistant to interference. The range of the wireless is also significant with up to 500 feet of in-building range and up to 1,000 feet of outdoor radius. Frequency hopping spread spectrum allows the students to receive a 2 Mbps transfer rate.

Laptop Specifications

Ms. MacRae stated that the current laptop specifications for this academic year, 2005-06, include an IBM T43 laptop computer. Figure 5 shows the specifications. The current model computer came with a price of $625.00 per semester for four semesters. After the 4th payment, the student owns the laptop. Students are allowed to take the laptops home on breaks and during the summer. Government financial aid is available for those who qualify. The standard software configuration includes the following:

- Microsoft Windows XP Professional
- Microsoft Office 2003 Professional
- AOL Instant Messenger
- Adobe Reader
- IBM RecordNow (CD Recording Software)
- Symantec Anti-Virus Corporate Edition

More information regarding the other laptops that Morrisville State College has used throughout the years follows:
<table>
<thead>
<tr>
<th>IBM T43 Specs</th>
<th>2005 - 2006</th>
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<tbody>
<tr>
<td>&gt;&gt; 1.7 GHz Pentium M Processor (2.7 - 2.8GHz P4 equivalent)</td>
<td>&gt;&gt; Lithium Ion Battery (lasting up to 4.9 hours)</td>
</tr>
<tr>
<td>&gt;&gt; 512 MB of DDR Memory</td>
<td>&gt;&gt; 2 USB Ports (v 2.0)</td>
</tr>
<tr>
<td>&gt;&gt; 60 GB Hard Drive</td>
<td>&gt;&gt; 14.1&quot; TFT XGA Display</td>
</tr>
<tr>
<td>&gt;&gt; 56 K Modem</td>
<td>&gt;&gt; CDRW\DVD Combo Drive</td>
</tr>
<tr>
<td>&gt;&gt; 64 MB (GDDR) ATI® Mobility Radeon X300</td>
<td>&gt;&gt; 4.9 LBS total weight</td>
</tr>
<tr>
<td>&gt;&gt; $625.00 for 4 semesters</td>
<td></td>
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<table>
<thead>
<tr>
<th>IBM T41 Specs</th>
<th>2004 - 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt; 1.5 GHz Pentium M Processor (2.2 GHz equivalent)</td>
<td>&gt;&gt; Lithium Ion Battery (lasting up to 4.9 hours)</td>
</tr>
<tr>
<td>&gt;&gt; 512 MB of Memory</td>
<td>&gt;&gt; 2 USB Ports (v 2.0)</td>
</tr>
<tr>
<td>&gt;&gt; 40 GB Hard Drive</td>
<td>&gt;&gt; 14.1&quot; TFT XGA Display</td>
</tr>
<tr>
<td>&gt;&gt; 56 K Modem</td>
<td>&gt;&gt; CDRW\DVD Combo Drive</td>
</tr>
<tr>
<td>&gt;&gt; 32 MB ATI Mobility Radeon 7500</td>
<td>&gt;&gt; 4.9 LBS total weight</td>
</tr>
<tr>
<td>&gt;&gt; $625.00 for 4 semesters</td>
<td></td>
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<table>
<thead>
<tr>
<th>IBM T40 Specs</th>
<th>2003 - 2004</th>
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</thead>
<tbody>
<tr>
<td>&gt;&gt; 1.3 GHz Pentium-M Centrino Processor (2.0 GHz equivalent)</td>
<td>&gt;&gt; Lithium Ion Battery (lasting up to 4.9 hours)</td>
</tr>
<tr>
<td>&gt;&gt; 512 MB of Memory</td>
<td>&gt;&gt; 2 USB Ports (v 2.0)</td>
</tr>
<tr>
<td>&gt;&gt; 40 GB Hard Drive</td>
<td>&gt;&gt; 14.1&quot; TFT XGA Display</td>
</tr>
<tr>
<td>&gt;&gt; 56 K Modem</td>
<td>&gt;&gt; CDRW\DVD Combo Drive</td>
</tr>
<tr>
<td>&gt;&gt; 32 MB ATI Mobility Radeon 7500</td>
<td>&gt;&gt; 4.9 LBS total weight</td>
</tr>
<tr>
<td>&gt;&gt; $625.00 for 4 semesters</td>
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<table>
<thead>
<tr>
<th>IBM T30 Specs</th>
<th>2002 - 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;&gt; 1.6 GHz Pentium 4 Processor</td>
<td>&gt;&gt; S-Video Outputs</td>
</tr>
<tr>
<td>&gt;&gt; 256 MB of DDR Memory</td>
<td>&gt;&gt; 16 MB ATI Radeon Video Card</td>
</tr>
<tr>
<td>&gt;&gt; 20 GB Hard Drive</td>
<td>&gt;&gt; 14.1&quot; TFT LCD Display</td>
</tr>
<tr>
<td>&gt;&gt; 56 K Modem</td>
<td>&gt;&gt; CD-RW</td>
</tr>
<tr>
<td>&gt;&gt; 2 USB Ports (v 1.0)</td>
<td>&gt;&gt; $625.00 for 4 semesters</td>
</tr>
<tr>
<td>IBM A22 Specs</td>
<td>2001 - 2002</td>
</tr>
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<tr>
<td>&gt;&gt; 800 MHz Pentium III Processor</td>
<td>&gt;&gt; 3 1/4&quot; Floppy Drive</td>
</tr>
<tr>
<td>&gt;&gt; 192 MB of Memory</td>
<td>&gt;&gt; 4 MB ATi Radeon Video Card</td>
</tr>
<tr>
<td>&gt;&gt; 20 GB Hard Drive</td>
<td>&gt;&gt; 12.1&quot; TFT LCD Display</td>
</tr>
<tr>
<td>&gt;&gt; 56 K Modem</td>
<td>&gt;&gt; 24X CD-ROM</td>
</tr>
<tr>
<td>&gt;&gt; 1 USB Port (v 1.0)</td>
<td>&gt;&gt; $625.00 for 4 semesters</td>
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<td>&gt;&gt; 550 MHz Celeron Processor</td>
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<tr>
<td>&gt;&gt; 128 MB of Memory</td>
<td>&gt;&gt; 4 MB ATi Radeon Video Card</td>
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<td>&gt;&gt; 6 GB Hard Drive</td>
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<td>&gt;&gt; 56 K Modem</td>
<td>&gt;&gt; 24X CD-ROM</td>
</tr>
<tr>
<td>&gt;&gt; 1 USB Port (v 1.0)</td>
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<th>1999 - 2000</th>
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<td>&gt;&gt; 300 MHz Celeron Processor</td>
<td>&gt;&gt; 3 1/4&quot; Floppy Drive</td>
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<tr>
<td>&gt;&gt; 128 MB of Memory</td>
<td>&gt;&gt; 2.5 MB NeoMagic Video Card</td>
</tr>
<tr>
<td>&gt;&gt; 3.2 GB Hard Drive</td>
<td>&gt;&gt; 12.1&quot; TFT LCD Display</td>
</tr>
<tr>
<td>&gt;&gt; 56 K Modem</td>
<td>&gt;&gt; 24X CD-ROM</td>
</tr>
<tr>
<td>&gt;&gt; 1 USB Port (v 1.0)</td>
<td>&gt;&gt; $545.00 for 4 semesters</td>
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<th>IBM 380XD Specs</th>
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<tr>
<td>&gt;&gt; 64 MB of Memory</td>
<td>&gt;&gt; 2.5 MB NeoMagic Video Card</td>
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<tr>
<td>&gt;&gt; 3.2 GB Hard Drive</td>
<td>&gt;&gt; 12.1&quot; TFT LCD Display</td>
</tr>
<tr>
<td>&gt;&gt; 56 K Modem</td>
<td>&gt;&gt; 24X CD-ROM</td>
</tr>
<tr>
<td>&gt;&gt; 1 USB Port (v 1.0)</td>
<td>&gt;&gt; $495.00 for 4 semesters</td>
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</table>

Figure 5 - Timeline of laptop specifications at Morrisville

Section 6: Data Collection and Analysis
Section 7: Findings

At Morrisville State College students who were interviewed indicated a high level of satisfaction with the laptop program. “From the beginning of the computer age, educational researchers and practitioners have told us that for technology use to be successful in our schools it needed to be closely tied to school reform. Technology without reform is likely to have little value: widespread reform without technology is probably impossible” (Valdez, 2). Administrators, teachers and students all had positive comments regarding the program and its implementation on campus and in the classroom. There were also issues that faculty and students portrayed as “needing improvement,” or “it could be better.” There were several key issues that students and faculty brought up when discussing the impact of the laptop program on their daily lives. These issues included: communication and mobility, reliability of the technology, classroom interaction, and uniformity.

Communication and Mobility

This study concurred with Records that today’s students expected to work when and where they wanted to do so without any constraints. “It is an environment in which they can customize the desktop of their laptops, can listen to mp3 music, can play video games, and can instant message at will, with or without being connected by a wire” (Records, 269). With the current application of technology to learning, students took greater responsibility for their own learning. A professor, Ms. Cring, stated that learners were able to access information from many more resources than from just one instructor or textbook. Students collaborated with other students on projects or for problem solving. Faculty and professors took on the role of counselor, guide, and coach. “They focused
more of their time on planning for more individualized instruction, facilitating learning and developing curriculum geared towards encouraging higher order thinking skills, and less time presenting content (Altalib, 10).” As Barber, a student stated, “it has become part of my school work and part of my life as far as how I live on campus and how I do my work.”

**Reliability**

Students voiced that overall the reliability of the technology was good. They stated that it was helpful that there was a helpdesk and the technology center in case something, either software or hardware, malfunctioned. “I don’t have to worry if something breaks on the laptop, because I know it’s under warranty,” Virkler declared. It was discussed that it would be easier on students if the tech center and the helpdesk were combined because of the hassle of having to go back and forth from one to the other.

**Classroom Interaction**

Students showed interest in classroom interaction between teacher/student and student/student. Another student, Turner stated that, “since you have your laptop, you can always present it to the teacher and work with them one on one. They can show you exactly what you’re doing wrong or what you should improve on. It allows you to make those recommended changes right there.” Students stated that their primary source of communication with professors, outside of talking to them in class, was email. Several students including Barber voiced that “it is really easy if you have a question just to send them an email. They are usually pretty good about replying. It helps because there is fast feedback to your problem.” Students also expressed positive opinions about their interaction with each other using the laptops. Students discussed characteristics such as
coherence, an overall sense of consistency and understandability, when identifying that the laptop program has brought people together. Students stated that when there was a lot of group work or team meetings then everyone brought their laptops and worked together. “This array of technology provides a continuous synchronous and asynchronous environment that meets and in many cases exceeds these expectations” (Records, 269).

Students stated that collaboration was much easier on projects and Turner said that “instead of one person typing everything, everybody worked together or worked on a piece of the project. Everything can be tied together really easily through email.”

Students also mentioned the social aspect of interaction with the laptop program. They stated that because everyone had a computer that ran the same software then everyone had an equal opportunity to communicate better. Virkler noted that “whether it is through email, or social networking sites like MySpace or FaceBook, it was a lot easier to get in touch with people.”

When asked about the quality of instruction in the classroom, students stated that they could not imagine what it would be like without the laptop program. Barber stated “teachers would get up and show a PowerPoint and you either handwrote your notes or didn’t take notes at all. Having the laptop there lets teachers make sure students are following along with things.” Colman, another student said, “I take my notes on my laptop instead of writing. It is just easier and my note taking is a lot better and more organized. I can also make changes to it easily.” One faculty member, Professor Cring, gave a scenario saying that “the accounting curriculum for this level of student is not changing. Accounting 1 and 2 is Accounting 1 and 2 for the rest of my life. The faculty member was the person, in that type of class, who had the information and they were
going to reiterate it to the students. The faculty members still have the information but it’s a new world because they are looking at new software and new ways of trying to teach so the faculty members are interacting more with students than they would without the technology. Even lecture classes have become more like the technology in that they have become more collaborative and interactive.” Professors were observed requiring students to bring laptops to class so the students could work on group projects together.

**Uniformity**

Several of the faculty on campus came up with many similar insights on the laptop program when interviewed. Some of their key concerns were uniformity of hardware and software, classroom discipline, faculty policies, file collection, and inclusiveness.

Faculty interviewed on campus expressed gratitude that there was uniformity of hardware and software on the laptops. Professor Stevens noted that “if it works on my laptop then it will work on the students’. I know that the students all have *Microsoft Windows XP* with *Microsoft Office* so it is easy to assign projects and not have to worry about compatibility issues.”

One negative outcome that a few of the faculty and students mentioned was the lack of inclusiveness of the laptop program throughout the campus community. Another faculty member, Professor Stevens, mentioned that “I know why we went through the whole implementation process and selected our four pilot programs as a test, but now I think we are at the point that we need to consider making every major a laptop required program.” The debate to decide whether or not to make laptops a mandatory part of an institution is not an easy one and is being questioned at many institutions. “The
pedagogical value of mandatory laptops is still being debated here, as it is on many other campuses. After observing the first freshman class using laptops, administrators and faculty members say they think that students had a better educational experience because of the requirement. The students, however, were asked only infrequently to use their laptops during class, because it takes commitment and time for faculty members to create electronic course content” (Olsen, 2).

There was also a feeling that some of the students from non laptop programs were being excluded from laptop activities in the classroom when they took a class with students in laptop programs. Professor Stevens gave a scenario that in the classes where there were both laptop and non laptop students there was a feeling of separation. Several faculty members recommended that the campus begin to make a change to require all students to have a laptop so to help improve upon the inclusiveness of the program.

Feelings were mixed, however, from faculty in non-laptop programs. Faculty of non-laptop programs interviewed stated that “after taking into consideration our curriculum and the cost of the laptop we can not see requiring students to purchase a laptop. Many of our classes are held outside and sometimes in bad weather, making it unsuitable for laptops.” Faculty did note that giving students the option to opt-in to the laptop program was beneficial.

Classroom Dynamics

Classroom discipline and policies was another concern that faculty had to initially address during the laptop diffusion in the classroom. Both faculty and students expressed an initial concern similar to Records’ when he stated “when 30 students are sitting in a classroom, each with his or her own laptop configured to their choices, each with active
instant messaging, each with video, sound, games, and internet at their fingertips, the laptop becomes paramount to a personalized cyberspace dorm room that students carry with them, much like a turtle carries his shell. The temptation is for students to lapse into this cyberspace comfort zone and invest little or no attention on what is taking place in the classroom (Records, 273). Colman stated that he has had instances where students were not paying attention. “In some classes you can have Internet access and in other classes you can not. It depended on the professor. In many cases, he said the lower classes such as the 100 level classes, tend to be more restrictive. You have freshman come in and they are not used to the regimen of taking notes and being in class.”

Professor Stevens stated that there was no formal procedure for determining what the best solution was for the use of laptops in class. “It is really left up to the faculty to decide how best to use the laptops in class.” Professor Stevens said that “for me personally, I always let them use it if it is for notes; otherwise, it depends on what we’re doing for the lecture for that day.” It really depended on the faculty member and their view of the students. Some felt that if the students wanted to waste their time in class by talking on Instant Messenger then that is their own problem. Others felt that if students were caught using something like that instead of paying attention to the lecture then there should be a warning policy. Some students, Colman and Rodriguez, stated that after the second or third offense perhaps not allowing the student to use their laptop in class would be acceptable. Faculty did note that “it would be very difficult to come up with a general campus policy that covered all majors because of the great variety in the classroom.”

Many of the faculty on campus expressed similar concerns to Records’ including, Professor Stevens and Cring, who said “technology is highly useful when it works, but
contingency plans for the use of time in any given class must be in place for when it does not” (Records, 272). Professor Cring said “it really throws a wrench in class when we are working on a project and the network goes down.” When asked further what she meant, she stated that it was the shared network resources that would sometimes go down. These shared network resources were setup so that students and faculty can access them to share or post files as they wish.
Section 8: Conclusions

This study found that the program has improved communication between faculty and students and access to information resources. As Barber, a student stated, “whether the laptop program is required or not, many people want to be a part of it. It is amazing how much that affects the learning environment and having it I think has proved extraordinarily useable and I find it a lot better to have a laptop with me.” This was not to say that the laptops will replace the interaction of learning. Teachers and students said they still preferred conventional face-to-face lessons as the primary means of learning.

Altalib (2002) reached similar conclusions:

“The technology revolution in education will continue to be about access to information but also about ways of sharing information. Instructional technology in the next decade will support both synchronous and asynchronous interaction between the learner and the sources of knowledge and information. Incorporating digital text, audio, graphics, animation, and full-motion video into lecture, laboratory, self-study, and interpersonal and inter-group communication activities will be the norm. Real-time, simultaneous two way video, multimedia presentation, personal support systems, and education on demand will be delivered to students where they live, work, or study. Communications and connectivity will increase between the student and teacher, other students, the office, the dorm room, the classroom, the library, the campus, and the world” (Altalib, 20).

When considering the investments in planning, technology, training, implementation and support, the laptop program at Morrisville State College has turned out to be largely a success when using student and faculty satisfaction and opportunity for modification as metrics.

This study has found that the program had limitations. Students complained of the additional costs they incurred as well as the laptops being a distraction in a classroom setting. Teachers said that the program’s inclusiveness needed to be addressed. They felt
that moving all the school’s curriculums over to a laptop program might help address this issue although this might lead to other concerns. Teachers also felt that the general lack of a classroom policy guideline regarding laptop use was another issue that needed to be addressed. Teachers felt that this guideline should include proper classroom usage of laptops so they wouldn’t become a distraction.

Both students and faculty agreed that “when students and faculty have continuous, fast, portable access to information, they are able to work and study in a pre-class, class, and post class continuum that has the potential to make education more effective” (Records, 274).
Section 9: Closing Vignette

As the new semester begins, Joe finds himself with a new IBM ThinkPad laptop. Joe thinks to himself, “I wonder what kind of changes will take place this new semester?” As he wakes up to the dull thud of his suitemate’s stereo. “Oh, I am never going to get any work done with that thing playing all morning. It is nice outside. Maybe I will go down to the picnic table outside and do my work there?”

Joe walks downstairs and out of his dorm room. He finds a nice spot in the sun and sits down on the bench and starts working on his project. Joe is amazed that he can access so many different resources. He thinks to himself, “This is really something! I am outside enjoying the weather and I can still access my email, the Internet and the library resources that I need to work on my project.”

As classes get underway, Joe finds that he is taking notes on his laptop instead of writing by hand during the lecture.

He ponders to himself, “This is just easier and my note taking is a lot better and more organized.”

Joe begins to pay attention as his new professor gets ready to hand out the main project for his business class. The project involves working as a group and choosing a company that the students find interesting and then outlining the company’s strategies, doing several analyses of the company, and recommending new strategies based on the analyses. The group will also present their findings in front of the class using Microsoft PowerPoint.

When Joe and his new teammates talk after class it becomes apparent to Joe that there is no need to rush down to the computer lab anymore. All the teammates in his
group have laptop computers. Joe thinks to himself, “This is great because we can all communicate through email and Instant Messenger.” Joe suggests to the group they should all trade emails and screen names.

As the group identifies sections of the project to work on, they all decide to meet online in two days to see how everyone is doing. Joe seems a little skeptical of the idea but then thinks to himself, “Well, it would be nice not to have to run to the classroom to meet everybody. We could talk about how we’re doing on our sections and then I could go and do something else.”

Joe thinks to himself, as he walks out of class, “This new program is really going to change the way I do my homework. It is amazing how much the laptop program affects my learning environment. I find it a lot better to have my laptop with me.”
Section 10: Appendices

Appendix A: Glossary

Access point – The hub of a wireless network. Wireless clients connect to the access point, and traffic between two clients must travel through the access point. Access points are often abbreviated to AP in industry literature, and you may also see them referred to as "wireless routers," "wireless gateways," and "base stations." We prefer to use "access point" when discussing true access points that don't also share Internet connections or bridge between wired and wireless networks. Morrisville State College currently uses Raylink access points throughout campus.

Collaboration – The ability to work together in a seamless intellectual effort.

Laptop University – A partnership through IBM where every freshman enrolled in a ThinkPad University curriculum will receive an IBM laptop and a Raylink wireless card.

LAN – Local Area Network, The computers at your site, connected via Ethernet or Wi-Fi. Local area network is often abbreviated to LAN. Compare local area networks with wide area networks.

Network – A collection of interconnected computers and associated devices. Networks can be characterized by the protocols they use (TCP/IP, for example) or by the geographic area they cover (LAN and WAN).

Frequency hopping spread spectrum – One of two approaches (with direct sequence spread spectrum) for sorting out overlapping data signals transmitted via radio waves. Frequency hopping spread spectrum is commonly abbreviated to FHSS or FH. Bluetooth uses frequency hopping spread spectrum.

Nomadic environment – Describes the ability to learn at the best location for the user
Human-Centered Design Terms – 9 characteristics provided by Mike Cooley (2002)

Coherence – The embedded meanings, if not immediately evident, at least must not be cloaked or obscure.

Inclusiveness – The system should be inviting and tend to invite you in and make you feel part of a community of activities with which you are familiar and on friendly terms.

Malleability – A possibility to mold the situation to suit, to pick and mix and sculpt the environment to suit one’s own instrumental needs, aesthetic tastes, and craft traditions.

Engagement - A sense that one is being invited to participate in the process and which creates a feeling of empathy.

Ownership - A feeling that you have created own parts of the system; a sense of belonging to the system.

Responsiveness - A general sense that you can get the system to respond to your requirements, needs and ways of doing things.

Purpose - The system is capable of responding to the purpose the user has in mind and then encouraging him or her to go beyond it.

Panoramic - Good embedded systems should also provide windows or apertures though which one can take a wider or more panoramic view.

Transcendence - When operating the system, the user should be encouraged, enticed, and even provoked to expand their boundary of knowledge.
Appendix B: Consent Form

Phenomenological Study: What Kind of Impact has Laptop Programs had on Educational Teaching and Learning in the Classroom?

Patrick Cronn

This authorization is being requested in part to fulfill requirements of the State University of NY Institute of Technology's Human Subjects Research Review Board as well as state and federal regulations regarding the use of human subjects in research. The project involves a phenomenological study that may be used in my master's research at the SUNYIT Information Design and Technology Master's program. Excerpts or rewritten versions may also be submitted to professional journals for publication. The phenomenological study involves an investigation on the impact of introducing a laptop program on a higher education campus. In particular I plan to examine its impact on teaching and learning in the classroom and would like to know how things any different now after the implementation. I plan to study four majors that were pilot programs for the campus and investigate the effectiveness of the laptop program on the administration, professors, and students. The work involves participant and non-participant observations, one-on-one and group interviews, and scheduled visits.

I can be reached at 315.264.1319, which is my cell phone number. I would be happy to answer any questions about the project.

I would like to reassure you that as a participant in this project you have several, rights.

- Your participation in these studies is entirely voluntary.
- You are free to decline to answer any question at any time,
- You are free to withdraw from the study at any time.

My notes from meetings, interviews, and observations will be kept strictly confidential. Excerpts from these notes may be made part of the final thesis.

Copies of the final publications will be supplied whenever possible and as requested.

I would be grateful if you would sign this form to show that you have read its contents.

_________________________  __________________________  __________________________
Signed  Printed  Dated

_________________________  Number of Experiment
Appendix C: Interview Form

Project: What kind of Impact has Laptop Programs had on Educational Teaching and Learning in the Classroom?

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Time of Interview:
Date:
Place:
Interviewer:
Interviewee:
Position of Interviewee:

You will be asked to answer the following questions based on your observations of the laptop program and its impact on teaching. Please be as descriptive as possible when answering the questions but also keep in mind that you are free to decline to answer any question at any time, and you are free to withdraw from the study at any time. Thank you for your participation.

Questions:

1. What kind of impact has the laptop program had on educational teaching in the classroom?

2. What kind of impact has the laptop program had on teacher/student?

3. What kind of impact has the laptop program had on student/student interaction?

4. Does the laptop program change the quality of the instruction?
5. **Please evaluate the laptop program with regards to the following nine characteristics.**

*Coherence* – Does the laptop program bring people together?

*Inclusiveness* – How inclusive is the laptop program? Is it inviting or make you feel part of a community?

*Malleability* – Is the laptop program malleable? Can the program be sculpted to suit ones own instrumental needs?

*Engagement* - A sense that one is being invited to participate in the laptop program?

*Ownership* - A feeling that you have created and thereby own parts of the laptop program.

*Responsiveness* - A sense that you can get the laptop program to respond to your requirements and your individual needs and ways of doing things.

*Purpose* - Is the laptop program capable of responding to the purpose the user has in mind and then encouraging him or her to go beyond it?

*Panoramic* – Do you believe that the laptop program is an embedded system?

*Transcendence* – Is the user encouraged or enticed when operating or participating in the laptop program?
6. What were the technical obstacles needed to overcome an implementation?

7. What do you think was successful or unsuccessful about the laptop program?

I would like to reassure you that my notes from meetings, interviews, and observations will be kept strictly confidential. Thank you very much for your participation. Your help is greatly appreciated.
Appendix D: Observation Form

Project: What kind of Impact has Laptop Programs had on Educational Teaching and Learning in the Classroom?

Time of Observation:
Observation #:
Date:
Place:
Curriculum:
Observer:
Number of Students:

Questions:

1. Describe Learning Activity Observed. Include subject area(s)/theme, purpose, student learning outcomes or instructional goals:

2. Describe the resources used. Include computers, video, audio/voice, black/white boards, overhead, reference/other books, software, maps/globes, wall displays, pictures posters.

3. Observation Notes:

4. Reflective Notes:
Section 11: References


